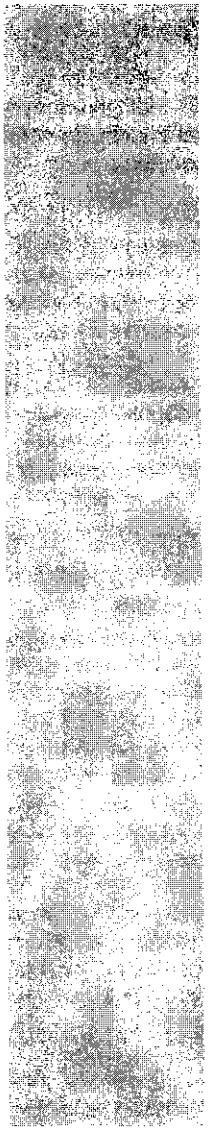
Measuring Student Achievement and Diversity in Learning

Papers of the Treasure Mountain Research Retreat #10
At the Elms, Excelsior Springs, Missouri

May 31 - June 1, 2002

Edited by
Daniel Callison

Hi Willow Research & Publishing



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- Ken Haycock

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Chapter 1

Treasure Mountain Research Retreat #10: An Introduction

Treasure Mountain 10 was a research conference that provided the opportunity for researchers in education, library and information science, communication, and ethnic and gender studies to consider research themes related to information literacy, student achievement and assessment, and information skills instruction.

David V. Loertscher, Blanche Woolls, and Phillip Turner created the first Treasure Mountain retreat in 1989. The first gathering of school library media researchers was held near Treasure Mountain in Park City, Utah.

Plans for Treasure Mountain 10 began in 1999. Danny Callison and Nancy Thomas envisioned a new format, which would team research, mentors with emerging scholars. Funding was gained from several corporate and university sponsors. The Institute for Museum and Library Studies matched those funds and provided additional dollars to support scholarships.

Following 18 months of recruiting mentors and scholars, Treasure Mountain 10 became a reality in the spring of 2002. Dr. Thomas had selected the perfect location for the event, a Victorian resort, The Elms, located near Kansas City. Dr. Callison and his associates at Indiana University, coordinated the logistics for nearly 100 individuals who participated. Over half of those who came to The Elms for TM10 came to attend their first Treasure Mountain research retreat.

Judy Pitts

Judy Pitts was a participant at the first Treasure Mountain retreat in 1989. She because a key leader at the second retreat at Atlanta as well as the third at Annapolis. Judy went on to earn her Ph.D. in library and information studies at Florida State University. Her dissertation was "Personal Understandings and Mental Models of Information: A Qualitative Study of Factors Associated with the Seeking and Use of Information by Adolescents". This study received the 1993-94 AASL/Highsmith Research Award.

In 1994, Dr. Pitts joined the graduate faculty at Emporia State University. She was the co-author of *Brainstorms and Blueprints: Teaching Library Research* with Barbara Stripling, former president of AASL. Stripling and Pitts were co-editors for the peer-reviewed journal *School Library Media Quarterly.*

Pitts' bright academic future was cut tragically short when, in the fall of 1994, she was diagnosed with a brain tumor. She died in the spring of 1995. Scholarships awarded for Treasure Mountain 10 are dedicated to her memory.

The Emerging Library Media Scholars

Twelve current doctoral students were selected as Judy Pitts Scholars. These students were selected because of their outstanding academic record and interest in information literacy education for young people. These scholars represent likely future teachers and researchers in higher education.

The 2002 Pitts Scholars:

Joan Celeste Bessman, Champaign, IL
Lourdes S. Cervantes, Kyle, TX
Jinsoo Chung, College Park, MD
Stephen Del Vecchio, Seattle, WA
April M. Hatcher, Riverhead, NY
Cory Little, Payson, UT
Mary Frances Long, Plano, TX
Janet E. Martin, Augusta, GA
Claudette S. McLinn, Simi Valley, CA
Marcia A. Mardis, Ann Arbor, MI
Sharon McQueen, Milwaukee, WI
Lorine P. Sweeney, Vermillion, AB Canada

Ten awards were given to individuals who demonstrated promise of seeking admission to a doctoral program within two years following Treasure Mountain Ten. These individuals were given scholarships to attend the retreat and carry the title Treasure Mountain Scholars. They, along with the Judy Pitts Scholars, became known as The Emerging Library Media Scholars or "The ELMS".

The 2002 Treasure Mountain Scholars:

Candace Wexler Aiani, Taiwan
Judah Hamer, Teaneck, NJ
Joquetta Lynn Johnson, Baltimore, MD
Kymberly Ann Kramer, Indianapolis, IN
Deborah D. Levitov, Lincoln, NE
Nancy McGriff, LaPorte, IN
Erin Meyer-Blasing, Madison, WI
Gabriella Miller, Gibsonia, PA
Leslie B. Preddy, Indianapolis, IN
Christina E. Petrus, New Haven, CT

Mentors

Educators from the ranks of graduate education programs in library and information science were selected to work with the emerging scholars during the retreat. Many informal conversations took place among mentors and emerging scholars to discuss research interests and career plans. A community of research-minded colleagues resulted.

The TM10 Mentors:

Danny Callison – inquiry learning; collection and program evaluation
James O. Carey – information use behavior; information use models
Nancy Everhart – program evaluation and professional development
Mary Ann Fitzgerald – information analysis and instructional methods
Kathy Latrobe – program evaluation; collaborative action research
Paula Montgomery – information literacy skills and publication
Delia Neuman – qualitative research and instructional design
Cecilia Salvatore – communications and diversity of learning styles
Ruth Small – instructional design and experimental methods
Julie Tallman – I-Search and information use; collaborative research
Pat Tarin – diversity and research on minority communities
Nancy Thomas – research methods and diverse learning needs
Ross Todd – evidence-based research; information use theory

The TM10 Participants and Speakers

Denise Agosto, Cherry Hill, New Jersey
Patricia Antrim, Warrensburg, MO
Kirsten Baesler, Mandan, ND
Lois Barranoik, Sherwood PK, AB Canada
James Baughman, Medfield, MA
Jennifer Branch, Edmonton, AB Canada
Danny Callison, Bloomington, IN
Jim Carey, Tampa, FL
Sharon Coatney, Linwood, KS
Linda Corey, Overland Park, KS
Karen Diaz, Columbus, OH
Nancy Everhart, Tamaqua, PA
Lesley Farmer, Los Alamitos, CA
Mary Ann Fitzgerald, Bogart, GA
Susan G. Fowler, Emporia, KS
Chad Galloway, Athens, GA
Melinda Greenblatt, Rockville Centre, NY
Bob Grover, Emporia, KS
Sheri Haderlie, Logan, UT
Carol Hambrfecht, Gladstone, MO

Frances Jacobson Harris, Urbana, IL
Lisa Hinchliffe, Normal, IL
Clara G. Hoover, Omaha, NE
Judith King, Waunakee, WI
Cindy Krimmelbein, Annapolis, MD
Keith Curry Lance, Westminster, CO
Kathy Latrobe, Norman, OK
Linda Lillard, Lexington, KY
David V. Loertscher, San Jose, CA
Betty Marcoux, Tucson, AZ
Anna M. Martinson, Bloomington, IN
Anne Masters, Norman, OK
Jeanne McConnell, Alexandria, VA
Joan Michie, Potomac, MD
Donna Miller, Grand Junction, CO
Paula Montgomery, Baltimore, MD
Delia Neuman, College Park, MD
Jennifer Burek Pierce, Bloomington, IN
Rose Pope, San Diego, CA
Cecilia Salvatore, Topeka, KS
Rebecca Scheckler, Bloomington, IN
Carol Simpson, Lewisville, TX
Ester G. Smith, Austin, TX
Julie Tallman, Athens, GA
Patricia Tarin, Tucson, AZ
Ross Todd, New Brunswick, NJ
Julie A. Walker, Chicago, IL
Marj Willeke, Pleasant Dale, NE

Program

Two days were devoted to presentations. Most involved examination of research methods and how different methods are applied to meet different questions and needs.

May 31

1. Analyzing Relationships Between School Libraries and Academic Achievement. Keith Curry Lance, Ph.D., Director of the Library Research Service, Colorado State Library.

2. Illiterate or Aliterate? Information Literacy Challenges. Lisa Hinchliff, Library Instruction Coordinator, Illinois State University, Normal, IL.

3. School Librarians and Evidence-Based Practice: Concepts, Conundrums and Challenges. Ross Todd, Ph.D., Associate Professor, Rutgers, The State University of New Jersey.

4. Action Research Methods: Evaluation of School Library Media Programs. Kathy Latrobe, Ph.D., Professor, University of Oklahoma. Ann Masters, District Coordinator of Library Media for the Norman Public Schools.

5. A Comparison Study of Library Media Students' Perceptions of Their Learning Experiences in Online and Face-to-Face Classrooms. Julie I. Tallman, Ph.D., Associate Professor, Department of Instructional Technology, University of Georgia. Sandra Geisler, Graduate Student, University of Georgia. Mary Ann Fitzgerald, Ph.D., Assistant Professor, Department of Instructional Technology, University of Georgia.

6. Development and Implementation of a National Survey: Methods and Limitations. Joan Michie, Ph.D., Senior Study Director, Westat Research, Rockville, MD.

7. Learning in an Information-Rich Environment. Delia Neuman, Ph.D., Associate Professor, Coordinator of the School Library Media Program, University of Maryland. Cindy Krimmelbein, Library Media Specialist and Technology Coordinator, Meade Middle School, Arundel County Public Schools of Maryland.

8. The Texas Study: Methods for How it was Conducted and Conclusions. Ester Smith, Ph.D., EGS Research & Consulting.

9. GirlsTech: Gender Considerations in the Evaluation of Digital Information. Denise Agosto, Ph.D., Assistant Professor, College of Information Science and Technology, Drexel University.

10. Diversity in Children's Services: From a Child's Perspective. Pat Tarin, Director, Knowledge River and the Center for the Study of Hispanic and Native American Information Issues, University of Arizona.

11. Communicative Competence in the Classroom and in the Library. Cecilia Salvatore, Ph.D., Assistant Professor, School of Library and Information Management, Emporia State University.

June 1

1. Collaborative Research Methods in Information Literacy. Julie Tallman, Ph.D., Associate Professor, University of Georgia. Mary Ann Fitzgerald, Ph.D., Assistant Professor, University of Georgia.

2. Time to Learn: Optimizing Students' Learning Time on Information Literacy Tasks. James O. Carey, Ph.D., Assistant Professor, School of Library and Information Science, University of South Florida.

3. Methods in Case Study Research for School Library Media Evaluation. Norman Webb, Ph.D., Senior Research Scientist for the Wisconsin Center for Education Research, University of Wisconsin at Madison.

4. Information Use and Meaningful Learning for High School Students. Jinsoo Chung, doctoral student, University of Maryland.

5. Think About It: Using Think Alouds, Think Afters, and Think Togethers. Jennifer Branch, Ph.D., Assistant Professor, Education, University of Alberta.

6. Teaching Students the Ethical Use of Information and Communication Technologies. Frances Jacobson Harris, Librarian and Associate Professor at University Laboratory High School, University of Illinois, Urbana-Champaign.

7. Publication Options for School Media Researchers. Nancy Everhart, Ph.D., Associate Professor, Director of the School Media Program, St. John's University.

8. Children's Choice of Information Sources and Their Perception on Information. Jinsoo Chung, doctoral student, University of Maryland. Diane Barlow and Anne S. MacLeod.

9. Methods for Measuring the Influence of Concept Mapping on Student Information Literacy Achievement. Carol Gordon, Ed.D., Head of Educational Resources Library and Associate Professor at Boston University.

10. Research Methods to Measure Student Achievement and School Media Programs. James Baughman, Ph.D., Professor, Simmons University at Boston.

11. Information Literacy Skills of College-Level Virtual Library Users. Mary Ann Fitzgerals, Ph.D., Assistant Professor, University of Georgia. Chad Gallaway, doctoral student, University of Georgia.

12. Qualitative Research Methods: An Opportunity for School Library Media Researchers. Delia Neuman, Ph.D., University of Maryland.

13. Gender Issues in the Design and Analysis of an Instructional Web Site. Rebecca Scheckler, Ph.D., Center for Research and Learning, Indiana University at Bloomington. Anna M. Martinson, doctoral student, Indiana University at Bloomington.

Results of the Conference

The influence of the TM10 conference presentations and mentoring was documented by the 22 emerging library media scholars. Each was requested to submit a summary essay of their observations one month following the conference. Each was also requested to complete an open-ended questionnaire nine months following the conference. Selected responses are given below to represent the growth in research awareness and an increased commitment to future scholarly study.

Q1: In what manner have you read and evaluated research documents differently since TM10? Include specific journals, articles, and document titles when possible. Describe any specific researchers who you may have given more time to explore because of TM10.

- I have been much more aware of quantitative vs. qualitative research and the strengths that can come from a combination of both. TM10 helped me a great deal with the statistics course that I just completed last semester and I know it will continue to benefit me in the advanced stats course I will be taking this semester. I felt I had a much better grasp of research generally and that I hade a much better focus going into the course than I would have without the opportunity to attend TM10. I honestly can't say that I have had time to read much more that the statistics text this past semester, but TM combined with my statistics class has raised my awareness level a great deal in terms of knowing what to look for when interpreting research reports and being able to understand significance and results of studies. I pay much closer attention to the references of specific studies with greater interest in knowing more about the actual content of the research that is cited. – D. Levitov

- I have been more critical of survey research since the conference. I have looked very carefully at the way questions on surveys were worded, and how they were translated into any conclusions that the researcher claimed. – C. Little

- I had considered myself as a qualitative person, but developed an interest in quantitative research methods as well because of TM10. Carol Gordon's work became more interesting to me. I know that Dr. Gordon has done many qualitative works, but her recent study used quantitative measures. – J. Chung

- Since TM10, I have completed my first semester as a doctoral student and consequently my reading habits have changed considerably. TM10 helped me form a context for some of the readings I've pursued, assisting me in making connections. With respect to school library media reading, Keith Curry Lance and Ross Todd's talks were especially helpful in doing this. I've returned to notes/handouts from these presentations several times as I've pondered the impact school libraries have on student learning. Much of my reading now comes from *The Journal of the American Society for Information Science & Technology, School Library Media Quarterly (Research), Information Processing & Management,* and *Computers in Human Behavior.* For a couple of papers I've written, I've also drawn heavily from readings in *Sex Roles* and *The Journal of Counseling Psychology*. While these are not LIS journals, they've been useful for deepening my understanding of the gender variable. While at TM10 Jennifer Branch and Denise Agosto's respective presentations reflected how their exploration of research outside of the LIS arena enriched their investigations. Hearing about how these scholars have engaged other disciplines through the lens of information science has assisted me in undertaking this myself. – J. S. Hamer

- Since TM10, I've been much more interested in assessment. I am interested in learning how to assess my media program including my teaching methods, reading incentive programs, and professional development programs and collaborative projects with my faculty. As I wrote my essay, I was greatly influenced by Dr. Todd's presentation on Evidence-Based Practice. I am in my second year as a school media specialist and in my first year at my current position. Dr. Todd's emphasis on providing evidence that the work of the school media specialist is valuable

complements my own interest in creating a firm foundation for my new media program. – C. E. Petrus

- I believe I read more research since attending TM10. I find that I have a thirst to better understand what expert opinions are and what studies they use or have conducted to back their claims. I find myself now needing to support what I say to fellow practitioners with data and research instead of going on my first-hand account, personal opinion, or practitioner's hunch. – L. B. Preddy

- I don't think TM10 changed the way I read and/or evaluate research documents, but I do think the opportunity to attend and participate in TM10 strengthened my belief in the value of research for libraries. Since I am currently working on my dissertation, the opportunity to meet and talk to researchers who have impacted our profession has been very beneficial and rewarding to me. – M. Long

- My Masters Thesis, completed from the University of Alberta in 1994, is entitled "Collegial Experiences: Teachers and Teacher-Librarians Working Together." I discovered in my study that in working together with a teacher-librarian, teachers perceived benefits to themselves, the students, and to the school library program as a whole. Some benefits included increased energy, increase in professional growth and commitment, and benefiting from the wealth of information that comes from a colleague. Julie Tallman and Mary Ann Fitzgerald's presentation entitled "Collaborative Research Methods in Information" provided me with a vehicle to associate my findings about collaboration with their findings about collaboration in the world of information literacy research. I gained confidence that my former research and present doctoral study are important pieces in the field of school library media research. – L. Sweeney

- I have been reading more research information since TM10. Some examples include: Dania Bilal's series of articles in *JASIS&T* on "Children's Use of Yahooligans"; Melissa Gross's article about her pilot study of "imposed queries" in *SLMQ*; and Jennifer Branch's articles on the use of the "think aloud" method. – S. DelVecchio

- I've been trying to read more issues of *Knowledge Quest* and *School Library Media Research* when possible. Also, I received a copy of the White House conference proceedings held last June in which Laura Bush, Dr. Lance and others spoke on the importance of school libraries. It contained a multitude of great resources and references that I would like to investigate further. – A. Hatcher

Q2: Do you believe you would define "research" differently today than you would have prior to TM10? If so, how? If not. Why?

- I have both quantitative and qualitative backgrounds in my doctoral work at the University of Maryland, but attending the TM10 research presentations by experienced researchers gave me the opportunity to see how they really applied the methods they selected to their research problem. I do not think that at other conferences researchers take the time to explain their methodologies in detail. Listening to different approaches help me learn there are different ways research techniques can be applied. – J. Chung

- I'm better able to define qualitative methods from my coursework this past semester as well as from TM10. The overview of qualitative research given by Delia Neuman provided me a timely, much-needed introduction prior to starting my program. As a

result, when reading journal articles that used qualitative methods during the past months, I better understand the methodological approaches taken. This has been a great help! – J. S. Hamer

- I do not think I would define research differently. However, since TM10, I do feel that it is a more approachable and desirable activity. In being given the opportunity to meet the top researchers in my field and actively discuss research with them, as well as meet and talk with students who are currently going through the process to attain their Ph.D., I now find that I think of conducting research as far more exciting and attainable than I did prior to TM10. – C. E. Petrus.

- I always expected that research would have a fairly broad definition. I got the impression at TM10 that the field would like to see tighter standards and more rigor in defining research, but that doesn't seem to be the goal of the rest of the field that is not in academia. I see lines drawn between "real" research being conducted by university professors and being published in very serious journals and less controlled research being conducted by a wide variety of people and being published in journals that are more widely read by practicing librarians. – C. Little

Q3: Does there seem to be a research focus around which you tend to read, think and ponder, question, and seek more information from other educators since TM10?

- One of the programs that I attended was facilitated by Lisa Hinchliffe. She spoke about "information challenges and the first year college student." As a result, I have thought more about the idea of what information literacy skills are taught in high school and the impact it has on a student's future college experience. This is an area that has peaked my interest since I am a secondary school media specialist. I definitely want to explore it further. – A. Hatcher

- My interest in assessment was strongly piqued by Dr. Todd's presentation on the research he is conducting on evidence-based practice. Therefore, I have been very attracted to articles and information that have to do with ways of providing proof that I am an asset to the school community. – C. E. Petrus

- Though my focus is gradually maturing, I think each day about how to investigate the relationship between gender and information seeking, especially for males. Speaking with Dr. Agosto at TM10 was very helpful, since her dissertation work is related to my interests. -- J. Hamer

- My research focus, specifically regarding my dissertation topic, developed after I attended TM10. I am investigating the leadership training provided through academic institutions and/or professional development and the application of leadership skills by school librarians to see what impact these skills have on developing a strong library program. A key point I took away from TM10 was the suggestion that passion for what you are researching is critical. I stepped back and re-evaluated my research topic, scrapped it, and started all over with a new topic ... putting months behind me, but quickly catching up. – M. Long

- Since TM10 I have questioned more if teachers are taught how to research and understand how to really apply I-search and information inquiry models. How do we teach teachers information literacy? Why does the field of education continue to express the need to foster a child's natural curiosity, and yet the majority of

assignments are still geared toward gathering facts and reporting rather than inquiry and research? -- L. B. Preddy

- At TM10 great care was taken to present a wide range of research methodologies that would be appropriate in school library media research efforts, and to describe practical examples of how these methodologies are currently being used. I cam to the retreat with a dissertation topic, but with no idea of how to attack it. What I heard convinced me not only that my topic was a worthwhile one, but also that there were several ways in which the research could effectively be accomplished. I was able to ask Dr. Neuman more specific questions and she was willing as my TM10 mentor to listen and give me advice that was grounded in experience and practical for my upcoming work. Weeks after the conference, I continue to track down leads she gave me and to review with my dissertation chair the ideas Dr. Neuman and I discussed. – C. Little

- Dr. Todd's presentation had the most profound impact on my thinking about the direction I would like to follow should I have the opportunity to pursue a doctoral degree. Dr. Todd explained that due to the field's changing mindset, issues such as image, support, rhetoric, funding, and role were being afforded higher status over items such as learners, learner outcomes, libraries making a real difference, and evidence-based impact on learning. After listening to Dr. Todd's presentation, I came away with the view that if our field focused on these important "meat and potato" issues such as learner outcomes and evidence-based practice in determining and supporting our school library media programs, than the issues of role perception, status, and funding would not be issues. If our field focused on determining the best ways to increase student achievement, put them into practice, and shared the wonderful results with the rest of the education community, then over time the message would be clear and our worth would be obvious. In a similar vein, Kathy Latrobe and Anne Masters discussed their action research in evaluating a district's school library media program. – C. E. Petrus

- TM10 provided an opportunity to not only hear about what other researchers are doing, but also to hear how they think about and develop their research topics. In many cases this sparked ideas that my influence my own work. For example, Jinsoo Chung's research on "Children Choice of Information Sources and Their Perception of Information" is close to my own interests. Both her work and the discussion that followed it were rich with ideas for my own work. It also strongly reinforced my interest in focusing on children's information behavior that is self-generated and that is not bounded by a particular institution or technological setting. – S. DelVecchio

- Another example of how TM10 affected my thinking about my research topic came from Jennifer Branch's presentation on "Think About It: Think Aloud, Think Afters, and Think Togethers." Although the presentation focused on methodology, two points Dr. Branch made impressed me. One was that she feels we really don't know very much about how people, especially children, seek information, and that it is very difficult to find out more. The second was to re-emphasize the idea that whether the purpose or driver for an information need or an information seeking activity was externally imposed as opposed to being self-generated could make a great difference in someone's information use behavior. In addition to sharing some support for this from her own work, she also pointed to the work of Melissa Gross. – S. DelVecchio

- The greatest challenge, however, is sustaining focus and learning from the institute now that I am back in the daily pressure of career performance. This is always the most difficult part of any conference or professional gathering. It would be easy to allow this conference to fade away as well without really moving forward on the ideas and learning that took place at the institute. The difference, I hope, is the continuing

connection to the people and the research that is provided through both Treasure Mountain Online and plans for future ELMS conferences. – C. W. Alani

Q4: In what manner has the TM experience influenced your academic or professional work and goals?

- Treasure Mountain at the Elms changed the lens through which I view the possibilities of my work as a school library media specialist and a potential doctoral student. I had an "ah ha" moment in Dr. Neuman's session "Learning in an Information Rich Environment." I realized that my students and teachers exist in an information rich environment, although we tend to think in terms of what we do not have, rather than what we do have. I also realized that my instructional practice over the past five years has been on a search for strategies that provide structure for students using electronic information. I wouldn't have been able to articulate this practice before attending the session. – N. McGriff

- My experience at the Treasure Mountain Research Retreat uniquely prepared me to not only complete my doctoral studies with enthusiasm, and sustained interest, but it also furthered my desire to use my academic research and practice to ensure that media centers, media specialists, and the practice of information literacy continue. – M. A. Mardis

- The experience provided me with a wealth of information and topics to explore. As a result, I have organized my future plans around my priorities – to write my dissertation in the area of school librarianship and student achievement, complete the doctoral program, and contribute more of my time and energy in mentoring library science students from traditionally under-represented backgrounds. – C. S. McLinn

- James Carey conducted a workshop, "Time to Learn: Optimizing Students' Learning Time on Information Tasks." The role of theories in research was presented. Dr. Carey discussed how theories are hypothesized and the processes we go through in order to find solutions. In another workshop, "Publication Options for the School Library Media Researcher", conducted by Nancy Everhart, participants were asked to brainstorm about publishing and to think about different journals that were most likely to support school library media research. Dr. Everhart informed the participants that it was a good idea to start publishing as soon as possible. Do not wait until your dissertation is done in order to start. This was a great piece of advice for professional development, although the publishing world can be quite intimidating. – A. Hatcher

- Through TM10 I gained the confidence and the personal contact necessary to publish a series of articles in a professional journal and to begin negotiations on co-authoring a book. The academic leaders I met at TM10 continue to be ones I contact and they lend support and encouragement for me to pursue my doctoral study plans. – L. B. Preddy

- I have been accepted into a doctoral program. I have survived one semester of statistics and I am actually looking forward to the next class. I have an idea of a research project that I feel has some interesting potential for linking library media integrated information literacy skill instruction to student achievement. I have very specific plans for what I want to do to finish my doctorate. I am in the high-risk zone – ready to take the leap! – D. Levitov

- Because of TM10 I have made substantial progress on a literature review that will very likely contribute to my dissertation. I am planning a related pilot study for this summer. – S. DelVecchio

- Because of TM10 I am able to speak with colleagues with a greater level of confidence about current library issues. This connection is critical for me as a professional. I have written a professional article that I plan to submit to a library journal shortly. It will be my first. – C. W. Aiani

- Perhaps what most impacted me as a conference participant was that I was given the chance to be part of the larger community of school library media researchers. The sense of community began to build as soon as the scholars and mentors met. Lines of communication were opened when Nancy Thomas assured us that the mentors were hoping to learn as much from the scholars as the scholars were to learn from the mentors. When I returned to Alberta there was in place a series of information seeking meetings throughout the province. Presenters were to talk of concerns in public education. I was asked to speak about school libraries. I had prepared my presentation before Treasure Mountain, and had included findings from the Colorado study as part of my presentation. What a boost to be able to speak after hearing Dr. Lance. I was able to use his study confidently and talk about similar studies and their probably relationship to our own situation in Canada. – L. Sweeney
- "Your passion should drive your research," is the mantra that has been playing in my head since attending the Treasure Mountain Retreat. Prior to attending, I never realized I had a passion. I knew that there were issues that meant a lot to me and some I even had very strong opinions about, but to be passionate about these issues was a thought that never crossed my mind. Before I was selected as a TM Scholar I knew I wanted to pursue a Ph.D., however I did not know what to expect. Attending the retreat afforded me the opportunity to seek information from those in the field in how to properly plan for this adventure. What is my passion? To ensure that all students meet success. To help change the perception that children of color and poor children are at risk of failing because of their ethnicity or socio-economic background. – J. Johnson

- The welcoming community of TM10 scholars affirmed for me that my plan to return to Rutgers for doctoral studies is the right decision. It offered an initial opportunity to discuss at length with others my research interests, and I found this most exciting. TM10 provided me a preview of the arena in which I now work and study. For example, Mary Ann Fitzgerald discussed the long-term implications of one's dissertation topic. Julie Tallman shared the negotiation process with respect to joint authorship and collaboration with others on research. Joan Michie gave a great presentation about national surveys. Hearing about how they are undertaken was fascinating. At the same time, Dr. Michie's presentation provided a model for a research setting different for the academic one. – J. Hamer

Q5: Describe the relationship and influence your mentor may have had on your thinking and experience at TM10.

- I have communicated with Dr. Neuman who was designated as my mentor. She sent me a draft of an article she was in the process of writing and it truly provided me the guidance and ideas I needed to change my dissertation topic. I regret, however, that as scholars we did not have an opportunity for more exchange with our mentor and the other mentors at the conference. – M. Long

- Later in the conference I became engaged in a conversation about collaboration with James Baughman. He seemed genuinely interested in my completed thesis and asked for an electronic copy. That I had completed a qualitative study in school library media in 1994 interested him, and, in turn, Dr. Baughman's comments inspired me. – L. Sweeney

- The atmosphere was warm and friendly. I never once felt intimidated by such heavy hitters and no one put on an air of importance. In addition, each scholar was assigned a mentor from among the group of established researchers. My mentor was Dr. Carey from the University of South Florida. He was wonderful. The first evening Christine and I just sat and talked with Dr. Carey for a few hours. We asked him so many questions and shared our ideas. He was quite patient. He also took the time to find out who we are. – A. Hatcher

- As I told Dr. Carey and April on the last evening, the TM10 conference was the first time I felt I was taken seriously on a grand scale – that this was a field and I was a person worthy of investment. Participating in TM10 unquestionably nurtured my interest in conducting information science research and I am immensely grateful to the people and institutions that made my attendance possible. – C. E. Petrus

- Planners of the Treasure Mountain Research Retreat acknowledged the looming problem of doctoral attrition. TM10 attempted to address this with building on some key factors for success, including social faculty involvement. My experience started even before I arrived at the conference location. My mentor was not only in my shuttle from the airport, he was immediately interested in my course of study and began asking questions about my research interests and professional goals. This initial conversation formed the basis for an ongoing social engagement that he enriched with his own expertise and knowledge of the field. – M. A. Mardis

Q6: Please reflect on your overall experience at TM10. What would you recommend for future retreats for the Emerging Library Media Scholars (ELMS)?

- By sharing a common need and by being given the feeling that we belonged and were respected, I feel that we as scholars came away with a desire to contribute to the field effectively and creatively. We were encouraged to take initiative and to explore our passions and were given a safe place to discuss the ideas and resources that are as yet untapped. – L. Sweeney

- There are four ways that TM10 affected me: connections or collegiality; research topics; research methods; and recruitment. In the area of making connections and building collegiality, TM10 provided an ideal opportunity to get to know other people with similar or related interests. This began with my mentor, Dr. Fitzgerald and both my fellow "mentees," Joan Bessman and Judah Hamer. Dr. Fitzgerald supported both my research interest as valid in its own right and as related to the larger research agenda shared among participants at TM10. – S. DelVecchio

- I would like to have the opportunity to hear speakers share the details of their research process, particularly problems and how they dealt with those problems and resolved them. I would also suggest that the scholars be divided into small groups and plan for the scholars to have equal time with all of the major researchers attending, not just their individual mentor. Some scholars and their research mentors felt compelled to stick together during TM10 and others at the conference were not able to benefit from conversations with the other mentors. – M. Long

- I enjoyed the range of presentations at TM10. Future conferences with a diverse and yet interconnected set of topics would be great. In addition to the mentoring sessions, I think it might be interesting to have informal round-table sessions for discussing "works in progress." The purpose of each exchange would be to provide opportunities for feedback, sharing of perspectives from other scholars, and referrals to related research. Doing something like this might work well if participants have an opportunity to read in advance the papers to be discussed in these sessions. – J. Hamer

- I was particularly impressed by the "junior" faculty or new scholars. These people, such as Dr. Agosto and Dr. Branch, were still pretty close to their dissertation work. It was tremendously helpful to hear from them about how they conducted their research. – S. Del Vecchio

- We need to hear from university professors what they look for in a doctoral candidate. We need help getting a handle on acceptable research methods. TM10 did, however, establish camaraderie. What we witnessed first hand at TM10 was a group of academics who get along just as well as any other professional group. We saw a core of people who were passionate about what they were doing, and willing to welcome others with friendliness, encouragement and support. – L. B. Preddy

Papers

The papers printed here served as the basis for several of the presentations and discussions at TM10. The papers remain the property of the individual authors. Most were revised and expanded after the conclusion of the retreat.

Chapter 2

Methods for Measuring The Influence of Concept Mapping On Student Information Literacy

Dr. Carol A. Gordon, Ed. D

Introduction

Research traditions in Education and Information Retrieval have grown up in parallel worlds, although they share a theoretical foundation that profoundly influences research methodology and best practice in their respective domains. They also share a common problem: the need for a method for analyzing sparse, quantifiable data collected in qualitative studies with small sample sizes. This paper explores the Theory of Expected Information that uses formulas derived from the Fano measure (1961) and Bayesian statistics (1764), and demonstrates its application in a study on the effects of concept mapping on the searching behavior of 10th grade Biology students.

Common Ground: Research in Education and Information Retrieval Studies

Behaviorism was defined by Skinner's (1965) theory of operant conditioning which claimed that behavior could be shaped by reinforcing, or rewarding, the desired responses to the environment. Educators became concerned with learning outcomes and devised steps to help learners achieve desired behaviors. Behaviorism also became a theoretical basis for systems approaches in information retrieval for research that was system, rather than user, centric. Behaviorists did not make inferences about how learners process information, or what goes on internally when learning takes place. In education, behaviorist theory informed practice by providing a rationale for programmed instruction, teaching machines, and computer-assisted instruction. In library instruction it encouraged the a tool-specific approach to teaching information skills in isolated lessons taught out of the context of their utility.

Cognitive psychologists investigated learning and created models of how information was received, processed and assimilated into the learner's knowledge system. Piaget's (1928) theory of cognitive development traced the development of the child. Stages of development included: the sensory-motor stage of infancy; the intuitive or pre-operational stage of early childhood; the stage of concrete operations in the elementary school years; the stage of formal operations in adolescence (Inhelder & Piaget, 1958). He described schemata, or mental structures by which individuals organized their perceptions into categories to classify specific information. These schemata adapt during the learning process through assimilation, by which the learner integrates new information into existing schemata, or by accommodation, whereby existing schemata are modified to create new mental structures. Learners were viewed as actively assimilating and accommodating information in terms of what they already knew (Bartlett, 1932; Inhelder & Piaget, 1958). Constructivist theory has grown to provide a rationale for hands-on, active learning, inquiry learning, "learning to learn," and performance-based assessment in the classroom. With a paradigm shift from bibliographic instruction to information literacy, this theory supported the process approach to teaching information skills in the academic context of curriculum. The information user is seen as learner through the lenses of information literacy, cognitive and meta-cognitive processes.

The behavioral and constructivist schools of thought emerged from educational research that built its knowledge on a philosophical foundation, an ethnographic tradition of observation, and the practical study of human beings. Piaget (1928) and Dewey (1943) observed the child as the object of study as they studied the phenomenon of learning. When the ideas of Thorndike (1903) supplanted this ethnographic approach, psychology as an empirical science became the new foundation for building theory. His dictim, "Whatever exists at all exists in some amount. To know it thoroughly involves knowing its quantity as well as its quality"(Lagemann, 2000, p. 57) prodded educational research to mature into an empirical science. The subsequent contributions of Benet, Simon, Galton, Pearson, Spearman, and Fisher established quantitative measures as the dominant, and most credible, kind of data. Lagemann (2000, p. 94) criticizes educational psychologists who embraced mental testing: "But having found a technology that could be applied and tinkered with endlessly, they generally avoided questions concerning the value and necessity of sorting students in the first place." The "Eight-year Study," conducted by the Progressive Education Association, moved Tyler (1950) to use learning objectives to guide test construction. Fueled by the large number of college applicants and rooted in Education's march to empiricism, the Educational Testing Service was born, creating a culture of standardized testing. With the writings of Lincoln and Guba (1985) qualitative methods began to find a place in educational research. The re-birth of qualitative research and philosophical traditions in educational research, along with the adoption of principles of constructivism from cognitive psychology,

provide the common ground where educational research and information retrieval studies can find their roots.
This is significant for their respective research agendas since learning theory adopted as a theoretical framework in a research study has a particularly strong effect on that study's methodology.

The behavioral, system-centric tradition in information retrieval studies grew from a bibliographic paradigm: "Information retrieval has concentrated on what matches the system's representation of texts rather than responding to the users' problems and process of information gathering." (Kuhlthau, 1993, p. 1) These studies, conducted largely by engineers and scientists who were pioneers of IR development, relied heavily on probabilistic theory and algorithmic approaches. User-centric studies, on the other hand, were based on constructivist theory and collected data through ongoing interaction with the user. The system-centric school considered relevance too elusive and subjective and rejected it as a criterion for performance testing. On the other hand, user-centric studies explored relevance in the context of the sense-making approach and experimented with relevance judgments prior to accepting or rejecting relevance as a criterion for performance. The dominant research model of the 1960's and 70's emphasized input processes and components, such as document representation and retrieval effectiveness. Learning theories derived from cognitive psychology, which grew from concepts such as knowledge states, conceptual framework, and internal representation, constituted a trend away from system-centric views and shifted the focus from relevance to the information needs of the user. The theory of an anomalous state of knowledge (ASK) described by Belkin, Oddy, and Brooks (1982) counteracted the best match principle. Dervin's (1983) sense-making approach and Taylor's (1968) user-value approach emphasized the user's perceptions of the information problem and of utility and value of the system. Progress in sculpting a theoretical framework based in cognitive psychology culminated in Kuhlthau's (1986) model for the Information Search Process, which used Kelly's (1963) theory of constructs and included thoughts, actions, and feelings of the information seeker. Information retrieval studies used interviews, think-alouds, observation, journaling, concept mapping, and other methodologies that yielded qualitative data.

Constructivist learning theory and qualitative investigative methods have emerged as powerful research tools that have transformed practice in educational and information skills programs, shortening the distance between the classroom and the library.

The Quantitative-Qualitative Divide

The debate between quantitative and qualitative research is bogus in that the value of their respective methodologies lies not in their relative merits, but in their appropriateness to the research question at hand. There is a tension, however,

that arises from practical, rather than theoretical considerations. At the root of this tension is an over-confidence in what can be quantified and lack of confidence, or interest, in more cumbersome verbal data.

A practical consequence of qualitative research's lack of credibility is the inappropriate use of quantitative research findings as they are applied to all points of analysis in Education, i.e., learner, classroom and school, to produce results that raise concerns about validity. On a political level, the bias for the quantifiable, which offers a succinct interpretation of data, puts this kind of data in headlines. Although there are appropriate uses for norm-referenced tests, results are often interpreted in terms of individual student achievement. Funding, and even the very existence of marginal schools, may be determined, not on how well students are progressing with respect to their own learning history as a baseline, but how well they are progressing compared with everyone else.

The emergence of qualitative assessment measures in Education and the teaching of information literacy, namely performance-based (authentic) assessments, are endangered by the absence of a method for handling verbal data quantitatively. These methods use rubrics to determine the attainment of standards as measured by performance ratings that are described at each level of attainment, journals that document process, and portfolios that supply longitudinal evidence of growth. Mounds of qualitative evidence are accumulating devoid of any quantifiable analysis.

Performance-based assessments are intended to be formative, i.e., they yield continuous feedback to the learner for the purposes of providing opportunities for revision in order to improve the performance of both the learner and the teacher. Traditional testing and assessment are intended to be summative: they use grades or percentile ranks. While both formative and summative assessment are useful and necessary for the full cycle of the instructional process, the data collected by performance-based instruments can not easily be pronounced publicly or used politically to garner support and funding. This is a problem for educators, who know that a percentile ranking is a slick and clean way to pigeonhole student performance, but offers little substantive information with regard to diagnosis and remediation. Even item analyses of tests, while identifying weaknesses in students performances, are applicable to group performance in terms of a class, a grade level, or a school, but do not adequately address deficiencies or remedial needs of the individual student. Although performance-based assessment and its attendant constructivist methods are supported by the research, rote learning and behavioral teaching styles that are not information literacy friendly thrive in a climate of test-driven curricula and the demand of state departments of Education for measurable results.

Qualitative research seems to defy definition. Lincoln and Guba (1985, p. 8) wrote, "it is not possible to provide a simple definition...Instead a proper

impression...can be gleaned only as an overall perspective." A common criticism of qualitative research is that "soft" data do not escape the subjectivity of the researcher, raising doubts about reliability. In fact, the analysis of soft data explores the significance, or possible meaning, in the incidence of an event. Qualitative research has an effective tool, the method of constant comparison (Glaser& Strauss, 1967), which is based on the premise that repetitions and patterns in data are meaningful. The significance of this is under-appreciated as the bias against lengthy, verbose analyses that defy clear and efficient encapsulation renders vast bodies of meaningful qualitative research inert. When there is a need to process numerical data researchers often create hybrid studies that marry verbal and numerical data with corresponding qualitative and quantitative methods. If measures were available for sparse quantifiable data, that data could analyzed and triangulated with qualitative evidence in a way that would preserve the integrity of the ethnographic research. Even sparse data carries some information, and it could be argued that a single occurrence of an event provides important information that the event is possible at all.

Classical statistics requires a large sample, using the philosophy of a 'bias', 'probability generator' or 'urn of black and white balls' out there in nature, without agreement as to the "magic point" at which the amount of sampled data crosses from sufficient to insufficient. Not surprisingly, some researchers feel uncomfortable with its methodologies. This may be attributed to a lack of experience with numeric and, in particular, probabilistic concepts. It might also be due to a genuine intellectual concern for matters in relation to notions of sampling and standardized testing, excessive classical emphasis on the refutation of the negative hypothesis, and a feeling that many observations which cannot be quantified in probabilistic terms, or for which there is in classical terms insufficient data, nonetheless do seem to provide evidence which seem intuitively reasonably and cannot in good faith be disregarded. Some of these issues could be better addressed in terms of Bayesian statistics.

The Fano Measure and Bayesian Statistics

The treatment described below derives from The Theory of Expected information presented by Robson (1974) who combined a derivative of the Fano measure with Bayesian probability theory to treat sparse events. This was probably the first attempt to introduce Bayesian methodology into the bio-molecular life sciences and particularly the area now known as 'bio-informatics.' Here there was and is a pressing need for analysis, prediction, and decision making governing future action, even in cases of sparse data.

Information theory has developed in directions that are of interest as statistical measures, or as quantifiable concepts in information science. Generally, information theory is not concerned with confidence levels: you merely have a lot of information or very little. To some interpretations, the amount of information is

a kind of degree of confidence. This is analogous to saying that the hypothesis would become acceptable at the 43.0 or 88.5 or 99.75 confidence level, whatever the data gives, rather than say, "reject it because it did not reach the magic number of 95.0." Such a number is a human artifact. However, a certain threshold of value of information can be used to make a decision.

The Fano measure described the kind of information which most closely relates to perceived meaning or new knowledge is of the general kind:

Information learned about A =
What you now note about A - What you knew or expected about A.

The expected probability of A happening anyway can be related to that which is due to pure chance, or the probability of a happening in the general case rather than the circumstance of interest, or simply the probability of what you expected on the basis of well-founded subjective knowledge.

The notion of expected probability being the probability of A occurring by chance is the least controversial, not least because the same principle is used in standard statistics. However, it is quite common that your prior knowledge is not simply that something happens by chance. The chance situation is not always the most useful or meaningful basis: there is more hope of finding *Oliver Twist* in a library than in the average room in the average house, for example. It is also possible to introduce a kind of probability which actually relates to utility such that one will tend to make a decision in a direction which is more profitable or less risky. For example, the decision to look for a book in a library rather than the average room might be reassessed if it cost an enormous amount of money to enter the library or execute a library search.

The information measure can be positive (A has more chance than you would expect), zero (the occurrence of A is just what you would expect, and there is no information), or negative (A has less chance than you would expect). The units depend on the base of logarithms used:

base 2 - binary units or BITS

base 10 - decimal units or HARTLEYS

natural logs (base e) - natural units or NATS

For formal reasons the use of NATS is recommended for statistics: The natural logarithm is usually the automatic setting on a calculator. Metric units of these, e.g., centinats or decinats, are also used. The latter is common with 1 nat = 10.

Fano's measure is a particular well-defined case of the above information. It is one of mutual information:

$$I(A;X) = \log \left[\frac{\text{(number of times A and X are observed together)}}{\text{(number of times any A is observed, i.e., with or without X)}} \right]$$

This reads as the information relating A to X is equal to the number of times A and X are observed together divided by the number of times A is observed (with or without X).

Probability P(A) is the "simple probability" or "self probability" of event A. In the limit of large numbers this is given by n(A)/N, the number of times event A is counted divided by N the total sample size. Note that N will be:

$$N = n(A)+n(B)+n(C)+...$$

summed over all events A,B,C...etc. For example, P(blue eyes) = probability of occurrence of a person with blue eyes.

Probability P(A,X) is the "joint probability" or A and X, i.e., the probability that they will be counted together. For example P(blue eyes, boy) is the probability of counting a blue-eyed boy.

A joint probability could be represented as:

$$P(A, X) = P(A) * P(X)$$

Bayes' refinement of the Fano measure included the introduction of Probability P(X|A) is the "conditional probability" of X on A. For example, P(blue eyes|boy) is the probability of finding blue eyes, given that the person is a boy. It may be calculated from P(A) and P (A,X) by

$$P(X|A) = P(A,X)/P(A)$$

P(A|X) could be obtained by only counting eye color in the set X, i.e., in boys. Then P(A|X) = n(A,X)/n(X), i.e., the number of blue-eyed boys is divided by the total size of the sample, here the number of boys. Some condition X is in a sense always present behind the scenes: It is the set in which you perform your counting. In other words, in statistical sampling you are concerned about the representativeness of your X.

Mathematical probability is based on a model that assesses the frequencies of sequences of events. Conditional probabilities provide a refinement of the concept so that particular features of a situation are taken into account when probability is assessed (Parsaye & Chignell, 1988). If we rely on a frequency view of probability, however, the more features of a situation we consider, the more unique it is and thus there are fewer previous cases to draw on in

estimating the probability. This, in turn, reduces our confidence in the accuracy of the probability assessment.

"The Bayesian approach to probability relies on the concept that one should incorporate the prior possibility of an event into the interpretation of a situation" (Parsaye & Chignall, 1988). Bayes' (Parsaye & Chignell, 1988) equation is a special application of conditional probability as described above:

$$P(H|D) = P(D|H) \times P(H)/P(D)$$

P(D|H) is the probability of obtaining data D given (conditional on) hypothesis H, and is the quantity normally measured by statistics. Since it is not a probability of obtaining the hypothesis, but rather of getting that data given the hypothesis to be true, it is properly called the likelihood. However, it is P(H|D), the probability of the hypothesis being true given the data, which is of interest. To get the latter, we have to know P(H) and P(D). The latter is no problem, it can be chosen so that all the P(H|D) add up to one, the formal requirement for a probability. P(H) however, is the probability of a hypothesis before, or without taking account of, the data D. In classical statistics it is impossible to count, or even give meaning to, such a probability. Hence classical statistics cannot obtain the desirable quantity P(H|D) and rather tortuous reasoning must be used, notably, "I assume H if I can show that the P(H|D) I appear to get is not consistent with H happening by chance." Bayes got around the problem: probabilities cannot represent biases or trends put there out in nature, they can only represent degrees of belief. Incidentally, since we can hold degrees of belief about anything, it is perfectly good statistics to hold degree of belief about a probability or range of probabilities, e.g. Belief(P(H)|D)), which is a kind of probability about a probability, or in classical statistical terms, a "probability density."

Bayes' theorem relates the conditional probabilities of events, i.e., it allows us to express the probability P(A|X) in terms of probability of P(X|A), P(A) and P(X). This is important because the probabilities which are available are often P(X|A), P(A), and P(X), but the desired probability is P(A|X).

Information between alternatives is simply one Fano measure subtracted from another, the first being about the probability for some fact or event A, and the second about some fact or event not-A, i.e., the information that A will not occur. This takes in the full weight of available evidence, the information for A and the information against it. Note that the information which data carries about a hypothesis being true is

$$I(H;D) = \log [P(H|D)/P(H)] = \log [P(D|H)/P(D)]$$

The information about the hypothesis being true is what is implied by the above: we should write H = true every time we write H. This is not the same as the

information about the hypothesis being false, where we would write H = false every time we wrote H above. Fortunately, information against something is negative information for it, so we can subtract the two:

I(H = true: false; D)

= I(H = true|D) - I(H = false|D)

= log [P(H = true|D)/P(H = false|D)] - log [P(H = true)/P(H = false)]

Applying the Theory of Expected Information

The Theory of Expected Information is particularly well-suited for qualitative research that seeks to study an phenomenon in depth by reaching for underlying explanations. The theory also fits the needs of local studies in education, and in all fields of study where the field in which human behavior is observed is the laboratory where data collection occurs. Implicit in the verbal data generated by such investigations are occurrences that can be quantified, albeit with sample numbers that do not satisfy the pre-requisites of quantitative research. Such a study is described in this paper in order to illustrate the application of the Theory of Expected Information to such quantities, as well as to model how the information measures, which are a kind of statistic, can guide the analysis of verbal data.

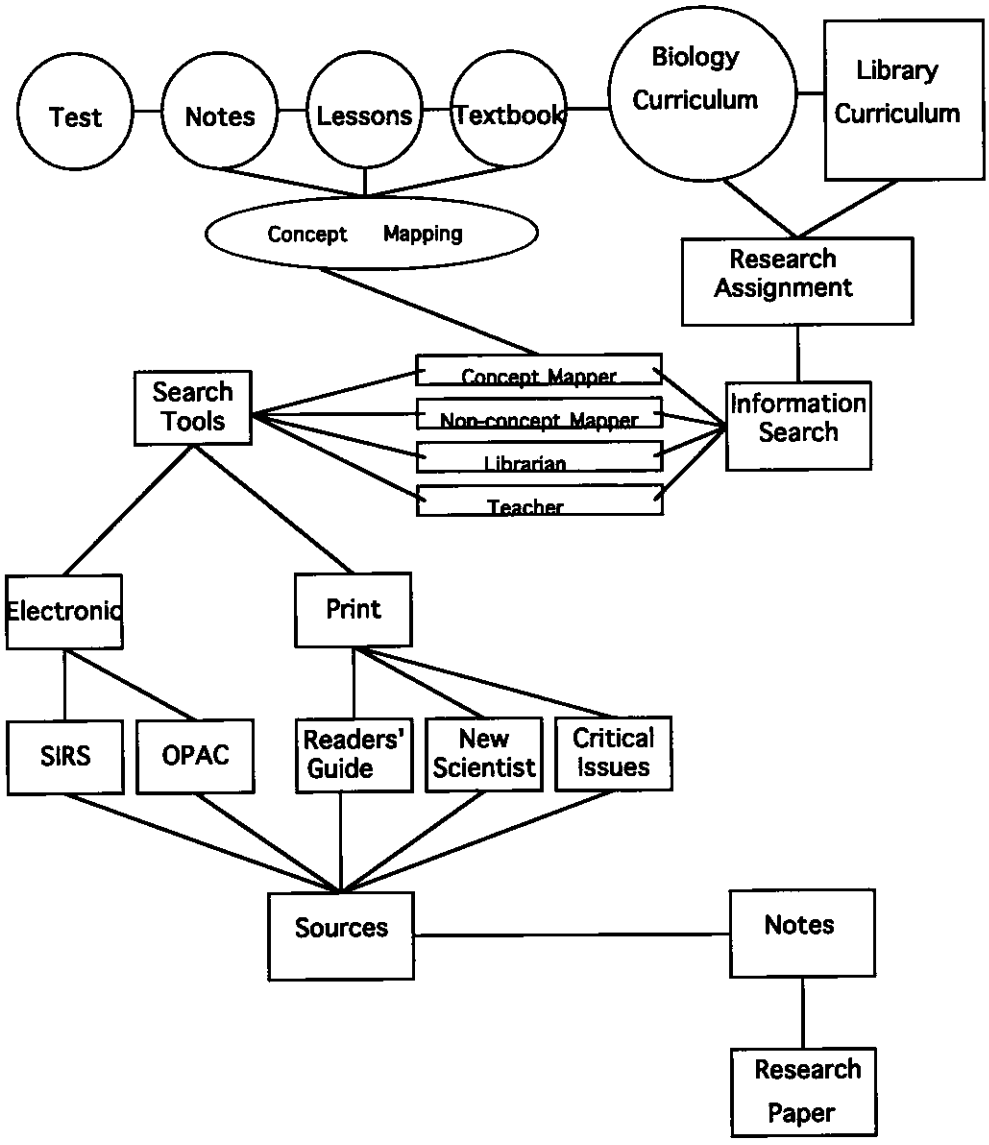
The research design. A qualitative study addressed the effect of concept mapping on the searching behavior of tenth-grade students engaged in research projects based on their instruction in a classroom-based genetics unit (Gordon, 1995). The setting was an automated library of a private American school in Europe. Ten students were chosen by purposive sampling. Selection criteria, monitored by user profiles, included student age, computer experience, native language, grades, and test scores. How did 10^{th} grade Biology students who learned and used concept mapping in the classroom for seven months search for information in the context of a library research assignment? Research questions included:

1. How did students mappers and non-mappers search for information in the context of the same library research assignment?
2. How did concept formation influence search strategies and relate to developing search strategies?
3. How did expert searches of the librarian and teacher compare with each other and with the searching of mappers and non-mappers?
4. How did student searching relate to stages of the Information Search Process? (Kuhlthau, 1993).

The conceptual framework for the study is shown in Figure 1 illustrates the key constructs of the study. One group used concept mapping over a period of seven

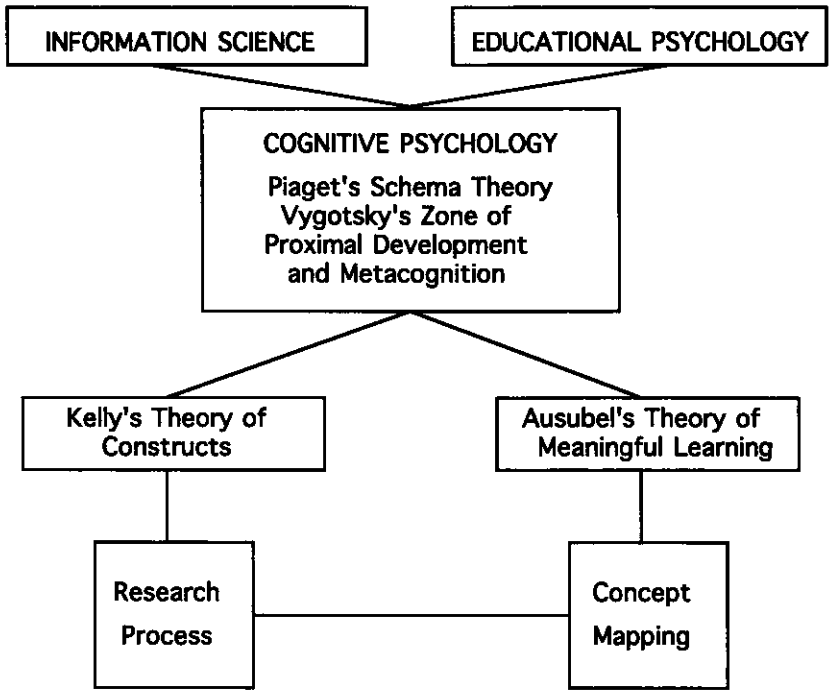
months, while the other, taught by the same teacher, received the same classroom instruction without mapping. Data on searching behavior of students, the Biology teacher, and the librarian were collected during audio-taped think-aloud search sessions followed by structured interviews. Participants wrote transaction logs from memory immediately following each search. Stimulated recall was used as an interview method; key informants were provided with written transcriptions of their think-aloud sessions. Participants maintained journals from the beginning of the genetics unit to the end of the research project. De-briefing took place immediately following each session of data collection. The constant comparative method of analysis was applied to these data. Calculations based on Bayesian statistics and the Fano measure from information theory were triangulated with qualitative analysis of data. Information searching, as defined by Kuhlthau's ISP model, was examined to include stages from pre-focus formulation to writing the research paper.

Figure 1: A Conceptual Model of the Study



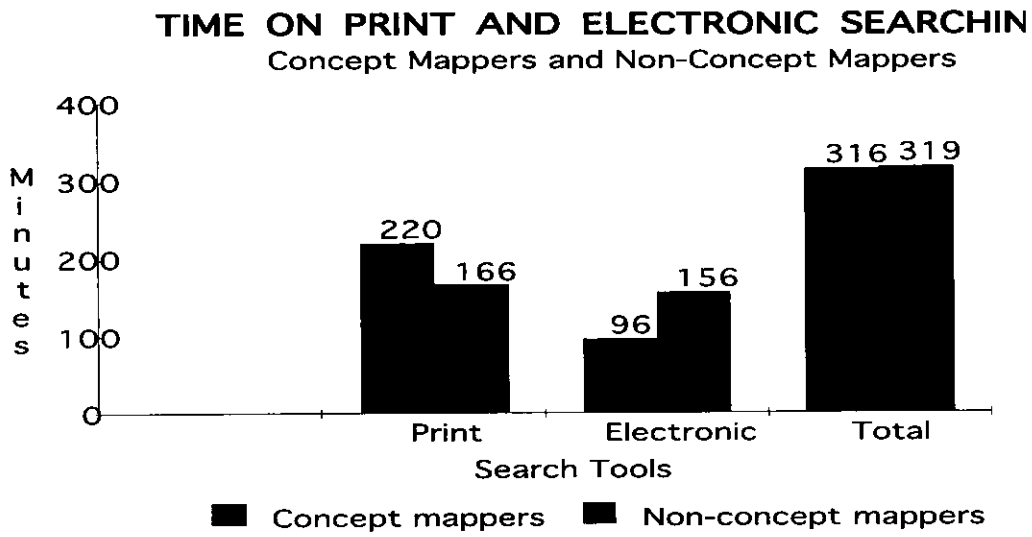
The theoretical framework drew from the research traditions in Education and Information Science studies based on cognitive psychology. Figure 2 illustrates the components of this framework.

Figure 2: Theoretical Framework for the Study



Analysis of the Data. The raw data for time spent searching on electronic and print search tools is shown in Figure 3. The total time spent searching by the two groups differed by only three minutes, with the mappers searching a total of 316 minutes and the non-mappers searching for a total of 319 minutes. There was some difference between the total time spent by the two groups researching print indexes: mappers searched for 220 minutes while non-mappers searched 166 minutes.

Figure 3: Total Time Spent Searching on Print and Electronic Search Tools



When the time allotted to print indexes was compared with computerized search tools, it was observed that mappers spent 96 minutes of their total time searching electronically while non-mappers spent 156 minutes on computers. As noted, there was virtually no difference in the total searching time of both groups. Another way of highlighting the differences in apportionment of time is shown in Figure 4 for mappers and Figure 5 for non-mappers. Mappers spent 6.6% of their search time on the OPAC while non-mappers spent twice as much time at the OPAC. The total time on computer search tools, i.e., OPAC and SIRS, was 30.3% of total time spent searching by mappers and 48% for non-mappers. The allotment of time to print indexes was 69.7% for mappers and 52% for non-mappers.

Figure 4: Search Time Allotment--Mappers

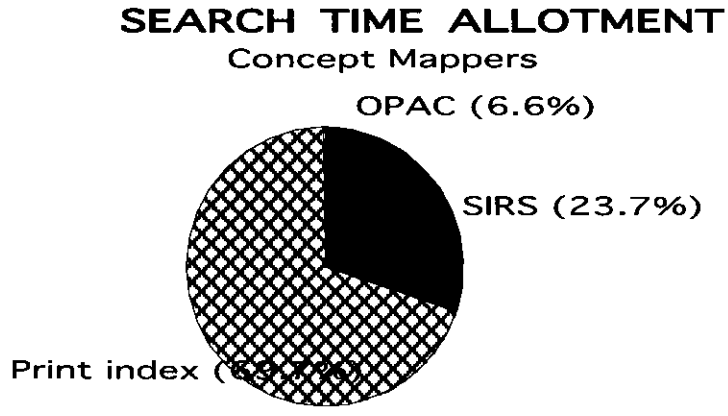
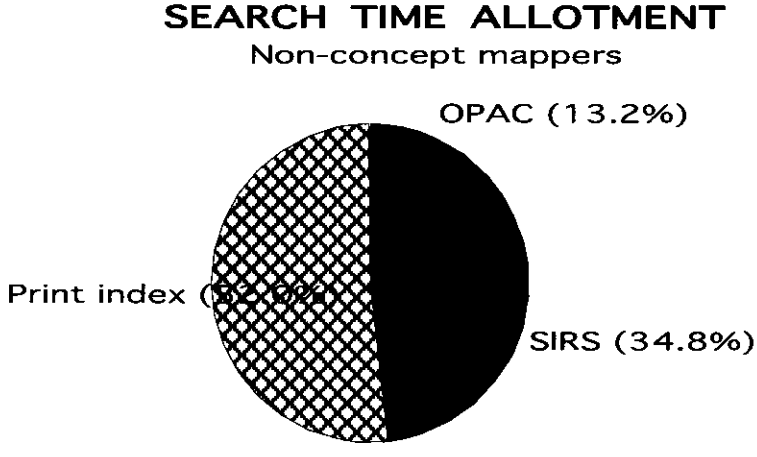


Figure 5: Search Time Allotment--Non-mappers



A useful way of encapsulating the essence of diagrams such as those in Figures 3, 4 and 5, and avoiding the subjectivity inherent in visual judgment of graphs, is to process the quantities represented to information measures. Even more importantly, the approach allows account to be taken of the fact that a particular type of education or training might have a beneficial effect in favor of some activity A even if the student still spends less time in that activity A than in other activities. To allow this analysis, the amount of time spent in each kind of pursuit (use of print, use of electronic) is interpreted as proportional to a probability, i.e.,

the probability that the student will be found in the specified pursuit, such as use of print, at any time. The ratio of time in one activity as opposed to another is, in effect, compared with (expressed, relative to) the ratio that we "expect" if we pool (and thus choose not to distinguish) concept map from non-concept map students. Logarithms are taken consistent with the theory of information posed by Fano, and in this case natural (base e) logarithms resulting in natural units or 'nats' of information. The formula used is as follows:

I(use=print : electronic ; mappers) =

log[P(mappers, print) / P(mappers, electronic)]

- log[P(print) / P(electronic)]

This could be read as "the amount of information provided by concept map training that the student will use print at any time as opposed to electronic means." The semi-colon means "information provided by" and the colon means "as opposed to." Substituting the times, we obtain log[220/96] - log[386/252] = +0.40 nats as the measure of that information. Because we are estimating probabilities from data in regard to time spent, it is customary to express results as being conditional on that assumption about data. To do this, a vertical bar is used to express the notion of "conditional on." That is, we may write

I(use=print : electronic ; mappers | time spent) = + 0.40 nats

which means the information being positive indicates that the information is information in favor of the student using print means at any time. Repeating this but now replacing the values for mappers by those for non-mappers, we obtain the information measure

I(use=print : electronic ; non-mappers | time spent)

which could be read as "the amount of information provided by non-concept map training that the student will use print at any time as opposed to electronic means." This yields

log[166/156] - log [386/252] = - 0.36 nats.

That is, we may write

I(use=print : electronic ; non-mappers | time spent) = - 0.36 nats

This measure, being negative, indicates that the information is information against the non-mappers using print at any time. As it happens, the effect is quite strong, such that this can be taken as equivalent to the fact that mappers will be more likely to use print. However the subtlety of the measure is that it could be

that the concept map training was shown to have a positive effect even if it was still less probable that print would be used. For example, your vote is a step in the right direction for your party even if it doesn't get elected! Note also that basic information theory does not make statements about significance, but only about the amount of information available and representing a "weight of evidence," loosely analogous to stating the level of confidence limit at which a given hypothesis would become acceptable in classical statistics. The above measures correspond to the kind of value one would obtain IF there was expected to be no bias and the results showed mappers to spend 50% more time in print than in electronic, which in this example is consistent with the impression easily gained from the diagram. In contrast to classical statistics the information theory approach likes to consider both Type I and Type II errors as of relevance, and this is implied in the above approach.

Although not used by Fano in that it loses comparative detail in relation to what is "expected", subtracting the second (non-concept mapper) measure from the first (concept-mapper) measure is some measure of the total information available in distinguishing mappers and non-mappers, and is

I(use=print : electronic ; mappers : non-mappers | time spent) =

+ 0.767 nats

The difference between measures for mappers and non-mappers is +.767, or about three-fourths the value of 1 nat (1 = natural log 2.718) or 2.04. This means that if there was the expectation that no bias existed between the use of print as opposed to electronic by mappers and non-mappers regarding time spent, the difference between the time spent by mappers and non-mappers in print is more than 2 nats. A measure of 1 nat or more is generally regarded as particularly "meaningful."

An alternative measure is

I(user=concept mapper : non-concept mapper ; print | time spent) = + 0.29 nats

and

I(user=concept-mapper : non-concept mapper ; print | time spent) = - 0.48 nat

This measure has some conceptual advantages in that it is predictive, reading as the "information that the time spent in the technique used tells about whether the user is a concept mapper or non-concept mapper." In the first case, the log of mappers' time in print (220 minutes) divided by non-mappers' time in print (166 minutes) minus the log of total time spent searching by mappers (316 minutes) minus total time spent searching by non-mappers (319 minutes) yields an

information measure of +0.29 which measures the amount of information in favor of the user being a concept mapper. Similarly, the second measure of -.48, obtained by subtracting +.29 from +.767, or the difference between the two information measures for mappers and non-mappers of time spent in print as opposed to electronic (+.40 and -.36) yields a measure of the amount of information in favor of the user being a non-concept mapper, (i.e., -.48.) The measure of +.29 is a useful, single measure, indicating by the positive sign of the measure of mappers that the mappers are doing better. Not least, the non-mappers are the whole complementary set to the mappers (they are "mutually exclusive") which covers all possible outcomes and so facilitates interpretation. However it leads to generally similar conclusions but seems less natural with regard to sequence of events in time, i.e., than considering the information provided for the posteriori process of searching by the prior process of the choice of the method of teaching (concept map or non-concept map). Further, for related reasons we are interested in predicting the search performance of a searcher given whether he is a concept mapper or not, which is another way of saying whether we consider the concept map training useful.

The methodology used here differs from the Fano measure in that it involves the difference between two such measures, in which the researcher considers the information for a hypothesis or an event, and then subtracts the information against the hypothesis or event, this latter information being regarded as relevant, but contradicting, information,. This then resembles other measures such as the 'K-statistc'. It was then regarded that many such measures could be held for a given set of sparse date, including cases like zero or one observations. A Bayesian expectation of the method was then evaluated over all the different measures that might exist in the mind of the researcher using Bayesian theory. As it happens, this approach and the mathematical integration implied in it led to a quite simple approach with a flavor of its own, which allowed a pencil and paper evaluation of the information content of sparse events.

Triangulation with Qualitative Data. Qualitative data provided evidence for formulating hypotheses that could explain the effects indicated by application of the measures of expected information. When asked whether they preferred print or computer searching, mappers did not share a consensus as a group. It was not yet obvious why mappers allocated more time to print.

Non-mappers unanimously expressed a preference for electronic rather than print because computers seemed to make searching easier. Their reasons for the preference indicated that either the computer helped them to cut through the large quantities of information or it provided them with a lot of information, which made them feel confident about searching even if that information was irrelevant.

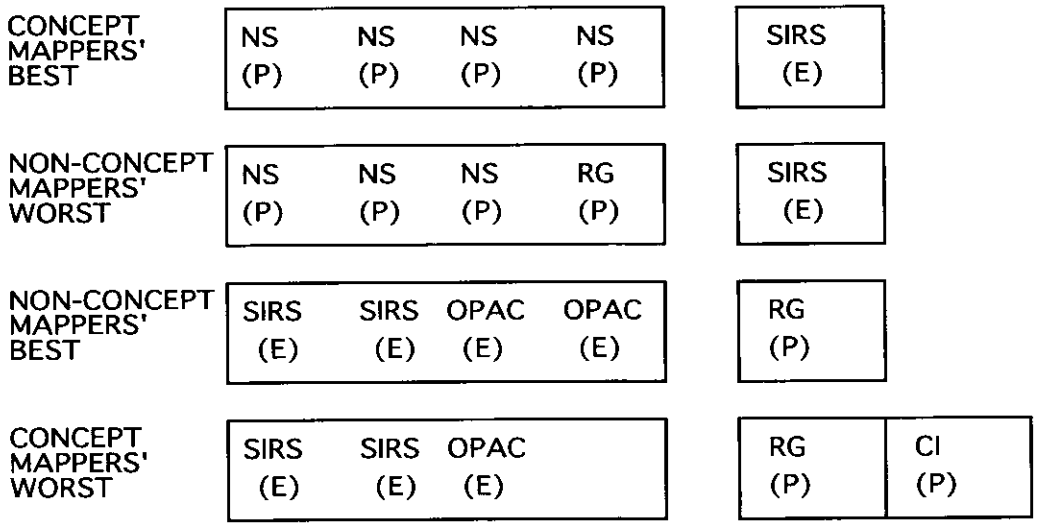
Data in Figure 6 shows stated preferences of searchers made about their best and worst searches. While a stated preference for a search tool is not

synonymous with judging that a search was a successful, one would expect to find some correlation between the two. Four mappers chose print indexes as their best searches, while only one chose a computer index, agreeing with their stated preferences for print indexes. On the other hand, four non-mappers chose computer indexes as their best searches while only one chose mappers thought their worst searches were electronic while two chose the print indexes for this category. Four of the non-mappers thought their worst searches were a print index. This evidence supports the non-mappers' stated preferences for electronic searching. When choices for the worst searches were compared, three of the mappers chose print indexes while only one chose a computer index as his worst. There was more correlation between the non-mappers stated preference for electronic and their choices of their best searches than for the mappers, who said they liked electronic searching but chose print indexes as their best searches. The choices of the two groups for best and worst searches are almost mirror images of each other: print searches were chosen for the mappers best searches and for the non-mappers worst four out of five times. Similarly, non-concept mappers chose computer search tools as instruments of their best searches while concept mappers chose them as instruments of their worst in almost the same ratio.

When non-mappers best searches were compared with mappers' worst searches, the same pattern was observed: non-mappers' best corresponded almost exactly to mappers' worst. Scrutiny of the search tools offered some clues for preferences. From the four mappers who preferred print indexes, three stated the *New Scientist* as their preference, which was the most difficult search tool to use because of its complicated coding system. It also indexed the most difficult, yet scientific and technical, reading material. The fourth concept mapper who preferred the print index stated a preference for *Critical Issues*, which indexes articles from the *New York Times*. This index was also difficult to use because it was coded to microfiche that was retrieved from a binder separate from the index. Searchers also had to learn how to use the microfiche reader printer. Mappers did not perceive any of these difficulties as obstacles. Some even saw the print indexes as an aid in focusing: "*The Readers' Guide* has helped me focus by showing me what articles are available on different subjects and to break down the subject." On the other hand, non-mappers chose the same types of indexes as their worst search tools, with the exception of Christian. He noted in his journal that the *Readers' Guide* "...has been my longest search so far. What I achieved through the search...is that out of the huge number of sources the search provided, it helped me to realize that a lot of the information that I had been considering was irrelevant given the time and length limits placed on this paper. I think this was the first search which has made me realize that I must maintain my focus if I am ever going to get this done!" Mappers tendency to spend more time in print indexes was directly related to: 1) the high quality of scientific, technical information retrieved through print indexes; 2) the large

number of sources the indexes yielded; 3) the rich supply of search terms the indexes offered by cross-references and titles.

Figure 6: Searchers' Best and Worst Searches



P = PRINT INDEXES **E = ELECTRONIC INDEXES**
NS = NEW SCIENTIST INDEX **OPAC = ONLINE PUBLIC ACCESS CATALOG**
RG = READERS' GUIDE INDEX **SIRS = FULL-TEXT DATABASE**
CI = CRITICAL ISSUES INDEX

A closer look at what the searchers were doing with their time revealed more information about the reasons for their preferences and time allotments. The number of sessions that the two groups searched differed, as shown in Table 1. Mappers searched a total of 24 sessions, 7 of which were electronic searches, which represents 29% of their total number of search sessions compared with the non-mappers, who had 9 electronic search sessions, which represents 53% of their total number of search sessions. For print sessions, the reverse was true with mappers spending 17 sessions, or 71% of their total number of sessions, in print; non-mappers spent 8 sessions in print, or 47% of the total number of sessions. These comparisons support earlier findings that mappers showed a preference for print index searching, allocating more sessions and longer periods of time to them.

When the number and length of search sessions is examined (Table 1), it can be seen that mappers spent more time and more sessions in print, but their sessions were shorter than non-mappers, indicating that they were either

searching faster and possibly doing more, or searching shorter periods of time during which they were doing less.

Table 1: Number and Length of Search Sessions

	Total time	Mean length of session	No. of sessions	Mean time per searcher
Electronic				
CM	96	19.2	7	2.7
NCM	156	30.6	9	3.7
Print				
CM	220	12.9	17	1.8
NCM	166	20.8	8	2.6
Total				
CM	316	13.2	24	12.9
NCM	319	18.8	17	20.8

Why did mappers search about one-third of their time on electronic tools while non-mappers searched almost half their time on computers? Why did mappers prefer print indexes while non-mappers spent considerably more time on electronic searches? Did electronic methods compensate for non-mappers lack of a conceptual map? Do electronic methods benefit mappers or non-mappers?

Critical to answering these questions was the data that would indicate whether mappers were searching more efficiently in electronic tools and more thoroughly in print indexes as compared to their non-mapper counterparts. Examination of the remaining search characteristics using the Theory of Expected Information was intended to explore how searchers used their time and the rates at which they performed search functions in order to make judgments about efficiency and thoroughness of their searches.

These questions led to applying the Expected Information measure to ten search characteristics.

Findings. Table 2 summarizes the information measures for ten search characteristics. In each instance, supporting qualitative data supplied explanations and insights about these measures.

Table 2: Summary of Measures of Search Characteristics

Search Characteristic	Mappers	Non-Mappers
Print vs. electronic	0.40	-0.36
SIRS vs. OPAC	0.96	-1.65
Subject vs. key word	0.74	-0.41
Total search word repertoire	0.91	-0.74
Unique search word repertoire	0.61	-0.41
Opening moves	0.72	-0.52
Reformulations	0.78	-0.57
Search operations	0.79	-0.64
Breadth searching	0.60	-0.47
Depth searching	0.22	-0.21

The differences between the two measures for each search characteristic is the measure of the probability that mappers searched more thoroughly and more efficiently. In all cases that probability measured at least half a nat (one nat being equal to 2.718), indicating that the chances were approaching twice as likely that searchers engaged in these functions in print indexes were mappers. The sign plus or minus is an indication: conclusive statements cannot be made on the strength of the effect. Since the study defined successful searching in terms of these indicators, findings strongly indicated that the amount of information available was in favor of mappers doing more in their searching, i.e., being more thorough searchers who showed a preference for print search tools.

There was a greater probability that mappers will use print rather than electronic means, that they will search in SIRS rather than the OPAC, and that in electronic searching they will conduct subject heading rather than keyword searches. In print, as opposed to electronic searching, measures showed mappers applied a larger number of search terms, employed opening moves, re-formulations, search operations, and relevancy judgments more often and executed more depth than breadth searching. In all cases probability measured at least half a nat (one nat equals 2.718), indicating chances were approaching twice as likely that searchers exhibiting these characteristics in print indexes will be mappers. Larger differences between the groups emerged in electronic searching, where mappers spent less time. Quantitative data verified mappers were more thorough and efficient, reformulating by shifting synonyms and moving from general to specific search terms and terminating searches to read rather than when they depleted their search terms. Stronger focus formulation emerged as the most important determinant of searching behavior. Further research is recommended to replicate the study with a larger sample, using information theory as an alternative to classical statistics in hybrid qualitative-quantitative studies.

A summary of information measures on the number of times per minute opening moves, re-formulations and search operations were performed is reported in Table 3.

Table 3: Summary of Measures of Rates of Search Operations

Search Operations	Mappers	Non-Mappers
Opening moves	-0.25	0.3
Re-formulations	-0.26	0.34
Search operations	-0.33	0.38

Data indicated a trend: mappers will perform these operations about the same number of times per minute and make more relevancy judgments while searching in print as opposed to electronic search tools, which is appropriate given the nature of manual as opposed to electronic searching. With attention to sign, negative values were computed for print as opposed to electronic for reasons of consistency and comparison. The resulting measures indicated that the signs of the computations were consistently in favor of the probability that mappers would use these operations in electronic searching as opposed to print, the sign being inverted for the calculation of electronic as opposed to print. These characteristics were calculated per minute, indicating rate: mappers were performing the functions faster if they were able to do more per minute. Since the study defined the search in terms of these indicators, the findings strongly indicated that from these measures that the amount of information available was in favor of the mappers doing less per minute in their print searching, i.e., being more thorough given the nature of print searching.

The probability of assessing whether these results could arise by chance was actually quite difficult for a calculation of this nature. The nature of the indication of an information measure reflects the probability that a concept mapper will get one kind of result as opposed to another. However, the proper procedure would be to progressively increase the number of individuals in the sample until the results converge and become approximately independent of the sample size. This could be accomplished by replicating the study and using cumulative data in order to keep the sample small.

The relationship between the quantification of data and the texture and depth of understanding provided by qualitative data was synergistic in the analytical process that sought to explain as well as describe what was going on in the search process. Emerging patterns of searching behavior in print and electronic environments were outlined by numerical summaries; texture and color of related qualitative description served to provide a measure of understanding. For example, while characteristics of searching behavior, i.e., search word repertoire, opening moves, and reformulations, could be quantified to point out differences in print and electronic environments, qualitative data provided explanation for relevancy judgments and connections. The interplay of numerical and verbal descriptions served to push the analysis toward understanding the searching phenomenon in depth, e.g., the interdependence of focus formulation and

information overload. Qualitative data, through triangulation of students' testimony about their own thought processes with observations of their performance, shed light on the meta-cognitive aspects of searching. Quantification of the data provided direction and structure, as illustrated by the examination of key word and subject searching and search word repertoire, which highlighted characteristics of the concept-driven search. In every instance qualitative evidence supported the findings described through the information measures: mappers were more thorough and efficient in their searching, more inclined to concept-driven searching as evidenced by their ability to focus and make connections, and more inclined to make meta-cognitive judgments that led to successful searching.

The searching behavior of mappers was more thorough and more efficient if they:

- Reformulated by shifting synonyms and moving from general to specific search terms rather than by changing concepts, so their reformulations were within the focus of the search.
- Avoided information overload.
- Made more connections in a balanced and eclectic pattern from print and electronic search tools.
- Terminated searches, because they wanted to read and not because they exhausted their repertoire of search terms.

Analysis of the data has shown that the most dramatic differences between mappers and non-mappers emerged in electronic searching where the mappers:

- Spent less time searching.
- Searched for fewer and shorter sessions.
- Preferred subject heading to key word searching.
- Spent less time in the OPAC than in the electronic index..
- Had fewer search words in repertoire of non-repeated words and in total number of search words.
- Generated fewer opening moves and generated them at a faster rate.
- Generated fewer search strings and generated them at a faster rate.
- Generated fewer reformulations and generated them at a faster rate.
- Generated fewer search operations and generated them at a faster rate.
- Generated fewer relevancy judgments.
- Performed a larger percentage of depth rather than breadth searches.

Based on these observations the researcher concluded that mappers were more sensitive to the electronic environment. They were more efficient in the way they used their time to perform more search operations per minute and more thorough in consistently applying a more concise repertoire of search terms and in engaging in more depth searching. Without the benefit of quantification and the

resulting predictive nature of the information measures, the study's findings would have been based on raw numerical data without benefit of degree of certainty about conclusions reached and without the strength of a predictive information measure.

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Chapter 3

Learning in an Information-Rich Environment: Preliminary Results

Treasure Mountain/Elms Research Retreat
Elms Resort and Spa
Excelsior Springs, MO
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Charles Dickens said it most eloquently: "It was the best of times, it was the worst of times" (Dickens, p.1). Dickens was writing about the eighteenth century's French Revolution, but his words can be applied to today's information revolution as well. Then, the ideals of "Liberty, equality, and fraternity" propelled an uprising that ultimately changed the world for the better, but the uprising itself created suffering throughout France and long-term anxiety in the rest of Europe. Now, the promise of universal access to unfettered information is also generating a world-changing revolution that promises increased worldwide knowledge and eventual prosperity for all, but the recent collapse of the dot.coms certainly caused suffering for the information visionaries at the heart of today's information world and a good deal of anxiety for many of the rest of us.

Let me stretch the comparison even further, and perhaps too thinly. But I think it's fair to say that today is the best and the worst of times for the library media field, too. It's the best of times for at least two reasons: first, because we see far more clearly than many educators the promise of information as a learning tool and, second, because our skills and knowledge give

us a place at the heart of the revolution. Worst? Not only because, as many fear, we may become casualties of the revolution as interest in the technology outpaces interest in information but also because we seem to be stranded between wealth of opportunity and poverty of implementation. We have an extraordinary wealth of information resources at our disposal but very little in the way of research-based models of teaching and learning that give us insights about how to exploit these resources for learning. Sophisticated tools surround us, but as yet we understand how to use them for learning in only the simplest of ways.

Introduction

It's important to think about why this might be so. The issues involved in learning in an information-rich environment transcend the traditional notions of schooling and its usual organization, including the separation between the library media center and the classroom. We all know that students access information from classrooms and homes as well as in the library media center. Issues once the province of library media specialists are increasingly cropping up in teachers' discussions: terms like "authority" and "relevance" are now part of teachers' vocabularies as well as our own. But let's think about these obvious behavioral changes in a broader, more theoretical way.

About a decade ago, Don Ely wrote in a paper neither he nor I have been able to track down that information technology and instructional technology were merging. He was right, of course: the World Wide Web (which appeared several years after Ely's prescient statement) is the epitome of that merger. Designed as an information and communication technology, it has swept the schools as a learning environment as well. The implications of this merger are vast and little understood. Researchers, theorists, and practitioners who struggle to work in this fundamentally changed educational environment all have something to contribute to the ongoing dialog. I believe, however, that one of the primary implications of the merger of information and technology-based learning environments provided by the Web is that it places the library media field at the heart of modern education's most important challenge: to determine how to use information and information technology for effective, substantial learning and teaching.

But saying information and information technology are central is the easy part. The more complex question is, What do we do about it? We know that many things from our past experience carry over readily to the new information-rich learning environment. But we also know, or at least suspect, that we must also discover new ways and means of teaching and learning in this environment as well. We don't yet know in any detail how teachers and students can gain the greatest learning benefits inherent specifically in an information-rich environment. We must still discover the particular concepts, skills, and attitudes both adults and children must acquire to use advanced hardware and software in the service

of insightful teaching and deep and meaningful learning. We are just beginning to understand and document the teaching and learning strategies required to help students and teachers alike go beyond simply pointing, clicking, and superficial surfing to become competent and successful participants in the information revolution.

A Brief Literature Review

Fortunately, the library and information science field has developed a body of research that provides theoretical and evidence-based grounding for studying these issues. We can look, for example, to a long history of studies on information seeking in electronic environments that set the stage for some of the questions of interest: Bilal, 2000, 2001; Fidel, 1999; Hirsch, 1997, 1999; Perzylo and Oliver, 1992; Schachter, Chung, & Dorr, 1998; Small & Ferreira, 1994; and Solomon, 1993. Other research from information studies has glanced at learning in these environments, suggesting the connection but not relating the learning experience directly to the information in the resources at hand: Callison and Daniels, 1988; Crane & Markowitz, 1994; Kafai & Bates, 1997; Kuhlthau, 1997; Liebscher & Marchionini, 1988; Mancall, 1984; Marchioninini, 1989; Marchionini and Teague, 1987; Neuman, 1995, 1997; and Solomon, 1994. Still other studies have directly addressed the connection between learning and electronic environments (for example, Chung, 2002; Large *et al.*, 1994, 1995; and Neuman, 1993, 2001) opening an important stream of library and information science inquiry but leaving much to be done. Large *et al.*'s research, by far information science's most extensive and impressive on this general topic, needs to be buttressed and expanded by their own future studies and by others' work as well.

The field of instructional systems design has also provided theoretical and research-based grounding for research into important questions about information and learning. Over a decade ago, Robert Kozma's 1991 article on learning *with* media, rather than *from* media--opened the door for researchers interested in understanding the interaction between cognition and various representations of information. His work continues to provide strong theoretical guidance for designing research on learning in the information-rich, multimedia environment found in today's library media centers. A variety of other work in this field, much of it done by Michael Hannafin and his colleagues at the University of Georgia, offers additional theoretical and research-based insights. (See, for example, Hannafin, 1992; Hannafin *et al.*, 1994, 1999; Hill, 1999; Hill and Hannafin, 2001; Oliver and Hannafin, 2001; Park and Hannafin, 1993.) Others, too, have begun to conduct research on learning and information within an instructional-design framework: see, for example, Goodrum, Dorsey, and Schwen (1993) and Mioduser (2000). Jonassen, Peck, and Wilson, prominent members of the instructional-design research community, published a text in 1999 that explains the constructivist view of how technologies can foster learning and notes that one role technologies play casts them as "information vehicles for exploring knowledge" by providing opportunities "for accessing information [and]

for comparing perspectives, beliefs, and world views" (p. 13). Clearly, thinking of information resources as learning tools is a key element in studying the kind of learning that is at the heart of the library media profession's mission and that is, furthermore, "the authentic learning that modern education seeks to promote" (AASL and AECT, 1998, p. 2).

Research Questions

This study was designed to contribute to our growing knowledge base on learning in information-rich environments by addressing the question of what students and teachers need to know and be able to do in order to use sophisticated resources for meaningful learning. Grounded in the literature cited above and couched in a framework provided by research and theory in both information studies and instructional systems design, the study was guided by three foreshadowing questions:

1. What learning tasks yield the most significant opportunities for meaningful learning?
2. What instructional strategies and techniques must teachers and library media specialists develop in order to design, deliver, and evaluate these tasks?
3. What learning strategies and techniques must students develop in order to learn deeply and meaningfully from these tasks?

Overview of the Study

The study was conducted at Meade Middle School in Anne Arundel County, Maryland, a largely suburban and rural area about thirty miles from Washington, D.C. Meade is a new school (opened in the fall of 1998) that was designed to incorporate the latest insights in middle-school pedagogy and the most advanced technologies available at the time. Physically, it consists of six "houses," two for each of three grades (sixth, seventh, and eighth), and includes state-of-the-art music, fitness, technology-education, and other facilities. It opened with over 200 computers devoted to instructional use—one in every classroom, 68 divided between two labs, 31 in the media-center lab, and eight on mobile carts—and with a variety of other high-tech equipment as well: digital cameras, scanners, visual presenters, and digital editors.

Meade enrolls approximately 850 students, 56% percent of whom are African American; 36%, Caucasian; 4%, Asian; and 3%, Hispanic; 41% of the students are eligible for the school's free and reduced-priced breakfast/lunch program, and 45% are reading below grade level. The students are taught by 55 teachers, most organized into interdisciplinary teams who cover core curriculum areas and others who offer a variety of special subjects (i.e., art, ESOL, music, family and consumer science, foreign language, physical education, and technology education). The school has a principal and two vice principals, a variety of

counselors and other student-support personnel, and a library media center staff comprised of one full-time certified library media specialist and one full-time aide.

The research project involved five teachers, 140 students in sixth and seventh grades, and, of course, the library media specialist. Data collection occurred over two academic years and included extensive observations in classrooms, technology and computer labs, and the library media center; individual interviews with adult participants and focus-group interviews and students; and the gathering of documents related to a variety of teaching and learning tasks. By the time the data collection ended, both the adults and the children at Meade had had three years of experience with a variety of technologies. They'd had the opportunity to develop skills and strategies that other, less technology-rich schools have never had. Their experience and resultant expertise have yielded insights we hope will be of value to many others.

Preliminary Findings

Data analysis is still underway, and a full description of either the analytic techniques or the final results and conclusions of the study would be premature. However, preliminary analysis has resulted in the identification of several themes, including key findings related to both teaching and learning. The next section of this paper discusses three such findings, all three related to teachers' strategies and the final one related to students' learning as well. The section ends with a discussion of the implications of this third finding for learning in an information-rich environment.

1. Isolating specific practices

In some respects, my interviews with the library media specialist and the teachers were very frustrating. Over and over, they told me they didn't really do anything differently because of the technology that surrounded them. If one offered an idea of a "new" strategy, he or she would often back off, saying something like, "But that's really just good pedagogy." This was not the kind of answer I had hoped to get, but its prevalence suggests the difficulty of discovering what we in the research community still have to learn. Isolating what is unique to this environment from what is "just good pedagogy" is a complex task.

There are two extreme ways to interpret the teachers' responses: first, that they really weren't doing anything new or different, that they were simply using all this power at their disposal to design and deliver the same old instruction in the same old ways, perhaps with the addition of a few new bells and whistles. The second extreme interpretation is that in the rather brief time they'd had to experiment with the technologies, the instructional staff had integrated them so smoothly into their teaching repertoires that they simply didn't perceive how deeply they had changed their thinking about teaching and their planning and conduct of

instruction. While I believe I encountered a bit of each extreme during my field work, I think most of what I saw lay somewhere between them.

The teachers had, in fact, developed new strategies and techniques; but these were generally extensions of the teaching repertoires they had brought with them to the school's environment. Significantly, most teachers seemed to have a level of understanding of the "toolness" of the technologies that emerged from having so much technology at their disposal that they no longer thought of it as exotic and so could use it in straightforward and sometimes creative ways. While their use of technologies wasn't always seamless, it was generally smooth. And while they could certainly be seduced by the sound and light show provided by a new technological toy, they seemed more likely to fold whatever technology was available into their established pedagogical patterns than to develop grand new strategies simply because a particular tool was available. The changes I saw were generally subtle and difficult to detect.

2. Orchestration

One clear, overriding theme involving teachers and technology did emerge, however: a series of activities I've been calling "orchestration" because they remind me of the way a composer arranges different elements of music, notes, themes, harmonies, and instruments--to create an effective final product. The instructional staff I observed and interviewed were masterful at orchestrating the various elements of technology-enhanced teaching and learning: hardware, software, learning goals, instructional strategies, and students. I was struck, however, by the tremendous effort this orchestration takes. And I think it has two dimensions: what teachers do when they plan in advance of their classes and what they do when those classes are actually in session.

When teachers engage in advance planning for teaching and learning in an information-rich environment, they must decide what technology (or aspect of a given technology) will best serve their students' needs and their lessons' content. They must determine how to adapt particular hardware and software to meet individual students' situations and their own goals and objectives. They must have a series of back-up plans, both technological and pedagogical, so they won't be caught short if a piece of the technology goes down. All this really means that teachers must do virtually "double advance planning" for each lesson that's heavily dependent on technology, especially the Web but also more confined, more reliable pieces of software. This dimension of teacher planning simply isn't addressed in any research that I've seen. It's one of those areas that practice knows all too well that need to be communicated beyond the schoolhouse walls.

What teachers must do in the moment, every moment, in a technology-rich environment is even more daunting. Technical trouble-shooting is just the beginning in terms of pedagogy. Beyond dealing with equipment failure or

malfunction, teachers must: manage down time; keep students on task (or at least in learning mode) when the site won't load or the software won't run; adapt resources on the fly to highlight some facets of a site or a program while ignoring others; respond to one student who has a question about one aspect of a lesson and then race across the classroom or lab or media center to respond to another student who's stuck on a completely different site and question. That kind of orchestration takes a tremendous amount of cognitive flexibility, not to mention physical stamina. The nature of this phenomenon as well as specific findings related to the details of how it happens are generally absent from the research literature of which I'm aware.

3. Structure

Another particularly strong theme that emerged from my preliminary data analysis relates to both teachers and students. In a word, the issue is "structure." This study as well as others that I and others have done has led me to conclude that this particular theme is the single most important issue related to student learning in an information-rich environment, particularly the Web. The issue encompasses (1) how teachers design structures to help students cope with a wealth of information that is diverse, unrelated, and often contradictory; (2) how students learn to understand and apply teacher-provided structures; and (3) how students might learn to generate and apply appropriate and effective structures of their own.

In more "traditional" learning environments, lectures, textbooks, and other didactic tools provide content structures that students can adopt as their own. These tools are self-contained wholes that provide internal coherence and ways that students can understand that coherence: an index, for example, or chapter headings and questions at the end of the chapter provide indicators of the organization that the author or authors imposed on the overall content of the tool. Graphic design and layout, font sizes and styles, color, white space, etc.--reinforce this organization and help students develop a sense of the relationships and relative importance of various segments of the work almost by osmosis. Newer tools, like the Web, not only don't come equipped with such indicators but work on the assumption that users themselves have the built-in skills and understanding necessary to construct their own sensible structures from discrete pieces of information. My own work in this and other studies has convinced me that teachersBand especially library media specialists--cannot assume that students have such "structuring" skills. We cannot assume that students have acquired these skills incidentally or that they can understand and apply principles of structuring without extensive intervention.

Every teacher with whom I worked in this study used one or more tools to help students structure the information they found using various information resources. The library media specialist's packets, 5- or 6-page printed documents that guide students through projects that incorporate the information-

seeking process, are one example of a tool that provides extensive scaffolding and therefore a prefabricated structure to support students' process of gathering and using information. These packets are legendary, and unavoidable, at the school.

One teacher, whose class research project I followed very closely, used a variation of the packet idea and also employed a host of related tools throughout that project to help students conduct their work and structure their final products. Because this project provides a touchstone for many of the ideas about structure that I think are critical, I'll describe it in some depth.

After the teacher had introduced the project and approved the topics, the students began gathering their information from a series of approved Web sites. As an inherent part of this task, each student was required to complete a 4-page note-taking sheet that specified the information that the teacher wanted to see included in all the final papers. A student working on the white tiger, for example, knew to include information on diet, habitat, predators, reproductive system, relationship to humankind, and so forth; a student working on the dolphin knew to include the same kind of information about that animal. Because the note-taking sheet indicated not only the *kind* of information required but also the *order* in which students were to record that information, the strategy of the note-taking sheet gave students the general structure for their final papers. Moreover, it had them work within that structure from the very beginning of the assignment.

Next, after they'd taken their notes, the students used a prewriting tool in the form of a graphic organizer onto which they transferred those notes. Once again, this tool specified not only the content for each of the five paragraphs required for the final paper but the order of the paragraphs and the order of the information to be included in each paragraph: the third paragraph, for example, always had to include two sentences about the animal's social behavior and one about its reproductive system; the fourth, two sentences about its predators followed by two about its diet.

Moving on in the process, the students prepared five-paragraph rough drafts based on their prewriting organizers so they could get their narratives in place, again, following the particular structure embodied in the graphic organizer. At last, the students completed their final papers, within the same structure they had been given at the very beginning. The papers were only five paragraphs long, and many fit easily on a single page. What is noteworthy is the amount of structure the teacher believed was necessary to get the students to that point.

By the end of the assignment, the students had had four separate opportunities to work with the structure that the teacher had generated for the project. Although there was no specific instruction on that structure in and of itself, the teacher clearly saw the necessity for helping students work within an appropriate, coherent structure in order to gather information effectively and formulate it into

an acceptable final product. The library media specialist reported that many projects at the school incorporate similar strategies to help students structure their information. The assumption, of course, is that over time students will internalize the concepts and processes of structuring and then transfer this internalization to other areas of their studies and their lives.

I've never believed that the automatic transfer of abstractions like "structure" is possible for the majority of students, and my work in this study has confirmed me even more strongly in that belief. Good students do seem to understand the need for structure implicitly: one such student, in response to a question in a group interview about how students usually decided what information to put into their reports, replied:

> Well, usually I just follow my instincts. Like if I think something should be in like the first paragraph or the second, then I usually put it there. But then, once I read over it, and I usually do this with my rough draft, once I read over it and if I don't think it sounds good, I'll probably switch it around or something like that. But usually I just use my first instincts.

Clearly, the student wasn't able to articulate a strategy for deciding what information was important and what structure would best convey that information. Did she have such a strategy? I don't know. Developmentally, a seventh-grader might indeed have such a strategy yet be unable to verbalize it. I do know, however, that she had good instincts that served her well. And I suspect that, had she been given a tool to make those instincts explicit rather than intuitive, her final performance wouldn't have been much better than it was.

Less-advanced students, however, present greater problems, not only in their abilities to verbalize their strategies for structuring, but also in their conceptualizations of the whole notion of structuring. These students seem to believe that isolated facts are just that, isolated, and that an unrelated scattering of them is sufficient. Good students seem to look for structure and even to be willing to accept another's structure as an efficient way to move toward their own understanding. Less-advanced students can indeed follow a pattern established by another but seem not to understand that the pattern is separate from the content itself, much less to internalize the abstract notion of interrelationships that such a pattern implies. There is, of course, a need for much additional research to confirm my beginning suspicions about this phenomenon.

At the moment, however, the question becomes, What will happen to students, especially less-advanced ones, when there's no teacher present to suggest or impose a structure on their encounters with the vast array of information available to them in today's formal and informal learning environments? How many of our students are in fact capable of inventing and imposing their own patterns? And are the personal structures they erect relatively complete and

coherent or are they built on scattered factoids "arranged haphazardly? Do average and below-average students in particular know how to build sensible, well-organized structures? Without a basic understanding of the key concept that knowledge is organized in some fashion and an ability to manipulate that organization--to turn it around and see it from different angles and conflicting perspectives--how can they ever become independent, lifelong learners in a world in which the primary information resource may well be the "booming, buzzing confusion" known as the World Wide Web? Ultimately, we as educators must determine how to enable all our students to develop the skills, knowledge, and attitudes that will make such independence possible.

Conclusion

1. Implications for LMS and teacher preparation

The concept of "orchestration" has serious implications for the preparation of both library media specialists and teachers. It may be a more pedestrian topic than constructivism and all its works and pomps, but I think orchestration is just as important to all instructors' day-to-day efforts to foster learning. A specific instance of the philosophy we've all come to call the "guide on the side" approach, orchestration requires a wide array of skills that both library media specialists and their classroom counterparts must master if they are to marshal electronic information resources for meaningful learning. Both library media specialists and teachers must deal with the same elements of preliminary and in-the-moment planning, attain a high degree of fluency with the technology at hand, and develop a repertoire of new techniques in that troubling category labeled "classroom management" that we do not yet fully understand.

I would argue that, as an instructional partner and as one of the school's technology leaders, the library media specialist must master these areas to an especially high degree in order to help teachers deal flexibly and fluidly with information technology and its instructional uses. As an information specialist, you must become expert, not only in the content and scope of the information resources available to your teachers, but with their pedagogical potential as well. I think that people in practice are aware of all these issues, but I'm not sure that we in preparation programs are as helpful as we should be in identifying the knowledge and skills you'll need to be effective orchestrators and in ensuring that you have opportunities to acquire them.

2. Implications for curriculum and instruction

The findings from this study suggest that today's students need to learn, in a way that transcends their learning of specific content, a good deal about the structure of knowledge and about the importance of that structure. In order to learn in an information-rich environment, they need to learn (1) that knowledge is indeed structured in meaningful ways; (2) that various structures can be applied to

various kinds of knowledge, and (3) that a key part of learning is learning how to create personal structures that organize their own learning accurately and coherently. They must learn that knowledge is an organized, systematically related set of ideas and that they need to work at building an understanding of that organization as well as learning the individual ideas. They must learn the nature and uses of various kinds of structures—for example, timelines, maps, and hyperlinks as well as traditional narrative structures—that they can use as tools for building their own knowledge. They must learn criteria and procedures for building appropriate and coherent structures that will allow them to integrate and communicate their thoughts. A curricular emphasis on teaching students how to structure information is, I believe, the most important implication for learning and teaching that stems from the presence of the information-rich environment in which we and our students live.

Learning theorists tell us that learning consists of constructing mental models or schemas, structures that are comprised of ideas and patterns or frameworks that organize and link those ideas. At some basic level, then, learning is the equivalent of organizing information. And no one in a school knows more about organizing information than the library media specialist. Helping both teachers and students understand and learn to create a variety of ways to structure information is the key task for our profession in these best and worst of times.

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Chapter 4

A Case Study of One District's Implementation of *Information Power*

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One district sought to institutionalize the implementation of Information Power: Building Partnerships for Student Learning *into its established planning and evaluation activities. The rationale for this implementation strategy was that the stakeholders could be simultaneously informed about the principles of library media programming that support the standards and also enabled to evaluate their programs and apply their findings to annual action plans. This implementation strategy modeled the principles of* Information Power *in that it was a collaborative endeavor, overseen by district and building-level leaders who utilized technology. As reported in this case study, teachers, library media specialists, and principals evaluated their building-level library media programs according to the principles of teaching and learning, and they also evaluated the involvement of stakeholders in implementing those principles. By responding to the survey instrument, "Assessing the School Library Media Program and Its Partnerships" (* **appendix** *), these stakeholders provided data to inform future district implementation strategies and to inform decision making at the building level. Descriptive statistics, including correlation coefficients for the relationship of program involvement to program progress, thus can inform discussions for developing building-level action plans that include library media programming. Teachers' responses indicated consistently positive correlations between the school community's involvement in the library media program and positive assessments of*

the program. Furthermore, the district's secondary library media programs had higher average ratings for teaching and learning activities than did the elementary programs.

This case study documents the initial implementation of Information Power: Building Partnerships for Learning(American Association of School Librarians 1998) in a school district in the southwestern United States. This specific district was not selected for study because it is typical but rather because it is exemplary and represents best practice. It is a past winner of the American Association of School Librarians' Encyclopædia Britannica Award for excellence in library media programming, and it is one of four districts in the United States to win the 2000 Model Professional Development Award from the United States Department of Education. In February of 2001, the Midcontinent Regional Education Laboratory (McREL), one of ten regional educational laboratories sponsored by the Office of Educational Research and Improvement of the United States Department of Education, sent a research team to the district to document its professional development strategies.

Following the publication of *Information Power: Building Partnerships for Learning* in 1998,[**1**]this district began a three-semester introduction of the new guidelines to library media specialists, administrators, and classroom teachers. The goal of the district's long-term implementation strategy was that the 1998 guidelines would be institutionalized as an ongoing force for program change, not merely the subject of a series of workshops. A primary tool in this implementation process was "Assessing the School Library Media Program and Its Partnerships" (**appendix**), a survey instrument that was used as a communication device, a basis for reflection on practice, and as a source of data identifying program strengths and weaknesses. The district's approach was built upon and guided by its well-established practice of collaboratively integrating planning and evaluation.

The inseparability of planning and evaluation [**2**]is consistent with *Information Power* : "Program assessment is integral to the planning process" (108). Furthermore, *Information Power* emphasizes the use of a team approach to evaluation: "Assessment is collaborative and based on sound principles related to learning and teaching, information literacy, and program administration" (108). The guidelines also state that

> *In close collaboration with teachers, students, administrators, and other members of the learning community, the library media specialist develops and implements an assessment cycle that guarantees continuing attention to the critical role of the program and its services within the school. The library media specialist's assessment plan follows specific, formal steps to focus attention on a variety of issues: student learning, the place of information literacy for student learning within the curriculum, the role of information technology in the school, the quality of facilities and resources, and the quality and relevance of policies and procedures. (108–9)*

Therefore, consistent with the guidelines, the district designed the implementation process to encourage collaborative, ongoing assessment and planning with a focus on *Information Power'* s basic principles of effective library media programming.

The principles of planning and evaluation articulated in *Information Power* have been integrated into good practice for the last half century. In analyzing the trends of school library media evaluation, Joy McGregor (1998) has identified significant developments

across the twentieth century. Noting the integration of planning and evaluation during the 1950s, she cited *A Planning Guide for the High School Library Program* (Henne, Ersted, and Lohrer 1951), which described the use of evaluation in developing improvement plans. During the 1950s school librarians also utilized collaborative evaluation, a trend that continued into the 1960s, especially with its use modeled by the library programs recognized and supported by the Knapp Foundation (McGregor 1998). The Association for Educational Communications and Technology drafted (1976) and later published *Evaluating Media Programs: District and School, A Method and an Instrument,* which "included input from teachers, students, and media staff and provided for future planning throughout" (1980, 145). An important development of the 1980s was Retta Patrick's recommendation of a technique of data collection for the purpose of developing action plans for improvement (1985). Significantly, Patrick concluded that a data collection technique could define expectations that could be credited with positive change. In summing up the past decade, McGregor wrote that such trends as formative evaluation, emphasis on accountability and improvement plans, and collaboration among constituents in the evaluation continued throughout the nineties (1998, 148).

Trends for the increased integration of planning and evaluation activities for library media programs reflect the larger scope of contemporary educational reform. Writing about the reform of program evaluation in 1980, Lee Cronbach noted, "The process by which society learns is evaluation, whether personal and impressionist or systematic and comparatively objective" (12). The concept that *the purpose of assessment is to educate* guided the development of a series of evaluation handbooks published by the National Study of School Evaluation (NSSE).[**3**]In cooperation with the American Association of School Librarians (AASL), NSSE developed *Program Evaluation: Library Media Services* (2000) which is a guide for the evaluation of library media programs and student learning that occurs in those programs. As in this case study of the implementation of *Information Power* in a southwestern school district, *Program Evaluation* emphasizes the standards and principles of excellence in the national guidelines and the process of collaboration.

The school district has traditionally integrated planning and evaluation in the development of annual building-level improvement plans. School sites continuously collect and study profiling data, establish new site goals in the fall semester, and work throughout each school year implementing action plans created to address identified needs. Site visits are made at the end of the academic year by the superintendent and other central office administrators to assess the progress toward each site's goals. A survey instrument for library media programming provides additional profiling data and opportunities to address the ways that improved collaboration in the library media program can contribute to overall school improvement.

Following the publication of *Information Power,* the district's school library media specialists focused on planning and evaluation as primary modes for implementing the new guidelines, and they developed the following schedule:
In the fall of 1998 they analyzed the principles and implications of the new guidelines and began to document and share across the district the ways information literacy standards were integrated into curricula in all grade levels.

- In the spring of 1999 building-level school library media specialists met jointly with the district's principals and central administrators to collaborate on the implications of the 1998 guidelines. At an in-service workshop, building-level library media specialists presented their developing compilation of examples of

information literacy standards integrated throughout the district. Also, in building-level teams library media specialists and principals completed "Assessing the School Library Media Program and Its Partnerships," a questionnaire developed from *Information Power* (AASL 1998) (see **appendix**). The results of the collaborative assessment by library specialists and principals are indicated in **tables 1–4** under LMS/Principal (Team) Responses.

- During the fall semester of 1999, information literacy standards and basic principles of *Information Power* were introduced to the district's teachers. As a follow-up to that introduction, the district's teachers completed the first section of "Assessing the School Library Media Program and Its Partnerships," considering and analyzing the teaching/learning activities of their own building-level school library media programs according to the principles of the 1998 guidelines.

Thus in the course of three consecutive semesters, three sets of stakeholders (school library media specialists, administrators, and teachers) had considered aspects of their own school library media programs in terms of the 1998 guidelines and also in terms of the level of participation by those sets of stakeholders.

The Evaluation Questions

The district's fall 1999 implementation efforts focused on the audience of teachers and on *Information Power*' s principles for teaching and learning (AASL 1998, 58). Focusing the attention of teachers on the principles of teaching and learning was a priority because student learning is central to the mission of the district's library media programs and to the spirit of *Information Power* . And although teachers are certainly to be involved in information access and program administration, they are most directly related to the teaching and learning components of the program. Also underlying this focus was the understanding that teachers needed to be first introduced to the new guidelines in ways that are most relevant to their needs and goals.

Integral to this implementation process were questions that could inform district and building-level planning and evaluation of school library media programs.

- How did teachers rate library media program progress according to the guidelines' principles for teaching and learning?
- How did teachers rate the participation of the library media specialist, the principal, and the other teachers in their buildings?
- Were teachers' ratings of library media programs consistent with that of their building-level library media specialist/principal teams?
- Were teachers' perceptions of stakeholder participation consistent with those of the library media specialist/principal teams?
- Were there differences in program progress or program participation between elementary and secondary schools?
- What is the relationship between program progress and program participation?

Although answers to these questions cannot be generalized beyond the district, the assessment methods themselves may be adapted and adopted (according to results of this evaluation study) for planning and evaluation in other library media programs.

Furthermore, the data analysis may develop into research studies, especially those on the relationship of program participation to program satisfaction, the differences in needs and perceptions among elementary and secondary school library media specialists, and issues of library media program evaluation.

Procedures

The district's teachers were introduced to the principles of *Information Power* (1998) and to the evaluation instrument in a series of meetings held at various school sites. Participating were teachers from fifteen elementary schools (grades K–5), four middle schools (grades 6–8), and two high schools (grades 9–12). Differences between the scheduled school day in elementary and secondary schools required different implementation meeting times and sites. Meetings for elementary teachers were organized in sets of three schools, and the meetings occurred in the most central of the three schools at the end of a school day. Secondary teachers met in their own schools one morning before their classes began. Teachers were given an overview of the new guideline principles, an explanation of the information literacy standards, and an introduction to the assessment instrument. Teachers completed the assessment instrument anonymously.

In these meetings with teachers, as with the introduction of the guidelines to library media specialists (fall 1998) to administrators (spring 1999), the district coordinator emphasized the advocacy of school library media programs, and the theme of the in-service meetings was the celebration of progress. In addition to a summary of the literacy standards, teachers received gifts of a mechanical pencil (with the inscription, "Student achievement is the bottom line") and a small notepad with an information literacy standard printed at the bottom of each page. Teachers were motivated to return the completed assessment instrument by participation in building-level drawings for books and other materials provided by the district and a local bookstore. Of the district's 781 teachers, 523 (67%) completed the assessment instrument.

Assessment Instrument

"Assessing the School Library Media Program and Its Partnerships" (see **appendix**) was designed to fulfill a range of information needs. For each audience it was used first to create awareness of the principles that,

> *were identified and developed by the Information Power Vision Committee, reviewed and commented upon by the profession, and approved by the AASL and AECT boards as the cardinal premises on which learning and teaching [as well as program administration (AASL 1998, 101)] within the effective school library media program is based (58, 83).*

Its structure emphasized not only the guiding principles for effective programming but also the concepts of partnership and collaboration that are basic to *Information Power*. Beyond developing awareness, respondents to the assessment had an opportunity to evaluate the implementation of the guiding principles for teaching and learning within their building-level library media programs and to assess the involvement of teachers,

principals, and library media specialists. Building-level library media specialists gathered data that could later be shared as input for development of collaborative action plans for their library media programs as well as their overall school programs. The assessment instrument also made it possible for the district library media coordinator to monitor the long-term implementation process of the new guidelines within the district. Thus the assessment instrument facilitated communication and data collection among various audiences, and it was basic to institutionalizing implementation efforts into the district's annual action plans.

The development of the assessment instrument and its application to planning and evaluation evolved from "Assessment of the Building Level Library Media Program," developed in 1988 by Kathy Latrobe, Mildred Laughlin, Robert Swisher, and Anne Masters (Latrobe 1992, 43 –45). The basis of the 1988 instrument was *Information Power: Guidelines for School Library Media Programs* (AASL and AECT 1988). The 1988 instrument listed the basic guidelines but did not integrate aspects of program partnerships. The district's tradition of investing in planning and evaluation activities is illustrated by the fact that school library media specialists and principals applied the first instrument to the planning and evaluation of library media programs during AASL's national implementation teleconference in the fall of 1988. Using data from that assessment, the district's school library media specialists developed action plans that guided their building-level programs into the 1990s.

Data Reported to Schools by the District Coordinator

The teachers' responses for program progress and program participation across the principles of teaching and learning were analyzed using descriptive statistical applications of SPSS 8.0 for Windows. Means were calculated for the entire set of the district's schools, for elementary schools and secondary schools, and for individual schools (**tables 1–4**). For demonstration purposes, tables 1–4 include means for one elementary school (Elementary School X) and one secondary school (Secondary School Y). These two schools were arbitrarily selected to show how data was presented to building-level school library media specialists and administrators.

Program progress was rated on a scale of 1–5 with 5 being the highest level of program approval. Program participation was rated on a scale of 1–5 (1 for no awareness; 2 for awareness; 3 for collaboration; and 4 for leadership). The correlation coefficients of participation levels to program progress were calculated (Pearson's r) for the district as a whole (**table 5**). The calculation of correlation coefficients for entire sets of variables was justified because the results were used descriptively rather than inferentially.

Implications and Conclusions

The purpose of the data collection and analyses was not to rank programs or schools but rather to provide support for collaborative planning to be led at the district by the library media coordinator and at the building level by the school library media specialist. The district coordinator, as a consultant, specifically sought a collaborative, not a competitive environment; thus, schools were presented summative data for the district and specific school data only for their own sites. Of interest at the district level were data

indicating the following:

- Means for program progress across the ten principles ranged from 4.00 to 4.19, indicating teachers' approval of the programs within the areas of teaching and learning.
- Means for program progress for secondary schools exceeded those for elementary schools on nine of the ten principles of teaching and learning.
- Without exception, there was a positive correlation of program participation to program approval.
- Correlation coefficients indicated that among library media specialists, principals, and teachers, the one whose behavior was the best predictor of program progress was the library media specialist.

Shaping future district planning will be the indication that higher levels of participation among teachers, administrators, and library media specialists lead to higher levels of program approval and that differences among schools emphasize the importance of the collaborative development of unique site-based improvement plans. For continuing implementation efforts, the results will inform in-service providers who may choose to showcase the strengths of particular schools. Significantly, the strength among secondary schools across the principles of teaching and learning challenges the sometimes held assumption that the teaching and learning functions of the library media program (and the guidelines as a whole) are more relevant at the elementary levels.

Data on elementary school X and secondary school Y (**tables 1–4**) illustrate how this implementation assessment could shape discussions, planning, and future data collection. For example, considerations in elementary school X may include an analysis of the discrepancies among the perceptions of the stakeholders (those of teachers and of the library media specialist and principal team); and the development of an improvement plan on targeted principles (e.g., the program's integration into the curriculum or its link to the larger community).

Secondary school Y may choose to investigate how teachers' perceptions of program progress relate to their expectations and practice; focus a future evaluation on the guidelines' second set of principles (those of information access and delivery); and develop a workshop or conference presentation on ways the program promotes the understanding and enjoyment of literature.

Individual schools, as well as the district as a whole, might utilize other data collection techniques and instruments to gain perspective on specific program aspects, considering such useful sources as Nancy Everhart's *Evaluating the School Library Media Center* (1998). In *Forecasting the Future* Wright and Davie emphasize the value "of multiyear planning and evaluation" and "argue strongly for lots of formative evaluation procedures and a very limited number of summative evaluations" (1999, 153). They conclude that multiyear planning based upon an array of evaluation procedures enables the "library media program . . . to be self-correcting as the currents of the instructional program change" (153).

Although the conclusions in this case study cannot be generalized beyond the district, they do suggest the appropriateness of future action and theoretical research studies on implementation activities and especially on the role of stakeholders' collaboration and participation, stakeholders' expectations, and the integration of planning and evaluation.

Furthermore, there is a need for the study of data collection methods and instruments that can best inform the practice of planning and evaluation within library media programs.

Notes

1. *Information Power* and related products are available for purchase from the American Association of School Librarians (AASL) at **AASL *Information Power* Products Web page** . AASL also makes available free PowerPoint presentations to guide media specialists in sharing *Information Power* with parents, teachers, and administrators. You can find these presentations on the **AASL Information Power Basic Implementation Kit Web page** . [**BACK**]

2. A brief overview of the principles of program planning and evaluation can be found on the Northwest Regional Educational Laboratory Web site at **www.nwrel.org/eval/evaluation/planning.shtml**

3. You can learn more about the National Study of School Evaluation and their publications from their Web site at **www.nsse.org**

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Key AASL Resource

School media specialists who want to explore effective methods in program evaluation should read the new *publication* ***A Planning Guide for Information Power: Building Partnerships for Learning*** **with** ***School Library Media Program Assessment Rubric for the 21st Century*** .

Appendix

Assessing the School Library Media Program and its Partnerships

Adapted from *Information Power: Building Partnerships for Learning* (AASL and AECT, 1998)

Recommendations:

1. Involve the school's administrator(s), teachers, and library media specialist(s) in the completion of this assessment instrument.
2. Follow the assessment with a discussion directed toward identifying three planning priorities for each of the major sections (teaching and learning, information access and delivery, and program administration).

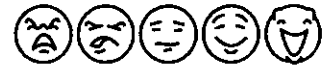
Directions:

1. To indicate your school's progress toward full implementation of each principle, mark the most appropriate face.
2. To indicate the level of participation by your school's principal(s), library media specialist(s), and teachers, mark the corresponding square *L*, *C*, *A*, or *N*:
   L = leadership + collaboration + awareness
   C = collaboration + awareness
   A = awareness
   N = no awareness or involvement

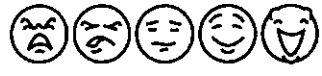
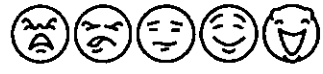
Adapted by: Kathy Latrobe, Professor, University of Oklahoma, School of Library and Information Studies, and Anne Masters, Director, Media Services and Instructional Technology, Norman (Oklahoma) Public Schools; graphics by Gary Kramer, Director, Video Resource Center, Norman Public Schools (1999).

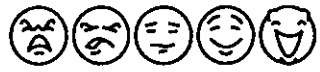
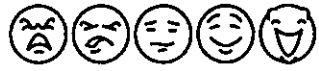
Principles of Teaching and Learning

1. The library media program is essential to learning and teaching and is fully integrated into the curriculum to promote students' achievement of learning goals. The library media program ensures that: • Information literacy standards are integrated throughout the teaching and learning process. • Appropriate resources support information literacy and critical thinking throughout the curriculum. • Technology plans focus on information literacy.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
2. The information literacy standards for student learning are integral to the content and objectives of the school's curriculum. The library media program ensures: • a rationale for infusing information literacy standards into the curricular and instructional policies; and • integration of standards into day-to-day student learning activities.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
3. The library program models and promotes collaborative planning and curriculum development. The library media program ensures: • the teaching and assessment of student achievement in information-literacy concepts and processes.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
4. The library media program models and promotes creative, effective, and collaborative teaching. The library media program ensures: • a current professional collection that supports instructional excellence across the curriculum; • the design and implementation of instructional activities that reflect the best in current research and practice; and • the application of basic principles of instructional design in creating, implementing, evaluating, and revising activities and resources for learning.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
5. The library media program provides access to the full range of information resources and services to support learning. The library media program ensures: • a professional collection that supports instructional excellence across the curriculum; and • the evaluation, acquisition, provision, and promotion of information resources to meet the learning needs of all learners.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**

6. The library media program encourages and engages students in reading, viewing, and listening for understanding and enjoyment. The library media program ensures: • the effective and enthusiastic use of books, videos, films, multimedia, and other creative expressions that provide pleasure and information; and • the encouragement of reading for enjoyment and information.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
7. The library media program supports the learning of all students and other members of the learning community who have diverse learning abilities, styles, and needs. The library media program ensures: • analysis of individual learning needs; and • activities and resources to address the diverse needs of the learning community.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
8. The library media program fosters individual and collaborative inquiry. The library media program ensures: • the learning community's intellectual access to needed information; and • demonstration of the attitudes and skills of an independent, lifelong learner.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
9. The library media program integrates the uses of technology for learning and teaching. The library media program ensures: • expertise in assessing technologies for the enhancement of learning; and • the use of new media and technologies for learning and teaching.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
10. The library media program is an essential link to the larger learning community. The library media program ensures: • an environment that encourages information literacy and lifelong learning; • access to information resources within and beyond the school; and • appropriate professional development opportunities for all staff.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**

Principles of Information Access and Delivery

1. The library media program provides intellectual access to information and ideas for learning. The library media program ensures: • the matching of individual needs and interests with appropriate materials; • a collection development policy that provides access for members of the school community; and • comprehensive references services, including assistance with access, interpretation, and communication of intellectual content.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
2. The library media program provides physical access to information and resources for learning. The library media program ensures: • a well-designed facility; • the most advanced resources and equipment appropriate to learning needs; • the acquisition and circulation of all information and instructional resources; • the organization of all resources for effective and efficient use; and • flexible access to its programs and services.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
3. The library media program provides a climate that is conducive to learning. The library media program ensures: • facilities, services, and schedules that are welcoming and appealing; • an inviting, attractive environment; • energetic and enthusiastic personnel; and • organization that promotes productive and focused learning.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
4. The library media program provides flexible and equitable access to information, ideas, and resources for learning. The library media program ensures: • policies and procedures that promote intellectual freedom, flexible scheduling, extended service hours, and after-hours technological access; and • service and access to all learners, regardless of ability.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
5. The collections of the library media programs are developed and evaluated to support the school's curriculum and to meet the diverse learning needs of students. The school library media program ensures: • policies that govern the selection, deselection, and reconsideration of materials; • continuous collection development; • the use of up-to-date reviewing and evaluation sources for the selection of materials; and • the promotion of learning resources.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**

6. The library media program is founded on a commitment to the right of intellectual freedom. The library media program ensures: • creation and dissemination of policies that promote freedom of information; • an atmosphere of free inquiry; and • the openness to the ideas and the robust debate characteristic of a democratic society.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
7. The information policies, procedures, and practices of the library media program reflect legal guidelines and professional ethics. The library media program has: • a library media specialist(s) with in-depth understanding of current legislation and regulations about access, copyright, and other legal issues; and • a commitment to intellectual freedom, confidentiality, the rights of users, and intellectual property rights.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**

Principles of Program Administration

1. The library media program supports the mission, goals, objectives, and continuous improvement of the school. The library media program has: • mission, goals, and objectives consistent with those of the school; • widely-held acceptance that it is essential to the school's instructional program; and • direction from results of assessments and evaluations for school improvement.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
2. The library media program has at lease one full-time, certified/licensed library media specialist supported by qualified staff. The library media program has: • support and feedback beyond the building level; • a library media specialist(s) involved with performance appraisals as supervisor and employee committed to personal development; and • library media specialist(s) active in professional organizations.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
3. The library media program has a level of professional and support staffing that is based upon the school's instructional programs, services, facilities, size, and numbers of students and teachers. The library media program has: • staffing patterns based upon the analysis of program requirements; • supervision of technical and clerical staff that facilitates its smooth operation; and • access by students and teachers throughout the school day and at other times, as needed.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
4. The library media program has on-going administrative support. The library media program has: • a library media specialists who communicates with principal(s) and other appropriate administrators about program plans, activities, and accomplishments; • a library media specialist who participates on the school's administrative team; and • a library media specialist who communicates the program's contribution to student learning.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
5. The library media program has comprehensive long-range strategic planning that ensures its effectiveness. The library media program has: • planning as a priority and has resources to support the planning process; • alignment with the information literacy standards, the school's goals, and national curriculum standards; and plans that direct the management of all resources, focus on program accountability, and accommodate a changing environment	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**

6. The library media program has ongoing assessment. The library media program has: • regular and systematic data collection from a wide range of users and potential users; • plans and policies based upon the analysis of quantitative and qualitative data; and • results of its assessments reported to all members of the learning community.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
7. The library media program is sufficiently funded. The library media program has: • a budget based upon current information that ensures the purchase and upkeep of all resources; • a budget administered according to sound accounting procedures; and • a budget that is maximized by centralized processing and purchase discounts and that is augmented by partnerships with local organizations and with grant writing.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
8. The library media program provides ongoing staff development. The library media program has: • library media specialist(s) with current and in-depth knowledge of the research and best practices in all aspects of the field; • provisions for program staff to attend workshops and courses; and • provisions for ongoing in-service opportunities for the full school community, particularly for the integration of information literacy standards and the use of technology.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
9. The library media program affirms its own excellence and demonstrates its value to the entire learning community. The library media program has: • regular reporting on plans, policies, and achievements; • advocacy that demonstrates its value to a broad audience; and • promotional outlets that include a variety of written, verbal, and visual formats.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**
10. The library media program has effective management of human, financial, and physical resources. The library media program has: • library media specialist(s) expert in budgeting, supervision, and scheduling; • provisions for regular reporting to administrators and others regarding holdings, services, and finances; and • library media specialist(s) who participates in hiring, training, and evaluating all program staff and who is responsible for assigning and scheduling staff and volunteers.	**PROGRAM PROGRESS**  **PROGRAM PARTICIPATION** **Principal LMS Teacher**

Principles for Teaching and Learning	Mean Teacher Responses*					LMS/Principal (team) Responses	
	All Levels	Elementary		Secondary		Elementary	Secondary
		All	School X	All	School Y	School X	School Y
(1) Program is integrated into the curriculum	4.14	4.10	2.86	4.21	4.52	4	4.5
(2) Literacy standards are integrated into the curriculum	4.06	4.00	3.00	4.19	4.52	3	5
(3) Program models cooperative planning and curriculum development.	4.11	4.06	3.07	4.21	4.42	4	4
(4) Program models creative and collaborative teaching	4.11	4.06	2.86	4.22	4.48	4	4
(5) Access to information/services is fundamental to learning	4.27	4.25	2.86	4.32	4.48	5	5
(6) Program promotes activities for understanding and enjoyment	4.43	4.44	3.64	4.42	4.81	5	5
(7) Program supports diverse learning needs	4.00	3.96	2.86	4.07	4.29	4	4
(8) Program fosters individual and collaborative inquiry	4.14	4.09	3.08	4.24	4.57	5	4
(9) Program integrates technology for learning and teaching	4.19	4.10	2.92	4.40	4.60	4	5
(10) Program is link to larger learning community	4.13	4.08	2.77	4.25	4.62	3	5

*N=523

Table 1. Program Progress by Level and Respondent [Back]

Principles for Teaching and Learning	Mean Teacher Responses*					LMS/Principal (team) Responses	
	All Levels	Elementary		Secondary		Elementary	Secondary
		All	School X	All	School Y	School X	School Y
(1) Program is integrated into the curriculum	3.14	3.21	2.95	2.98	3.17	3	3
(2) Literacy standards are integrated into the curriculum	3.06	3.12	2.76	2.96	3.26	1	4
(3) Program models cooperative planning and curriculum development.	3.13	3.21	2.88	2.98	3.22	3	2
(4) Program models creative and collaborative teaching	3.14	3.21	2.76	2.99	3.26	3	2
(5) Access to information/services is fundamental to learning	3.13	3.18	2.76	3.02	3.30	4	4
(6) Program promotes activities for understanding and enjoyment	3.43	3.53	3.25	3.23	3.39	4	4
(7) Program supports diverse learning needs	3.08	3.17	2.59	2.92	3.13	4	2
(8) Program fosters individual and collaborative inquiry	3.22	3.29	3.00	3.08	3.30	4	4
(9) Program integrates technology for learning and teaching	3.12	3.12	2.59	3.12	3.30	3	4
(10) Program is link to larger learning community	3.11	3.14	2.88	3.04	3.35	3	4

*N=523

Table 2. Program Participation for Teachers by Level and Respondent [Back]

Principles for Teaching and Learning	Mean Teacher Responses*					LMS/Principal (team) Responses	
	All Levels	Elementary		Secondary		Elementary	Secondary
		All	School X	All	School Y	School X	School Y
(1) Program is							

integrated into the curriculum	3.04	2.99	2.31	3.15	5.52	4	4
(2) Literacy standards are integrated into the curriculum	2.97	2.94	2.31	3.04	3.48	2	4
(3) Program models cooperative planning and curriculum development.	2.93	2.90	2.35	2.99	3.30	4	4
(4) Program models creative and collaborative teaching	2.98	2.97	2.41	3.00	3.55	4	4
(5) Access to information/services is fundamental to learning	3.12	3.14	2.53	3.07	3.43	4	4
(6) Program promotes activities for understanding and enjoyment	3.13	3.14	2.65	3.11	3.57	4	4
(7) Program supports diverse learning needs	2.91	2.91	2.25	2.91	3.34	4	4
(8) Program fosters individual and collaborative inquiry	3.10	3.14	2.71	3.03	3.39	4	4
(9) Program integrates technology for learning and teaching	3.24	3.21	2.24	3.29	3.74	4	4
(10) Program is link to larger learning community	3.25	3.28	2.53	3.17	3.70	3	4

*N=523

Table 3. **Program Participation for Principals by Level and Respondent** [Back]

Principles for Teaching and Learning	Mean Teacher Responses*					LMS/Principal (team) Responses	
	All Levels	Elementary		Secondary		Elementary	Secondary
		All	School X	All	School Y	School X	School Y
(1) Program is integrated into the curriculum	3.64	3.58	3.00	3.76	3.96	4	4

(2) Literacy standards are integrated into the curriculum	3.50	3.42	2.63	3.65	3.83	3	4
(3) Program models cooperative planning and curriculum development.	3.48	3.46	2.82	3.54	3.83	4	4
(4) Program models creative and collaborative teaching	3.51	3.48	2.65	3.57	3.70	4	4
(5) Access to information/services is fundamental to learning	3.65	3.67	2.83	3.63	3.74	4	4
(6) Program promotes activities for understanding and enjoyment	3.71	3.68	3.06	3.77	3.96	4	4
(7) Program supports diverse learning needs	3.30	3.21	2.63	3.49	3.65	4	4
(8) Program fosters individual and collaborative inquiry	3.50	3.44	2.93	3.61	3.91	4	4
(9) Program integrates technology for learning and teaching	3.56	3.46	2.88	3.76	3.87	4	4
(10) Program is link to larger learning community	3.48	3.39	2.63	3.65	3.83	3	4

*N=523

Table 4. **Program Participation for Library Media Specialists by Level and Respondent** [Back]

Principles for Teaching and Learning	**Correlation of Participation to Program Progress**								
	All Levels			**Elementary**			**Secondary**		
	LMS	**Principal**	**Teachers**	**LMS**	**Principal**	**Teachers**	**LMS**	**Principal**	**Teachers**
(1) Program is integrated into the curriculum	.58	.40	.30	.64	.43	.29	.44	.32	.37
(2) Literacy standards are integrated into the curriculum	.62	.44	.36	.68	.45	.34	.44	.41	.45
(3) Program models cooperative planning and	.62	.45	.44	.62	.43	.47	.61	.52	.39

curriculum development									
(4) Program models creative and collaborative teaching	.70	.45	.43	.74	.44	.44	.60	.47	.48
(5) Access to information/ services is fundamental to learning	.61	.38	.33	.60	.33	.27	.62	.50	.47
(6) Program promotes activities for understanding and enjoyment	.65	.38	.41	.71	.36	.41	.48	.42	.45
(7) Program supports diverse learning needs	.67	.52	.48	.69	.50	.47	.62	.57	.51
(8) Program fosters individual and collaborative inquiry	.70	.48	.42	.72	.51	.45	.60	.45	.42
(9) Program integrates technology for learning and teaching	.67	.50	.38	.69	.54	.38	.53	.38	.41
(10) Program is link to larger learning community	.66	.47	.44	.71	.51	.46	.48	.42	.43

N=523

Table 5. Correlation of Program Participation to Program Progress (Based upon Responses by Teachers)

Chapter 5

School Libraries and Research in the Twenty-First Century

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The Research Setting

Research, which begins in the marketplace of ideas, aims chiefly to describe, explain, and predict events in the real world. This creative process attempts to establish new relationships, to make innovative connections, and to stimulate new thinking. Investigators engage in research hoping to find something new, to find results that are unexpected and counter-intuitive. And with a lot of work and a little luck they may do so.

The need for creative research and for its application to the educational environment remains an important aspect of the education field. On her appointment as dean of the Harvard School of Education, Dr. Ellen Lagemann highlighted the mission for educational researchers and the research process. She said:

> I hope Harvard can do more research that generates more usable knowledge. That's research that ensures you get findings, but the purpose of the research is general tools that can help teachers. . . . Sometimes it takes the form of doing research as designing experiments where you partner with schools or districts or even individual teachers. . . . **Another thing . . . is the need to do research and translate it into forms that can really be helpful to policymakers.** . . . We have to in many ways get out of our academic shells in order to transform knowledge into a form that will be useful to them without in any way leaving out the fact that it is complicated.[1] (emphasis added)

The criticism that Dean Lagemann levels at academic educational research applies to a degree across all of society. A number of socially significant discoveries that have affected society occurred outside the halls of academe; one good example is Rachel Carson's research on DDT. The school library field is no exception--Keith Curry Lance and Esther Smith work outside academe.

Serious researchers follow the broad outline of the scientific method and its rules in their effort to produce good results. The scientific research process is based on self-regulation. However, because of articles and reports about questionable scientific researchers and studies, some people wonder whether the scientific research process can be self-governing any more. The current system of review is vulnerable. (As an aside, perhaps foundations and government can sponsor symposia on how to fix or renew the system in order to regain the public's confidence in the scientific process.)

In the broader society, education is important to the public. People are demanding more from our public schools. Standards-based education, taking up the sentry-bird position, now steers the education process from teaching to learning to student achievement. Outcomes-based education fashions current educational thinking. (Or, with tongue in cheek, we can perhaps ask if outcomes-based education is today's educational fashion?) States are moving quickly to meet federal education mandates; such mandates are no longer an option if states wish to benefit from the rich federal purse. This push to meet federal guidelines in turn drives the need for demonstrable scientific knowledge about the learning process in the formal educational context. As part of the scientific community, educational researchers must know how the public sees their research findings.

Investigators conducting research on the effectiveness of school libraries must follow the rules of the scientific process if they want the scientific community and the public to accept their work. Investigators, ambitious to state with a reasonable degree of certainty that school libraries make a real positive difference in a child's learning experience, are carefully crafting studies to show the relationship

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[1] " New Education Dean at Harvard Focuses on Real World Tools," *Boston Globe,* April 14, 2002, p. B7.

between academic achievement and the presence of an ongoing school library program. In this age of accountability, such studies are absolutely essential. In addition, professional practice can be advanced and strengthened when it is guided by research. The social theorist Abraham Kaplan argued for a differentiation between a *logic-in-use* and a *reconstructed logic*. In the context here, logic-in-use is professional practice and reconstructed logic is the scientist's explicit formulation of the professional practice, and the two must not be confused. For some time now researchers have used the hypothetico-deductive method for reconstruction in science. Given the elegance, precision, and power of the hypothetico-deductive method, its attractions are nearly irresistible.[2] Some practitioners speak about theory *versus* practice. But this line of argument confuses the professional issue. To be in line with Kaplan, there is only a theory *of* practice—that is, it is the researcher's duty to make constructions of what school library teachers do when they do well as school library teachers.

Added Value for School Libraries—Student Achievement

The school library field has been called on to provide evidence that school librarians add value. If, in fulfilling its obligations, the field once again falls short in this task, then as a profession it may go the way of the pterodactyl. It therefore becomes increasingly important for school library teachers to demonstrate that they can add value to student achievement. This is the challenge. The school library field needs to consider changing its primary referent from "information access" to "student achievement." The achievement compass points the school library field in the direction of educational significance. Information access has become merely a shibboleth and thus is a barrier to progress toward the proper goal of student achievement.

In 1964, when the first *Handbook of Research on Teaching* appeared, some leaders in the school library field expressed dismay at its lack of a chapter on school libraries. At that time few studies existed on school libraries and student achievement. A strong paradigm was conspicuously missing. (The first Colorado study, *The Impact of School Library Media Centers on Academic Achievement*[3] includes a review of the literature.)

As the profession continues to build a cadre of professionals who can do research, hopefully it can continue to add to the public storehouse of knowledge in student achievement. Perhaps one way to strengthen the research front would be to renew federal scholarships and grants for the preparation of school library educators who have the requisite skills, knowledge, and attitudes to advance scientific questions in the field. Strong empirical evidence supports the relationship between federal funding and the growth of a subject literature in this

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[2] Abraham Kaplan, *The Conduct of Inquiry* (San Francisco, CA: Chandler Publishing, 1964), pp. 6-14.
[3] Keith Curry Lance, et al., *The Impact of School Library Media Centers on Academic Achievement* (Castle Rock, CO: Hi Willow Research and Publishing: Colorado Department of Education, 1993).

area.[4] The field needs an infusion of funds from foundations, businesses, and the federal government. (This was the case under both the Elementary and Secondary Education and the Higher Education Acts of 1965.) As Dean Lagemann implores, we urgently need educational research that is useful to policy makers.

Research Question

Research begins with a question or a problem. For example, what is the relationship between student achievement and the presence of a school library program? From this general question, we can begin to ask several more specific questions.

The first task in research is to select the method to use to answer the question posed. The purest form of research is experimental; from this method a researcher can make cause-and-effect statements. Few experimental studies are carried out in the school library field because they are both expensive and difficult to execute. An experimental study has to have at least two groups. This is so the researcher can randomly assign some subjects to a treatment and others to a control group, while manipulating the explanatory variable--that is, applying treatment to one or more groups.

Even though the government may insist on experimental studies involving children and their learning, in reality this often is not practical. As a parent, would you want your child deprived of an educational experience, such as the introduction of computer skills, for an extended period of time while a neighbor's child is exposed to this activity? Who would allow a group of children to be subjected to the presence or absence of learning processes and materials in order to determine their effect? What parent would want to sacrifice his or her child's future for the sake of a basic research project?

Investigators often have to settle for something less than the experimental method as a matter of practicality and ethics. The survey method offers a reasonable alternative. In survey or correlation research, the investigator can make statements of association, not of cause and effect. The investigator can say, for example, X is positively related to Y, or X is correlated or associated with Y. Library survey data are often combined with other data, such as census and/or achievement data. Critics often note that because survey research is not experimental, results are at best only correlations even though the researcher may apply a number of inferential statistics. An investigator must face this dilemma when engaging in research on human subjects, especially social scientific research such as education.

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[4] James C. Baughman, "Federal Aid and the Growth of a Subject Literature," *JASIS,* April 1972.

Methods and Methodology

The terms method and methodology are frequently used interchangeably. Generally, method refers to the specific procedure, such as historical, survey, or experimental. The term methodology refers to the sample, the data, and the techniques used to analyze the data. Current research studies in school librarianship use the survey method, with results analyzed using descriptive and inferential statistics.

The word survey is composed of two elements that indicate what happens in the process. *Sur-* is a derivative of the Latin *super*, meaning "above," "over," or "beyond"; the element *–vey* comes from the Latin verb *vidre,* "to look" or "to see." Thus, *survey* means "to look or to see over or beyond" the casual glance or the superficial observation.[5] A survey allows us to search out and move beyond "glad tidings" and "how we do it good," a criticism leveled at the library field by Ralph Beals of the University of Chicago a number of years ago.

Techniques

The common statistical tools that current library researchers use to analyze data, in addition to descriptive statistics, are correlation, the t-test, regression, and analysis of variance. The t-test offers the advantages of simple assumptions as well as being more robust--that is, it works reasonably well in the face of departure from assumptions. The t-test is based on two groups defined by the explanatory (independent) variable. If more than two groups are involved in examining mean differences, researchers use analysis of variance.

Regression allows the researcher to investigate and model the relationship between a response (dependent) variable and one or more predictor (independent) variables. A regression study attempts to predict the value of one variable for a given value of another variable. For example, by using the regression line, one can predict the (approximate) level of achievement for a school with a given library program.
Correlation indicates how strongly two variables are related; it does not indicate the size of change in one variable as a result of a certain change in another variable.[6] For example, the regression model, given the presence of a good school library program (predictor variable), can predict higher student achievement (response variable).

The accuracy of regression predictions rests on three requisite assumptions. These assumptions have produced the difference of opinion in the studies on school libraries. Roughly summarized, they are as follows:

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[5] Paul D. Leedy, *Practical Research: Planning and Design,* 6th ed. (Upper Saddle Ridge, NJ: Merrill, 1997), p. 190.
[6] Prem S. Mann, *Introductory Statistics* (New York: Wiley, 1992), p. 593.

1. linearity--the relationship between the X (predictor) variable and the Y (response) variable must be linear in nature;

2. normality--the error component is normally distributed; and

3. homoscedasticity or constant variation--the error component should have a constant standard deviation.

Serious departures from any one of these assumptions affect the results of the inference associated with linear regression. The discussion on using regression models in the school library/achievement arena arises because research in library and information science is in its infancy. The field of school librarianship, as a social science, is not as well developed in terms of research methodology as, for example, is sociology or health care. Researchers are feeling their way in finding methods and methodologies that are appropriate and that work. But with time and more research, the field remains optimistically expectant.

The Current Library Research Situation

Researchers in school libraries and academic achievement are working toward a common goal--support for school libraries at all levels. By gathering and presenting information on the significance of school libraries, researchers hope that government officials and opinion makers at all governmental levels will have the information they need in order to support school libraries, thereby working to improve the quality of education while "leaving no child behind."

The field currently contains some ambiguity, even confusion, as individuals travel the research road together. A beginning researcher can expect to encounter such problems as securing funding, constructing meaningful data bases, and seeking appropriate methodology.

Intolerance by other researchers can also be a problem. Noted British physicist John Ziman in *Public Knowledge*, perceptively notes that the degree of tolerance researchers have for each other's work in a given field depends on how scientific the area tends to be. "A sure symptom of non-science is personal abuse and intolerance of the views of one scholar by another."[7] The more scientific the field tends to be, the more tolerance it shows, and vice versa. As dissent occurs, hopefully tolerance for each other's work will be commonplace as each researcher seeks answers to scientific queries. A field that cannot develop a posture of tolerance in its research will surely fall. And the new generation of school library leaders will once again lament the absence of school libraries in the latest handbook of educational research.

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[7] John Ziman, *Public Knowledge: The Social Dimensions of Science* (Cambridge, England: University Press, 1968), p. 28.

Background of the Massachusetts Study

To begin our discussion of the current survey studies of school librarianship and their associated techniques, we can examine the Massachusetts study *MCAS and School Libraries,*[8] available on the Web at the following address: http://www.simmons.edu~baughman/mcas-school-libraries.

Several specific programmatic goals guided the Massachusetts study, including quite purposely the political dimension. Massachusetts ranks at the bottom nationally in terms of school library programs and resources. And existing programs are woefully inadequate to serve student needs—especially the needs of deprived and inner-city children. The condition of school libraries in Massachusetts inner-city schools can be discussed only in terms of unspeakable neglect. Few seem to be concerned about this inequitable situation, despite all the political rhetoric about education reform and excellence. As anticipated, the Massachusetts study has opened a dialogue about the deplorable condition of the state's school libraries. But the governor and legislature have yet to face the problem of funding for adequate school libraries. School boards, of course, hold immediate responsibility for local education and school libraries; however, in the eyes of the law they are instruments of the state legislature, and any deficiency in public education explicitly and ultimately devolves to the governor and state legislature, since education is a state function under the U.S. Constitution.

Massachusetts is the tenth wealthiest state in terms of personal income, but it ranks below the national median in state aid to education. And according to the U.S. Office of Education, Massachusetts ranks an abysmal forty-ninth in support of school libraries. Because Massachusetts relies heavily on local property taxes to fund education, there tends to be wide disparity in funding for public school libraries from town to town. School libraries often land at the bottom of the heap when it comes to funding. The Massachusetts study sought to draw attention to the unacceptable conditions in school libraries and hoped to secure funding necessary to correct these intolerable conditions. Based on the information presented in the Massachusetts study, the MSLMA (Massachusetts School Library Media Association) filed legislation for state aid for school libraries. Given the plight of the state budget due to a recessionary economy, the legislature has not acted on the issue.

The Massachusetts Study

The Massachusetts study invited every public school (elementary, middle, junior/senior high school) in the Commonwealth to participate. The survey instrument served as much as a public-relations device as a data-gathering instrument. Even though the return rate of surveys was low, the investigators felt that the returns were sufficient to move forward inasmuch as they reasonably

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[8]James C. Baughman and Mary S. Eldringhoff, *MCAS and School Libraries: Making the Connection* (Boston, MA: Simmons College, October 2000).

represented the many kinds of public schools in Massachusetts. On the other hand, the investigators realized that their generalizations would be limited due to possible sample bias--that is, to the self-selecting nature of the respondents.

Each returned instrument was matched to MCAS (Massachusetts Comprehensive Assessment System) data for that school. The 1999 MCAS tests consisted of three scores: language arts, mathematics, and science. These three test scores were combined to form a total MCAS score for each school. The unit of analysis was the school. The investigators found that the combined MCAS scores explained more than the language arts (reading) MCAS test score alone.

The results of the Massachusetts study of school libraries, based on a statewide survey, confirm the value of school libraries. The findings represent constructions of knowledge, indicating that school libraries and student achievement are strongly related. Some of the specific findings from the Massachusetts study can be summarized as follows:

1. At each grade level, schools with library programs have higher MCAS (Massachusetts Comprehensive Assessment System) scores.
2. At each grade level, students score higher on MCAS tests when there is a higher per pupil book count.
3. At each grade level, schools with increased student use have higher MCAS scores.
4. At each grade level, school libraries with more open hours score higher on the MCAS tests.
5. At the elementary and middle/junior high school levels, students score higher on the MCAS tests when there is a library instruction program.
6. At the elementary and middle/junior high school levels, average MCAS scores are higher in schools with larger per pupil expenditures for school library materials.
7. At the elementary and high school levels, students who are served by a full-time school librarian have higher MCAS scores than those in schools without a full-time librarian.
8. At the elementary and high school levels, library staff assistance (nonprofessional help) makes a positive difference in average MCAS scores.
9. At the elementary level, students score higher on the MCAS tests when the library is aligned with the state curriculum frameworks. (This fact is especially true in schools that have a high percentage of free school lunches.)
10. At the high school level, schools with automated collections have higher average MCAS scores.[9]

[9] James C. Baughman and Mary S.Eldringhoff, *MCAS and School Libraries, p.3.*

Commonality of techniques

Lance and associates use mostly correlation, factor analysis, and regression. However, Ester Smith[10] in the Texas study questions regression since the assumptions required for its use may not have been fully satisfied with available data. The Texas study reports results using primarily descriptive statistics. The Massachusetts study employs regression, analysis of variance, and principally the t-test.

The Colorado I and II (Lance) and Texas (Smith) studies use reading scores for the response variable. Massachusetts use combined MCAS scores (language arts, mathematics, and science scores), which yield higher "coefficient of determination"--that is, a higher R-squared value; or, to say it another way, one is accounting for more of the variance.

R-squared, which statisticians call the "coefficient of determination," indicates the percentage of the variability in Y (response or dependent variable) that can be explained by its linear relationship to X (predictor or independent variable). The higher the R-squared value, the more of the variability in Y the predictor variables are able to explain.

Lance and associates uses standardized regression coefficients or beta coefficients. They transform the units in variables into standardized scores in order to apply the regression model to several predictor variables. The objective is to measure directly the impact of each predictor variance on the Y (response variable) by removing the effect of the units of the Xs--that is, percent, time, and number.

Interpreting Content Results from the Studies

Even though we could go more deeply into the commonalities in the studies, I think this discussion below gives an impression of the emerging pattern of a strong, positive relationship between the presence of a good school library program and student achievement. The comparisons discussed are not intended to be definitive; instead, they are intended to be indicative.
The various school library studies do contain some similarities in their findings. In examining five specific areas, similar results appear in the Colorado I and II, Alaska, Pennsylvania, Massachusetts and Texas studies.[11] The areas are teaching, staffing, service factors, collaboration, and leadership.

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[10] Ester G. Smith, *Texas School Libraries: Standards, Resources, Services, and Students' Performance* (Austin, TX: EGS Research and Consulting: Texas State Library and Archives Commission), April 2001.
[11] Keith Curry Lance *et al.*, *The Impact of School Library Media Centers, op. cit.* (Colorado I); Keith Curry Lance *et al.*, *How School Librarians Help Kids Achieve Standards: The Second Colorado Study* (Hi Willow Research and Publishing, April 2000); Keith Curry Lance, *et al.*, *Information Empowered: The School Librarian as an Agent of Academic Achievement in Alaska, Rev. ed.* (Juneau, AK: Alaska State Library, 2002); Keith Curry Lance *et al.*, *Measuring up to Standards: The Impact of School Library Programs & Information Literacy in Pennsylvania Schools* (Harrisburg, PA: Pennsylvania Department of Education,

Teaching. All studies report favorable results in situations where staff spends more time delivering school library service to students. For example, the Alaska study states: "The presence of a librarian (full-time or part-time) is a strong predictor of whether a library media program is above or below average in terms of the amount of time it delivers information literacy." Individual visits make a difference. Colorado II notes that reading scores increase with increased individual visits to the library; individual visits, separate from a class, increase scores. Individual visits as a result of flexible scheduling have impact. Library instruction programs make a difference. The Texas study says: "Impact on scores exists at the middle school level."

Staffing. Across the board all studies report that academic achievement increases when the library media center has a full-time librarian, when library staff hours are increased, and when support staff hours are increased. The old maxim that a library without a librarian is not a library rings true. The Texas study specifically breaks down these favorable results by grade level.

Service factors. Flexible scheduling gets a boost in Colorado II and Texas. Selection policy is acknowledged in Alaska and Texas. Longer hours gives an advantage in Alaska, Colorado II, Massachusetts, and Texas. Bigger collections carry weight in all studies except Alaska, which does not specifically mention the issue of size. More periodicals add to student achievement in all except Alaska. More money brings a higher level of service in all except Alaska.

Collaboration. Collaboration with other sources of information and integration of information literacy with the curriculum are identified as being related to student achievement in each study. Alaska particularly notes that time spent planning cooperatively on units with classroom teachers is very important. At the elementary level, the Massachusetts study also notes collaboration when the collection was aligned with the state curriculum frameworks. Alaska finds cooperative relationships with the public library especially important. The study identifies several cooperative activities:

- electronic network links (such as shared catalog access),
- book talks by public library staff at LMC,
- homework alerts to the public library from the LMC,
- referral of more complex reference questions from the LMC to the public library,
- bulk loans of books and other resources from the public library to the LMC, and
- perhaps most likely, a summer reading program at the public library.[12]

Office of Commonwealth Libraries, February 2000); James C. Baughman and Mary S. Eldringhoff, *MCAS and School Libraries, op cit.;* Ester G. Smith, *Texas School Libraries: Standards, Resources, Services, and Students' Performance* (Austin TX: EGS Research & Consulting: Texas State Library and Archives Commission, April 2001).

[12] Keith Curry Lance *et al. Information Empowered, op.cit.* p. 53.

Leadership. The importance of leadership is recognized in each study, especially the importance of teacher and principal support, although Massachusetts deals with this concept as a recommendation under the discussion section. Texas especially notes the importance of curriculum committees.

Some Results of the 2001 National Survey of School Superintendents

These various national studies on school libraries are quite clear about the decisive influence of school libraries on student achievement. However what seems to be less apparent is the political will required to mount corrective action.

Knowledge does not always translate into action, especially at policy levels. Specifically, what perceptions do superintendents of schools, as opinion makers and budget deciders, hold about school libraries?

To answer this question, in the spring of 2001, a survey instrument was mailed to 700 superintendents of schools based on a national random sample; 348 (or 50 percent) were returned. The national survey aimed to determine superintendents' perception of school libraries as well as their perceptions of the sources of funding, which is national and state aid for school libraries.

The perceptions of superintendents of schools and their program offerings affect the educational program funded and offered. Perceptions of schools libraries are no exception. How do superintendents see their school libraries? What are their budget priorities? What interest do they have in federal and state aid for school libraries? Should federal and state aid for school libraries be categorical--that is, should it be earmarked?

To the statement that every child should have access to a good school library, 77 percent of the superintendents strongly agree and 21 percent agree. Thus, 98 percent of the superintendents agree that every child needs to have a good school library.

Staffing of school libraries with a full-time librarian also received strong support from the superintendents, with 61 percent agreeing that an elementary school should have a full-time librarian, 76 percent at the middle/junior high school level, and 85 percent at the high school level. School superintendents obviously appreciate the importance of library teachers and their role in interpreting library collections for students. This finding corresponds to the research findings discussed here.

The key to good school library development is long-range planning. Superintendents strongly support the need for long-range planning (three-to-five years) for school libraries; 83 percent agree on this activity. Thirteen percent are undecided; the remaining 4 percent disagree.

Adequate funding for school libraries is essential for program success. Given the pressures on local school budgets, which often include mandated programs that need to be funded, it is reasoned that the two remaining sources for funds—federal and state governments—could provide reasonable alternative funding sources. Superintendents were asked to respond to four specific statements: (1) There should be federal aid for school libraries; (2) Federal aid for school libraries should be categorical (earmarked); (3) There should be state aid for school libraries; and (4) State aid for school libraries should be categorical (earmarked).

Superintendents strongly support the need for both federal and state aid for school libraries. Surprisingly, 81 percent either strongly agree or agree (45 percent strongly agree and 36 percent agree) that there should be federal aid. In terms of earmarking federal aid, 55 percent either strongly agree or agree (27 percent strongly agree, 28 percent agree, 28 percent disagree, and 17 percent are undecided). With respect to state aid, 88 percent either strongly agree or agree (45 percent strongly agree and 43 percent agree) that there should be state aid, with 54 percent either strongly agreeing or agreeing (26 strongly agree, 28 percent agree, 32 percent disagree, and 14 percent undecided) that it should be earmarked.

Length of service for superintendents tends to make a difference in perception. Superintendents with fewer than five years of service favor school libraries. They also support both federal and state aid with such aid being earmarked.

Budgeting for school libraries, however, yielded different responses. Superintendents were asked to rank five budget categories (with "1" being the most important and "5" being the least important). They rank their budget categories as follows:

Budget Category	Mean Rank
Class size	2.06
Salaries	2.18
Technology	3.23
Textbooks	3.67
Libraries	3.73

It is not especially surprising that libraries rank at the bottom. As has been suggested, there are many pressures on the local school budget, and superintendents must make hard choices to balance budgets. School libraries thus become a logical program area for federal and state funding in order to provide relief to local communities in this critical and under funded program area that contributes significantly to student achievement.

An effort has been made at the federal level in 2002 under ESEA (Elementary and Secondary Education Act) with $12.5 million, which will be distributed to lower socioeconomic communities through an application procedure. If this federal program is funded at $100 million or more, it will become a general grant program to the states. With the possibility of a war and ensuing budget deficits, the future does not look promising.

Wrapping Up

Children need books and other learning materials that are up-to-date and appropriate to their needs so they can learn to be good readers. Without the ability to read, which is developed at a young age through such activities as free voluntary reading, children are at a disadvantage, seriously reducing their chance to achieve in life. Reading is life. And, yes, to waste the mind of a child is a terrible thing.

Some schools do not have school libraries, and some that do often have out-of-date book collections. Children get many of their books from libraries. A school that does not provide a library and books and other learning materials with a staff to interpret the collection is depriving children of an equal opportunity to learn. With the changing perception of the more recently appointed superintendents, there is hope. The school library teacher profession needs to be self-critical of its activities. People on the outside are looking carefully at what is going on in our field. There are several critical questions remaining to be answered. Where does the profession of school library teachers go in order to advance its mission? How does the profession support more and better research for policy makers? How can studies be reported so they are read and correctly interpreted by the public? How can the profession convince state legislatures and the Congress to support its efforts?

Herein lies the challenge—being self-critical, but at the same time supporting and building a strong research edifice so we can tell the story with effectiveness to superintendents, principals, school boards, the Congress, state legislatures, the press, and the public at large.

Our task appears formidable, and it is. But school library teachers and their profession may not be part of the future without developing the capacity to achieve, to aspire, to develop, and to research. Conferences such as Treasure Mountain 10 that include future researchers are going to advance significantly the agenda of school libraries and student achievement. Finally, the sooner there is a shift in the paradigm from "information access" to "student achievement," the more relevant school library teachers and our profession will be.

Chapter 6

Experimental Research for Instructional Design

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Introduction

Scientific research. Lab experiments. They often conjure up old Boris Karloff movies with images of maniacal, old men stooped over bubbling flasks of liquid in dark underground laboratories.

Experimental research in the social sciences is generally far removed from these types of images. While some experimental studies are conducted in laboratory settings in order to attempt to control all variables, many such studies are conducted in the field---in libraries, schools, playgrounds, etc. to study subjects in a more natural environment.

What is experimental research and why do we do it?

Experimental (or quasi-experimental) research* is exactly what the name implies --- an experiment. It allows us to try something new, to implement a new method (e.g., learning centers), a new product (e.g., online catalog), or a new approach (e.g., problem-based learning) and scientifically study its effect on its intended audience. In experimental research, we can compare two or more methods, products, or approaches or study a particular method, product, or approach's effect on two or more groups of subjects using statistical techniques to analyze the results.

Experimental research allows us to predict results by asking questions and stating hypotheses based on what we already know about the phenomenon, manipulate the phenomenon in deliberate ways, and then measure the results using quantitative (numerical) reporting methods. Experimental studies require randomization (e.g., random assignment of students to treatment groups). Quasi-experimental research, more common in the social sciences, permits us to compare intact, existing groups (e.g., three 5th grade classes) or groups within a larger group (e.g., girls vs. boys within a single class), when randomization is difficult or inappropriate for answering research questions.

Typically, school administrators prefer to see numbers to report research results. Means and percentages are able to be understood easily and quickly and can be communicated to their constituencies (parents, communities, upper administration) quickly and easily.

How do quantitative research methods differ from qualitative research methods?

Experimental[1] research requires an intervention of some sort while naturalistic studies typically study an existing phenomenon as it happens. Experimental studies depend on controls, allowing researchers to manipulate the independent variables while carefully controlling other factors that might affect the outcomes. Controls allow the researcher to have confidence about whether the treatment imposed actually caused a change in the phenomenon studied. Qualitative studies, on the other hand, seek not to control but to let things happen as they naturally would. Generally, experimental studies in the social sciences study human behavior in the context of existing theories while naturalistic studies typically begin with little or no theoretical framework, often developing such a framework based on the data collected.

Which type of research method should I use?

The type of research methods one uses is typically dictated by the research questions one wishes to explore. There are even circumstances where both quantitative and qualitative methods are used to study a phenomenon. For example, one might conduct a participant observation study to try to understand the complexity of a situation and all potential variables *before* conducting an experimental study that tests the introduction of something new. Or, one might conduct interviews with some participants to gather additional information *after* they had received the experimental treatment. For example, in a study that explores library use before and after the introduction of a new library service, one could simply report changes in the number of students and teachers using the library after the service is in place or one could include quotes from individuals

[1] In this article, the term "experimental" incorporates both experimental and quasi-experimental research methods.

taken during interviews as to why the new service has motivated them to increase their usage of the library. The combination of words and numbers is more powerful than either alone.

Why is there relatively little experimental research conducted in our field?

In my ERIC search, I found very few studies in on school library media programs, resources, and services that could be labeled "experimental" or even "quasi-experimental." Why do you think that is? While there has been little formal investigation of this phenomenon, there may be some potential barriers that interfere with the use of such methods by practitioners and even academic researchers.

- Perceived lack of competence in experimental research methodologies. Few practitioners have had enough formal instruction and practical experience in experimental research methods to feel comfortable and competent in conducting experimental research studies.

- Perceptions that experimental research methods as more difficult to implement than other methods. Because experimental studies require manipulation of some variables while controlling others, the amount of preparation for conducting such studies is often perceived as greater and more difficult than for qualitative studies that study a phenomenon as it exists.

- Worries about statistics. Like research methods, often practitioners lack adequate training in statistical analysis methods go gain competence in this area.

These barriers are not as great as one might think. Here are some ideas for overcoming them:

1. Read several experimental studies to get a sense of how they are conducted. They don't have to be in our field but studies set in some type of educational setting will be most useful. Look for flaws in these studies, such as no randomization or lack of tight use of controls where results could be explained by some factor other than the treatment.

2. Keep your research design as simple as possible. For example, compare only two groups, a treatment group and a control group or compare only two methods of instruction.

3. Depending on the complexity of your research questions, try to use simple descriptive statistics (e.g., means, percentages) rather than more complex statistical analysis techniques. Often, those who are reading your research

report are more comfortable with and have a better understanding of more basic numerical results.

What are some examples of experimental studies in our field?

A search of the ERIC database reveals a relatively small number of experimental or quasi-experimental studies over the years. Here are a few examples.

In their study, Gifford and Gifford (1984) sought to explore whether there would increased library use or requests for assistance by two classes of 26 non-ability grouped students, randomly assigned to either the experimental group or the control group. The experimental group spent two weeks in the library learning the skills necessary to effectively utilize the resources available, such as using the card catalog, categories of reference materials and how to access and explore each tool. Additionally, teachers from all disciplines were asked to incorporate referencing library materials into their assignments. These students were given drills and practice exercises but they were not tested on the skills taught. The control group continued with their regular courses without the library instruction but did receive assignments from their teachers that required the use of library materials. For six weeks following the library instruction, a record was kept for each period of the day for both groups, noting the material accessed as well as the frequency of their requests for assistance. Results found that the experimental group utilized the library more than the control group, most importantly in the area of reference materials and during their free study periods. While the experimental group made use of the library more than the control group, the latter requested assistance three times more than their counterparts, concluding that the implementation of library instruction can dramatically affect the use and efficacy of accessing library materials.

In 1992, Todd reported the results of a research study on the effects of different amounts of bibliographic information on catalog cards on 227 secondary students' selection of books in "Bibliographic Information and Book Selection: An Experimental Study of Information Load on Choice Behavior in a School Library." Students were randomly assigned to five treatment groups and given as few as five and as much as 25 pieces of bibliographic information about six books related to a hypothetical assignment. He found that the number of information items affected the time taken to select correct books for completing the assignment. He also found that number of information items also affected students level of confusion

Small & Ferreira (1994), in "Multimedia Technology and the Changing Nature of Research in the School Library," explored the information locating and use activities, motivation, and learning patterns of children using either a print or multimedia resource to complete an independent research task. In this study, sixth grade subjects were asked by their art teacher to "write a report on Vincent van Gogh." Students were assigned to using either a reference book (linear) or a

computer-based multimedia program (non-linear) on this topic. Both resources were comparable in content. Use of the resource was limited in time and done in a room with an observer. Tests of knowledge using concept-mapping techniques both before and after the treatment revealed that while students using multimedia and books had learned the same amount, the type of learning for each group differed. Those who had learned about the topic from a book tended to express what they knew about the topic in phrases or complete sentences while those who had learned about the topic from the multimedia program, expressed what they learned in single words or short phrases or what the authors referred to as "sound bit learning."

In 1996, Van Deusen reported on her research in "An Analysis of the Time Use of Elementary School Library Media Specialists and Factors That Influence It." Ninety elementary library media specialists in Iowa to recorded their use of time for two days. Activities reported in the data were then coded using fifteen categories. She found that overall activity was nearly evenly divided between direct work with/for students and teachers and management/operational activities. Teaching and management were the most frequently recorded activities. Results also indicate that factors such as automation, scheduling, support staff, and number of buildings served by the library media specialist had a significant influence on how time was used.

Why should there be more experimental studies in our field, particularly those focused on instruction as a context?

There are a number of reasons to conduct experimental studies in school libraries but the main one is that these types of studies often have the greatest impact on our knowledge of and our decisions about the practice of school librarianship. Often, administrators and other decision makers prefer to see numbers rather than read long narratives that explain research results. Typically, percentages, means, and raw scores are preferred as they are perceived as easier to understand and interpret.

Another reason for using experimental methods to study phenomena in our field is that we can compare large numbers of subjects or several groups using these methods. Often, phenomena can best be studied through these more objective research methods.

What are some experimental research ideas for school libraries?

There are unlimited ideas for studying phenomena of interest in school library media centers. Here are some examples of research questions that could be explored.

1. Does accessibility to learning centers result in greater learning of information literacy skills by 3rd graders?

2. Do extended library hours result in more fiction reading by high school students?

3. Do teacher and library media specialist collaboratively planned and taught information literacy skills lessons result in greater student learning achievement than lessons planned and taught by the teacher or library media specialist alone?

4. Do experienced (tenured) teachers collaborate more often with library media specialists on instruction and curriculum planning than untenured teachers?

5. Do information literacy skills lessons integrated with the curriculum result in greater learning achievement than lessons taught in isolation?

6. Is one online catalog system easier and more satisfying for elementary students and teachers to use than another online catalog system?

7. Do interlibrary loan services affect the amount of library usage by students and teachers?

8. Are library media specialists with formal classroom teaching experience more successful in collaborating with teachers on instructional and curriculum tasks than those without a teaching background?

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Chapter 7

What Research Tells Us About the Importance of School Libraries

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During the 2000-01 school year, Williams Intermediate School in Davenport, Iowa, improved use of its library dramatically. From one month to the next, circulation of library books and other materials doubled, sometimes even tripled. A survey of students found that there was a 3 percent increase in the number of students who indicated reading frequently rather than sometimes or never.

What difference did these changes make? Of tested 6th graders, 18 percent moved from needing improvement to meeting or exceeding reading standards. Test score improvements for Black and Hispanic students were even higher than for the general student population.

The big question is: how do improvements in school libraries contribute to such student progress?

In recent years, I have led several studies of the impact of school libraries and librarians on student performance, working with my colleagues Marcia Rodney and Christine Hamilton-Pennell. To date, we have completed such studies in six states: *Alaska, Pennsylvania, and Colorado in 2000; Oregon and Iowa in 2001; and New Mexico just recently.* All of these studies replicate and expand upon an *earlier Colorado study*, The Impact of School Library Media Centers on Academic Achievement. That study was completed by Lynda Welborn, Christine Hamilton-Pennell and me in 1992 and published in 1993.

The original Colorado study, as it is popularly known, found that the *size of the library* in terms of its staff and its collection is a *direct predictor* of reading scores. The amount of test score variation explained by this school library size factor ranged from *five to 15 percent* across various elementary and secondary grades and while controlling for a variety of other school and community differences. *Indirect predictors* of achievement included the presence of a professionally trained librarian who plays an active *instructional role* and higher levels of *spending* on the school library. Other indirect predictors included overall school *spending per pupil* and the *teacher-pupil ratio.* The *lion's share* of test score variation was explained, predictably, by *socio-economic* characteristics that identify at-risk students-namely, being from poor and minority families in which parents themselves did not excel academically.

Recent Research

Looking across the six studies we have completed most recently, three major sets of findings figure prominently. These findings concern:

- the *level of development* of the school library,
- the extent to which school librarians engage in *leadership* and *collaboration* activities that foster information literacy, and
- the extent to which instructional *technology* is utilized to extend the reach of the library program beyond the walls of the school library.

School Library Development

The *school library development factor* developed in our more recent studies is an elaboration of the original study's school library size factor. School library development is defined by:

- the ratios of professional and total staff to students,
- a variety of per student collection ratios, and
- per student spending on the school library.

When school libraries have higher levels of professional and total staffing, larger collections of print and electronic resources, and more funding, students tend to earn higher scores on state reading tests.

In the aftermath of the original Colorado study, one of the more intriguing findings to many people was the one concerning the importance of school librarians playing a *strong instructional role*. To the disappointment of many practitioners, the earlier report did not *define what that means*, so they were uncertain how to act differently on the job. In our recent studies, we have succeeded in elaborating just what that instructional role involves.

Leadership

In order to play an instructional role successfully, school librarians must exercise *leadership* to create the sort of working environment they need to help students and teachers succeed. Specific activities which define such leadership include:

- meeting frequently with the principal,
- attending and participating in faculty meetings,
- serving on standards and curriculum committees, and
- meeting with library colleagues at building, district, and higher levels.

Allison Hutchison, librarian at Bald Eagle Area High School in Wingate, Pennsylvania, is a good example of the school librarian in a leadership role: In my school, she reports, the librarian is an integral part of the school steering committee which is made up of five area coordinators and other school leaders, such as the technology director. We meet monthly and together we make decisions about many building-wide policies, most importantly, future curriculum directions.

We review all curriculum proposals and decide which course changes and initiatives will be presented to the board. Not only do I get to provide input from my vantage point, which takes in the school's curriculum as a whole, but I also get to know in advance which content areas to emphasize in collection development.

School librarians who serve as active leaders in their schools have a dramatic impact on teachers and students alike. Barbara St. Clair, librarian at Urbandale High School in Iowa, learned how quickly the impact of her leadership could be felt.

During the second week of school I visited every 9th grade classroom. I introduced students to the library and booktalked all 16 Iowa Teen Award books for this year. I keep them in a special place and as soon as one comes back it is checked out again, which makes me very happy. I gave each student a bookmark with the titles and each English teacher a poster about the books. Another English teacher at a different level said that he had heard that I gave really good book talks and asked me to pick out some books to present to his basic English class.

Since then, I have had more requests for booktalks. A teacher also requested that I arrange a panel of teachers to talk about their favorite books with her class.

Collaboration & Information Literacy

When school librarians demonstrate this kind of *leadership* in their daily activities, they can create an environment conducive to *collaboration between themselves and classroom teachers*. That, in turn, enables them to work with classroom teachers to instill a love of reading and information literacy skills in their students. *Collaboration* activities in which school librarians should participate, according to our research, include:

- identifying useful materials and information for teachers,
- planning instruction cooperatively with teachers,
- providing in-service training to teachers, and
- teaching students both with classroom teachers and independently.

It is these types of collaboration between librarians and teachers that are linked directly with higher reading scores.
Consider the example of Eaglecrest High School in Aurora, Colorado, reported by social studies teacher Debbe Milliser:

Our school librarians-Barbara Thorngren, Pat Holloway, and Norma Nixon-work with our U.S. History and American Literature classes to do a research project from start to finish. Individual language arts and social studies teaching teams meet with the librarians before bringing students to the library.

Students are taught the research process, including accessing and using both primary and secondary sources. My students' ability to access library books and other materials and to use information appropriately in their papers is very evident in the quality of their work.

This project helps the juniors and seniors I teach to meet history, language arts, and library standards.

Technology

Perhaps the most dramatic changes since the original Colorado study have been in the realm of instructional technology. More and more schools provide students and teachers with computer networks. At their best, *school libraries are integrated into these networks* in such a way that they enable school librarians to reach out more proactively to the school community. Such networks also enable students and teachers to use library media resources from wherever they are-in classrooms, labs, offices-even, in the best situations, from home.

In our recent studies, we have found that in schools where computer networks provide remote access to library resources, particularly the *Web and licensed databases*, test scores tend to be higher.

Becky Hickox, librarian at Silverton High School, reported to us on the impact of the Oregon School Library Information System.

A 9th grade health project has evolved into a partnership between Hickox and teacher Erik Cross to introduce freshmen to the Internet. The cornerstone of this project is introducing the licensed databases made available through OSLIS. Although students often come with some knowledge of the World Wide Web, none of them are familiar with subscription databases. I provide the basic instruction and help individuals construct searches, she says, and Erik makes sure they are covering the required content.

This project introduces students to the concept of finding pertinent information as lifelong learners and gives them a base of search strategies for future projects in almost any subject area.

Controlling for School and Community Differences

The most critical feature of the research design employed in our studies and in other recent studies based on the same design is controlling for other school and community differences. The earliest studies on school library impact failed to do this. As a result, those studies were subject to easy criticism.

The event that precipitated the first Colorado study is an excellent example of this dilemma. In a 1987 National Public Radio interview, the head of School Match, a Westerville, Ohio, data vendor, reported that researchers at his firm had identified school library spending-among a host of other variables-as the strongest predictor of scores on the National Merit Scholarship Test. But, when this claim was investigated, other researchers were not convinced. Perhaps it was not spending more on school libraries in particular, but spending more on everything-that is, simply being a rich school-that led to higher test scores.

To preclude the dismissal of such findings about the importance of school libraries, our research design controls for a variety of school and community differences.

The *school differences* included

- characteristics of teachers, such as their levels of education, experience, and compensation;
- the teacher-pupil ratio; and
- total per pupil expenditures.

The *community differences* included

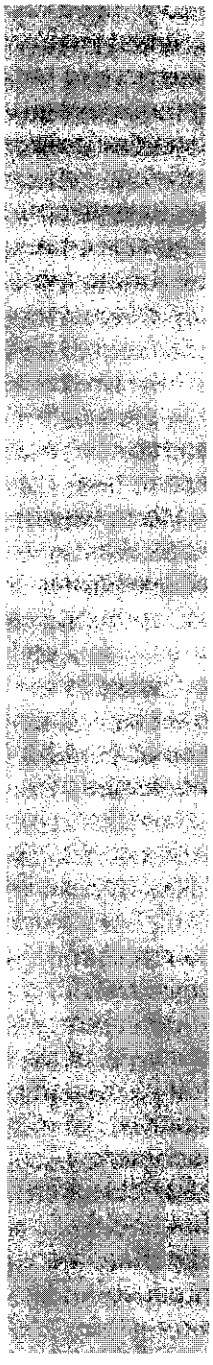
- poverty,
- minority demographics, and
- adult educational attainment.

As a result, we have been able to demonstrate successfully in several diverse states that such differences do not explain away the importance of high-quality school libraries.

Our research along these lines continues, currently in Michigan and California, and other states are in line to follow between now and 2004. Our methodology has been adapted by other researchers in studies of Massachusetts and Texas school libraries, yielding remarkably similar results to ours. Still other researchers are in the process of implementing our research design to study the impact of school libraries in other states.

At this point, however, there is a clear consensus in the results now available for eight states: School libraries are a powerful force in the lives of America's children. The school library is one of the few factors whose contribution to academic achievement has been documented empirically, and it is a contribution that cannot be explained away by other powerful influences on student performance.

Chapter 8



Qualatative Research: An Opportunity for School Library Media Researchers

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One of the most exciting outcomes of educational research in the latter part of the twentieth century occurred not in the area of research findings but in the realm of research methodology. Earth-shattering findings in education have always been few and far between, but the decline and fall of the assumption that the only good educational research is experimental research shattered the foundations of the research community in the 1980s and early 1990s and opened vast new horizons for educational researchers. Freed from the near-universal reliance on target- and control-group designs, pre- and post-assessments, and the application of inferential statistics that had marked educational research for most of the century, educational researchers became able to explore what to many have always been more interesting questions and to explore them in more diverse ways.

With considerable pushing and prodding from pioneers like Egon Guba (1981), it became acceptable for us to go beyond narrow and often simplistic searches for cause-and-effect relationships to investigate the "hows" and "whys" of learning, teaching, and information use. We were able to pose more sweeping questions and look for more nuanced findings. We were able to focus on processes, not just outcomes. We were able to think of interpretation as an inherent part of the research process rather than only an outgrowth of research conclusions. For those of us beginning our research careers at the time, the change wasn't just a breath of methodological fresh air–it was a tsunami.

Introduction

A number of specific methodologies were spawned by that tsunami, and eventually they became known collectively as "qualitative research." That generic label still encompasses a great deal of variety–case study research, grounded-theory research, ethnographic research, naturalistic inquiry, phenomenological research, and so on. At this point, it seems especially important for school library media researchers to think about the overall nature and techniques of qualitative research and to explore in more depth some of the ways this approach can be useful in our field. The first step is to concoct a definition of this research paradigm that's broad enough for our purposes and that doesn't do too much violence to any of the individual "qualitative" traditions abroad in the land. We'll start with a one-sentence definition, expand on it, and identify the characteristics of the qualitative paradigm that distinguish it from the other prominent research paradigm in education, the quantitative one.

1. Definition of qualitative research

Qualitative research is a set of systematic, empirically based procedures for investigating events as they occur naturally in context. It is, first of all, research–a process undertaken to discover and understand something about the world in which we live. It is systematic–disciplined, orderly, and well-planned. It is empirical–focused on what can be observed in the physical world or deduced from what people other than the researcher say about their experiences in that world. It involves procedures–by now a specific and well-recognized set that will be discussed below. It is naturalistic–seeking to explore questions and issues as they occur in ongoing, "natural" settings and situations. And it is contextual–studying those questions and issues in light of what's important to the people in a particular context and using those people's perceptions to help shape and define both the issues under study and the explanation of their meaning and importance.

2. How qualitative and quantitative research differ

In some ways, it's easier to understand qualitative research by contrasting it with its quantitative counterpart. Speaking very broadly–and far too simplistically except as an introduction–here are a few of those contrasts. Qualitative research involves the collection and analysis of verbal or pictorial data in social settings, while quantitative research focuses on numeric data. More specifically, qualitative research focuses on exploring a phenomenon in detail and in depth, while quantitative research focuses on providing a broad, general understanding of a phenomenon. Qualitative research is interested primarily in processes, while quantitative research is interested primarily in outcomes. Qualitative research seeks to understand the multiplicity of beliefs, motivations, and perceptions behind an action or an outcome, while quantitative research generally seeks (1) to establish one-to-one, cause-and-effect relationships between one factor and an outcome or (2) to find correlations

among various factors and outcomes. In other words, qualitative research goes deep, while quantitative research goes broad.

Perhaps the easiest way to see the difference is to picture yourself studying the phenomenon of the eating of a banana split. If you were a qualitative researcher, you might focus on understanding and describing the interactions of the ice cream, the syrups, the fruit, and the whipped cream with one another and with your taste buds. If you were a quantitative researcher, you might focus on determining the number of calories you'd consumed–the effect--as a result of engaging in those interactions–the cause. It's important to remember that both perspectives are important to the person on a diet who's trying to balance the relative values of the pleasures of the process with the outcome of the pounds!

3. Underlying theoretical assumptions

The differences between quantitative and qualitative research stem from two very different sets of assumptions about the world that underlie the two traditions. Without belaboring these distinctions–which are critically important to understand but beyond the scope of this introductory presentation–let me point out five of the beliefs that undergird qualitative research, as adapted and expanded from Lincoln and Guba (1985). The beliefs are somewhat overstated for pedagogical purposes, but their essence is intact.

1. Reality is perceived from multiple perspectives. Particularly in the realm of meanings and other "internal" and "social" phenomena, each of us constructs our own understanding of reality. Each of us understands reality uniquely. While we'd probably all agree that a rose is a rose is a rose, each of us would also attach highly individual meanings to a bouquet of roses left on our front doorstep. And there's no external authority who can tell us that whatever that bouquet means to *you* is better or worse, right-er or wrong-er, than whatever it means to *me*.

2. Human actions–including learning--cannot be explained in terms of linear, cause-and-effect relationships. Circumstances of programs, institutions, and behaviors are nonlinear and profoundly complex. Human beings act with intentions and beliefs rather than simply reacting blindly to stimuli. Understanding and explaining human actions requires creating a holistic, complex picture that takes into account a full range of circumstances.

3. There is no separation of the researcher and the people he or she studies. In fact, these people are called "participants" in qualitative research to reflect that they interact with the researcher in meaningful ways that help to shape and define the issues under study. The researcher and participants depend upon each other to discover what's important about a phenomenon. I always tell my participants that they're the experts about their

situations–that's why I want to study them. It's my central job as a researcher to tease out their expertise and present it to a wider audience.

4. There is no such thing as objective, neutral, values-free research. Values play a central role in inquiry. The questions asked, the data collected, the data-analysis techniques used, and the reporting of findings unavoidably reflect the values and assumptions of the researcher and of those he or she studies. The very choice of a topic to study reveals what the researcher thinks is important to discover and understand. Further, all other methodological decisions flow from the way that topic is conceptualized and presented.

5. Finally, generalizability is neither an outcome nor a goal. Generalizability is a statistical construct that makes sense in the physical sciences but that is a misplaced notion when it comes to human beings. The same experiment performed by a dozen chemists in a dozen chemistry labs can be expected to produce the same result, and that result can be generalized to any chemistry experiment that involves the same conditions. Qualitative studies of chemistry lessons taught by a dozen different teachers to a dozen different classes in a dozen different schools can't be expected to yield the same outcomes in any linear, predictable way. There may be enough similarities that we can say that the results of the study "transfer" across sites, but these results certainly can't be generalized to all chemistry lessons on that topic.

These five assumptions are grounded in the philosophical traditions of phenomenology and hermeneutics. Without question, a deeper exploration of these fields and of the beliefs summarized above is crucial for the development of an understanding of the strengths, weaknesses, and nuances of the qualitative paradigm. Once again, however, such an exploration is beyond the scope of this introduction to qualitative research for potential school library media researchers.

Designing a Qualitative Study

The next section of this paper introduces three resources that are likely to be useful to the beginning qualitative researcher in the school library media field: a checklist to help such a researcher determine when to use a qualitative approach, an explanatory list of definitions of key qualitative terms, and a selection of books and articles that cover both general background information on qualitative research and specific descriptions of qualitative studies in the school library media field. Taken together, these three resources provide considerable guidance on qualitative research for school library media researchers.

1. When to choose a qualitative approach

Obviously, the research method you choose depends on the research question you want to ask and the kind of answer you want to get. If you want general answers about effects over a wide group, then you want to choose a quantitative method. If you want specific answers about processes within individual settings or involving individual students, then you want to choose a qualitative one. Beyond that broad distinction, however, how does one know when a qualitative approach might be particularly useful?

Appendix A (Choosing a Qualitative Approach for a Study of School Library Media Topics) provides some more specific things to think about when making that decision. It's based on the work of Michael Quinn Patton (1990), who first developed his checklist of evaluation situations for which qualitative methods are appropriate almost twenty years ago. It draws on this list and the later work of Patton and others to suggest a set of questions you might ask when thinking about doing a qualitative study in the school library media field.

2. How to design and conduct a qualitative study

If you can answer yes to *any* of the questions on the checklist, then perhaps a qualitative approach is the most appropriate method for your next study. Once you've made the decision to proceed with that approach, you'll need to know a few techniques. And once again, you'll need to know far more than an introductory presentation can cover. However, Appendix B (Definitions of Key Terms in Qualitative Research) provides a starting point. Essentially, it's a vocabulary list, organized roughly according to the sequence in which you'd encounter the terms and concepts when you're designing and conducting a qualitative study. Reading it in that sequence will take you through the full process such a study entails.

3. Applications to School Library Media Research

The list of references in Appendix C includes some of what I believe to be key background documents as well as an overview of some of the studies that I think are exemplary. It, too, is only an introduction to the qualitative literature you can find in education in general and in education's various subdisciplines. However, the list offers a thorough overview of the qualitative research that has been done to date in the school library media field.

One Final Caveat: Action Research Lite

In conclusion, I'm afraid I have to add a small caution, because one thing I think our field must avoid is labeling things "qualitative research" that simply aren't research at all. They're important and useful, but they're not research. Because the techniques of qualitative data collection are relatively easy to use, at least on the surface, they're

easy to adopt for a variety of purposes. But too often–and I've read this in our field's literature–we observe our own situations and we interview our own peers and patrons and we examine various documents we have at hand and we think we're doing research. We describe "how I done it good" and think we've written a research report. Believe me, we get a lot of criticism for that kind of enterprise.

Let me pick on "action research" to illustrate my point. That phrase originally meant a kind of qualitative research in which a practitioner teamed with an outsider–generally a university researcher--to investigate a specific phenomenon within a social setting. The practitioner--who knew the situation, the people, and the full context involved--identified the problem to be studied. The researcher--who knew the techniques of research design, data collection, and data analysis–designed the study. Working as a team, the practitioner and the researcher (together or separately) collected and analyzed the data according to the study plan. They analyzed it for one specific reason: to solve the identified problem.

The strength of this approach is that it draws on the particular expertise of both types of people. The practitioner, who knows infinitely more about the problem than the researcher, can bring insights into the data collection and analysis–and the worth of suggested solutions to the problem–that the researcher couldn't possibly have. The researcher can bring not only expertise in research but the ability to observe and analyze the situation from an outsider's perspective and can therefore see things the practitioner might be too close to the situation to see. This kind of research is rigorous, systematic, and useful.

However, when we identify our own problems and seek evidence-based ways to solve them, that's just not research, even though we might want to call it that. It's an important--even critical–and useful task; but it's not research. It's what educators call "reflective practice." That's an idea that's been around education for a long, long time–and it's being rediscovered in a major way as part of the reform of teacher-education programs. Colleges of education are now formally training their students to become reflective practitioners. It's a mantra I now hear all the time. Yes, reflective practice often involves qualitative techniques. But simply using those techniques–whether it be to solve a particular problem or to determine a student's progress through alternative assessment–just doesn't pass muster as research in the educational community at large.

So by all means let's engage in reflective practice, and let's use qualitative techniques to do it. But let's be careful about diluting our field's credibility as a research-based discipline by calling something research when our colleagues in the classrooms, in the principals' offices, in the editorial offices of journals, and in the educational establishment in general know that it's something else. We in school library media have a strong research community who are doing and poised to do solid, rigorous, useful, and interesting qualitative research that will advance both knowledge and practice in our field. We need to do just that.

APPENDIX A
Choosing a Qualitative Approach for a Study of School Library Media Topics

1. Does the research emphasize *individual* outcomes–i.e., are individual students, teachers, and/or library media specialists expected to react or behave in qualitatively different ways from one another? And is there a need or desire to describe and evaluate these individual outcomes?

2. Does the research focus primarily on *process* rather than outcome? Is it interested in "how" something happens (or doesn't happen) rather than "to what extent" a program, service, or lesson or other activity succeeds or fails?

3. Is the research *exploratory* in nature–i.e., does it seek to discover and understand new issues and factors at work in a learning or teaching process or in a school library media program rather than to measure the effects of currently known variables?

4. Are the *perspectives and perceptions* of the teachers, students, administrators, library media specialists and/or others more important than the outcomes of any group's actions?

5. Is there an interest in focusing on the *diversity* among and *unique qualities* of individual students or program components–e.g., for instructional planning, service provision, program design, etc.?

6. Is information needed about the *details* of a program, service, or activity–what students and teachers experience, what information services are provided and how well they meet individuals' needs, how a program is organized, what individual staff members do, what individual students do or learn, how something developed over time?

7. Is detailed, *in-depth information* needed about particular activities or programs–e.g., particularly successful programs; unusual approaches; exemplary programs that are important for programmatic, financial, or political reasons?

8. Are decision makers–e.g., principals, school boards, site-management teams, others with responsibility for funding–interested in understanding the *internal dynamics* of a program–its strengths, weaknesses, and overall processes–instead of or as well as its final outcomes?

9. Are administrators and other decision makers interested in the collection of detailed, descriptive information about a program, activity, or service for the purpose of improving it–i.e., do they want a *formative evaluation* rather than a summative one?

10. Is there a need for information about the nuances of program or service quality–i.e., descriptive information about the *quality* of activities and outcomes, not just summary information about the levels or amounts of these factors?
11. Is the state of measurement science such that *no valid, reliable, and believable standardized instruments* are available to measure particular outcomes of interest–e.g., students' and teachers' acceptance and understanding of a new information literacy curriculum?

12. Would the administration of such instruments be overly *obtrusive* in contrast to gathering data through observations and open-ended interviews?

13. Are the goals of the program, service, or activity diffuse, general, and nonspecific, indicating the possible advantage of a *goal-free* approach to gather information about what effects the phenomenon is actually having rather than assessing effects related specifically to stated goals?

14. Is there the possibility that the phenomenon may be affecting students, teachers, library media staff, and/or others in *unanticipated* ways or and/or having unexpected side effects, indicating the need for a method of inquiry that can discover effects beyond those formally stated as desirable?

15. Has the collection of quantitative data become so *routine* that no one pays much attention to the results anymore, suggesting a possible need to break the old routine and use new methods to generate new insights about a phenomenon?

16. Is there an expressed or felt need and desire to *personalize* the research or evaluation through methods that may be perceived as "humanistic" and personal through methods that seem natural, informal, and understandable to participants?

17. Do decision makers and participants have *philosophical or methodological biases* that lead them to prefer qualitative methods, thus increasing the likelihood that they will find the results of a qualitative approach particularly believable, credible, understandable, and useful?

18. Are decision makers or others interested in increasing their understanding of the phenomenon by developing a *grounded theory* of actions and effects that is inductively derived from a holistic picture of the phenomenon?

19. Are you–the researcher–*comfortable and capable* working in a realm that requires verbal facility and a high tolerance for ambiguity?

APPENDIX B
Definitions of Key Terms in Qualitative Research

Conceptual framework: An explanation of the main dimensions to be studied and the presumed relationships among them. The conceptual framework is based on the literature review and serves as a device for clarifying and communicating the nature and scope of a study. For example, a conceptual framework for a study of an information-literacy program might be built from literature on information seeking in various environments, using information to learn, and using technology as a learning tool. The framework would integrate findings from these various areas to suggest the broad conceptual area to be investigated.

Research question: The overarching, general question that identifies the key issue of interest in a study. This question comes out of the literature review and the conceptual framework. For example, the following question might be developed from the conceptual framework noted above: "What do teachers and library media specialists need to know and be able to do to design and conduct a successful information-literacy program?"

Foreshadowing questions: Initial queries that focus and "bound" the key issue. These questions are subquestions of the general research question and are used to guide the study in its earliest stages. They may be changed, reduced, or augmented as the study unfolds. They can–and generally should–form the basis for the first stages of data analysis. For example, a foreshadowing question related to the previous example might be: "What knowledge, attitudes, and skills do teachers need to collaborate effectively with library media specialists in designing information-literacy lessons?"

Triangulation: The use of a variety of data sources, methods, time frames, and/or theoretical perspectives to cross-check data and interpretations. For example, teachers, students, the principal, and the library media specialist can all be data sources; multiple methods as noted below are often used in qualitative research; and theories from information seeking and from student assessment can provide two different perspectives for data analysis.

Researcher as instrument: The assumption that the researcher, rather than a paper-and-pencil (or electronic) instrument is the ideal data-gathering device. Because of the insightfulness, flexibility responsiveness, and judgment a human being can bring to the setting, s/he can pursue emerging dimensions of a study that are beyond the scope of instruments designed in advance.

Prolonged and persistent observation: A data-gathering technique that requires observations to be conducted regularly and over a prolonged period of time. The technique ensures an adequate amount of data for analysis, a defense against distortions stemming from superficiality, and the development of an appropriate level of understanding from which to analyze the data.

Fieldnotes: The written record of each observation session as it is conducted. Raw notes taken during the observations include descriptions of the events, conversations, physical environment, etc., encountered at the research site.

Expanded fieldnotes: Extensions of the raw fieldnotes that include methodological notes, interpretive comments, tentative conclusions, etc., as well as observational statements. Creating expended fieldnotes is the first step in data analysis because the process serves to refine and direct subsequent fieldwork on the basis of the researcher's growing understanding of the pheonomenon under study and its context.

Informal interviewing: Using an interview schedule (also called a protocol) to guide the questioning of study participants. Informal interviews presume that questions will be tailored to tap the unique perspectives of various participants rather than standardized for all members of the study group. Interviews should be taped, transcribed, and verified by the researcher before inclusion in the corpus for analysis.

Interview schedule (protocol): A list of questions and follow-up probes designed to focus interviews while at the same time allowing for open-ended responses and the exploration of unexpected dimensions that emerge during an interview. One way to maximize the usefulness of an interview schedule is to include a final question asking if there was anything important to the topic at hand that the interviewer neglected to address.

Document analysis: The examination of artifacts that are present or produced at the site and that often give the researcher access to information prepared in participants' own words and contexts. Student products, teacher assignments and packets, search histories, printouts of screens, documentation, etc., are all candidates for document analysis.

Coding: The assignment of brief, written symbols that represent major topics and patterns present in the data. Coding is the basic process for analyzing qualitative data. Codes are developed by the researcher to cover such areas as events, relationships, situations, perspectives, etc. A code like TOT, for example might be assigned to all the segments of the fieldnotes and transcripts relating to the students' spending time on task–or not doing so. Codes generally relate to the foreshadowing questions but often go beyond them. Strauss and Corbin (1998) is the best source for information about coding.

Electronic supports: Software programs that facilitate the manipulation of qualitative data. Such programs as *NUD*IST, NVivo,* and *The Ethnograph* allow a researcher to import fieldnotes and transcripts, assign codes to these data online, sort and resort the data according to developing data analytic schemes, and generate descriptive statistics on the basis of the coded data. These products do not actually analyze the data but provide a mechanism that helps the qualitative researcher to do so.

Data reduction: The process of systematically selecting, discarding, organizing, and simplifying data in order to determine the appropriate focus for further analysis and reporting. Data reduction is a continuous process that involves making analytic choices about what to include and exclude during each phase of a qualitative study.

Theme: A concept or pseudo-theory that emerges from the data and provides a focus for data analysis and reporting. Themes can be developed at various levels of abstraction during a study, from a context-bound idea like "students' difficulties in conducting searches" to a more general one like "students' perceptions of the value of electronic resources."

Grounded theory: A statement of a plausible relationship among concepts and sets of concepts about a phenomenon that is based on–i.e., "grounded" in–the data from the field, especially in the actions, interactions, and social processes of the participants. Developing grounded theory–a concept introduced by Glaser and Strauss (1967) and currently addressed by Strauss and Corbin (1998)–is a goal of many qualitative researchers.

Thick description: Both (a) an extensive collection of material upon which the findings of a study are based and (b) a full description of context (included in the final report) that will enable readers to judge the applicability of those findings to their own settings. "Thick description" of the first type provides evidence of the thoroughness of the research, while "thick description" of the second enhances the transferability of the results.

Transferability: The attribute of the data presentation that allows a reader of the final report to determine whether the findings are applicable to his/her own setting. The qualitative version of "generalizability," transferability is a goal of qualitative research. It is greatly enhanced by the creation of a thick description that enables the reader to see easily the relationship between the study site and his/her own situation.

Member checks: Ongoing and final testing of data, interpretations, and conclusions by selected participants. According to Guba, member checks are the single most important action qualitative researchers can take to ensure the credibility of their findings.

Peer reviews: The examination of methodology and findings by colleagues of the researcher who are experts in one or more aspects of the study. A peer review of a study of an information-literacy program might include an experienced qualitative researcher, an expert in information literacy, and a library media specialist–other than the one who implemented the program.

Audit trail: A collection of materials that would enable a researcher other than the original one to review the study and determine the dependability and

confirmability of the findings. Such materials might include the data themselves and the researcher's notes on the processes of data collection and analysis. Agreement with the conclusions of the study is not necessary; rather, it is the existence of plausible connections across data, findings, and conclusions that is confirmed.

APPENDIX C
Selected Resources

1. Some textbooks and other resources

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Marshall, C., & Rossman, G. B. (1999). *Designing qualitative research* (3rd ed.). Thousand Oaks, CA: Sage.

Maxwell, J. A. (1996). *Qualitative research design: An interactive approach.* Thousand Oaks, CA: Sage.

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Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage.

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2. Some exemplary studies

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Hirsch, S. (1999). Children's relevance criteria and information seeking on electronic resources. *Journal of the American Society for Information Science*, *50*(14), 1265-1283.

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society for Information Science*, *42*(5), 361-371.

Large, A., & Beheshti, J. (2000). The web as classroom resource: Reactions from users. *Journal of the American Society for Information Science, 51*(12), 1069-1080.

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Schachter, J. Chung, G., & Dorr, A. (1998). Children's internet searching on complex problems: Performance and process analysis. *Journal of the American Society for Information Science*, *49*(9), 840-849.

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Chapter 9

Teaching Students the Ethical Use of Information and Communication Technologies: A New Role for School Librarians

Frances Jacobson Harris

Abstract

With the publication of the 1998 *Information Literacy Standards for Student Learning*, the profession officially blessed the inclusion of social responsibility as a core component of information literacy. Standard 8 describes the information literate student as one who "practices ethical behavior in regard to information and information technology." But in a world where information technologies and communication technologies are no longer distinct, this mission is not as straightforward as it seems. We cannot continue to confine our professional role to the transmission of narrowly-defined intellectual property morés. This paper examines prevailing perspectives on moral development and ethics education in terms of the evolving role of the school library media specialist. A proposed analysis of approximately five years worth of student responses to information and communication technology-based ethical scenarios is presented. Student responses will be being coded according to the knowledge domains of moral knowledge, social-conventional knowledge, and a domain that constitutes a mixture of the two. Discussion focuses on evaluation of the data and possible implications for the role of school library media specialists in ethics education.

Introduction

In 1995 I made a sabbatical visit to Smoky Hill High School in Aurora, Colorado. The media specialists there taught a three-session class students were required to take before obtaining e-mail accounts and Internet access. I asked the librarians why this task fell to them. They answered that they took on the job voluntarily knowing that if the skills were taught piecemeal within the curriculum, the students would learn piecemeal. The biology teacher would teach biology applications and resources, the Spanish teacher would teach Spanish applications and resources, and so on. But the Smoky Hill media specialists felt that they taught the full spectrum of skills – the whys, the netiquette, the how-to-be-online lessons – as well as the core curriculum content. The viewpoint of these professionals has stayed with me ever since. Media specialists are generally in a position to see the big picture, which ought to mean that they are especially suited to teach it. Nevertheless, the prevailing professional model is one in which media specialists still focus on their traditional turf, teaching about information access and use. Their responsibility for broader, societal-based topics are generally confined to intellectual property themes (see, for example, *The Ethics of Information Use: A Guide for Teachers*, 2001).

With the publication of the 1998 *Information Literacy Standards for Student Learning*, the school library media profession officially blessed the inclusion of social responsibility as a core component of information literacy. Standard 8 describes the information literate student as one who "practices ethical behavior in regard to information and information technology." But in a world where information technologies and communication technologies are no longer distinct, that mission is not as straightforward as it might seem. With communication technology incorporated into the mix, the stakes are raised in terms of what it means to "practice ethical behavior in regard to information and information technology." Joyce Valenza's article, "A Bad Case of the Internet Blues," (2002) provides a snapshot of the persistence of these problems in the daily work lives of media specialists. Doug Johnson (1998) exhorts the profession to reconsider the variety of ethics topics that should be part of the media specialist's purview. It is time to restructure our ethics instruction role in broader terms than traditional lessons on copyright and plagiarism. As it is, schools are not value-free; a hidden curriculum is implicit in everything that comprises American schooling. We might as well make values education explicit, and the library media specialist is in a natural position to incorporate it into information and communication technology curricula.

The purpose of this paper is to look at one model of ethics education in a school library media center and examine it in the context of prevailing perspectives on moral development and education theory. It is my hope that the discussion will spark further conversation about the evolving role of the library media specialist. The paper is divided into two sections: 1) a brief overview of major themes in moral education theory; and 2) a proposal for applying the moral education

research to an analysis of student responses to online ethical scenarios, which are part of a media specialist-taught ethics education program for eighth grade students.

Part I: Moral Education Theory

The following brief overview of moral education theory is by no means comprehensive. It is intended only to provide a context for the proposed case study.

Durkheim and Piaget. The foundation of modern theory in moral education emanates from the work of sociologist Emile Durkheim (1925/1961) and psychologist Jean Piaget (1932). In Durkheim's view, the purpose of moral education was to teach adherence to societal norms via the transmission of traditions using stories and examples. He felt that morality grew from attachment to a group and respect for its rules and symbols of authority. Durkheim's views gave rise to the character education movement, associated most strongly with William Bennett, and derive from behaviorist traditions. Piaget's view was that children define morality by struggling with issues of fairness. Education should focus on developing ways of thinking about moral issues, ways of relating to others, learning to understand issues of justice and human rights, and learning how to *choose* what is moral. Piaget is known for his stage theory, which includes moral learning as well as other types of learning. Children progress from a heteronymous stage of moral reasoning, defined as egocentric and characterized by strict adherence to rules and a belief in "immanent justice," to an autonomous stage of moral reasoning, which is an ability to look at rules critically and to select them based on principles of fairness and cooperation. Piaget's theories derive from cognitive-developmental traditions and his work prompted the influential psychologist Lawrence Kohlberg's research into moral development and education.

Kohlberg. Lawrence Kohlberg (1958, 1984) expanded upon Piaget's stages, defining six stages of moral reasoning grouped into three major hierarchies. The first hierarchy, the preconventional level, corresponds roughly to Piaget's heteronymous stage. The second hierarchy, the conventional level of reasoning, finds that individuals understand the place of moral behavior in sustaining society and that shared agreements about behavior and rules take precedence over individual interests. Finally, the post-conventional level means that individuals reason based on principles, apart from a strict adherence to societal needs and norms. Kohlberg's group also defined two types of moral reasoning. Type A reasoning includes individuals who reason from a perspective of rules and authority, and Type B reasoning includes those who reason from a perspective of justice and human welfare. Kohlberg and his research group felt that the purpose of moral education was to help children advance to the next level and that the best way to accomplish this was by presenting children with information which did not fit into their current world view. By forcing children to reconcile the new

information, a process of equilibration, the children would reconstruct their basic moral perspectives. Kohlberg and his associates developed and tested a technique using fictional moral dilemmas, and employed it over a span of years to validate the stage theory and to assess the development of individual children.

Domain theory. An outgrowth of Kohlbergian thought is domain theory, first articulated by Elliott Turiel (1983). Turiel concluded that there is a distinction in domains of social knowledge – specifically, that concepts of morality are considered and learned separately from concepts of social convention. Domain theory argues that children can distinguish the difference between morality and social convention from a very early age (Nucci, 2001, p. 8). Moral transgressions are universal and cross-cultural. Murdering someone during an act of theft is considered a moral violation in any culture. But social conventions are not universal and are subject to change. For example, appropriate forms of address or judgments regarding modesty of clothing are arbitrary and can be defined differently by different cultures. The progress of personal development through the moral stages influences how a child functions in both the moral domain and in the social/conventional domain. Kohlberg looked at moral development as occurring across domains at the same rate of development. (Nucci, 2001, p.79). Domain theory argues that domains can develop or be taught separately, and that learning and advancement in one domain may influence development in another domain (Nucci and Weber, 1991). Although Kohlberg's stages are the "most widely researched description of moral development available" (Nucci, 2001, 81), domain theorists have reinterpreted them in terms of domain theory. They argue that Kohlbergian stages do not represent the full range of moral development, not accounting for within-individual variations across contexts. And beyond Kohlberg's moral reasoning types, individuals can generate reasoning using more than one conceptual system.

Domain theorists reason that the moral and social-conventional domains can overlap or mix. Nucci explains these interactions with illustrative examples (Nucci, 2001, 77). Lining up for a movie is a social convention that could be replaced with another procedure that would achieve the same ends. But cutting in line violates a moral principle, the equal distribution of justice. A second type of domain overlap, classified as a second order moral event, occurs when the violation of a social convention is seen as causing psychological harm. Someone who wears a bathing suit to a funeral is technically violating a conventional practice, but is also showing disrespect to the mourners and causing hurt. Individuals cope with a mixture of domains by: 1) emphasizing one domain over the other, 2) remaining in conflict, or 3) coordinating domain components. Nucci and Weber (1991) found that students who were taught with domain-appropriate methods were able to coordinate elements from both domains. Those taught with a moral-only perspective subordinated mixed domain issues to moral concerns, and those taught with a convention-only perspective subordinated most mixed domain issues to social convention.

Cultural psychology. The cultural psychology approach to moral development posits that cultural difference is a greater factor in moral development than Kohlberg's stages or Turiel's domain theory. Rather than a school of thought represented by specific theorists, the study of moral development is subsumed within the broader fields of cultural psychology and anthropology. This perspective holds that culture may determine that some violations of social norms are as egregious as, or even worse, than violations of universal moral code. Traditional cultures are more likely to "moralize" their conventions (Nucci, 2001, 95). Cultural norms may not match what other groups consider to be morally "right." Furthermore, specific social conventions are not regarded as alterable or contingent as they would be in domain theory. The definition of a moral act is not always generalizeable across cultures and societies. Cultural norms often determine a power structure that may influence perspectives on moral and conventional codes. For example, conventions may establish systematic biases that favor the rights of one group over another. These rights are reinforced by the information systems of the culture. Moral impact is interpreted by those who are in power and who benefit from the status quo. Cultural psychologists would argue that moral behavior is highly context dependent. Society and its norms drive the prevailing sense of morality, giving rise to moral relativism and situational ethics.

Part II: A Case Study of Moral Education in Information and Communication Technology

The project. For the past six years, I have been teaching information literacy skills as part of a required semester-long computer literacy course for eighth graders. Although ethics concepts are woven into all aspects of the course, one particular unit has ethics as its focus. Using online newsgroup software, I post six ethical scenarios students respond to online, followed by an in-class face-to-face discussion. The hypothetical scenarios are based on real situations that have occurred at school or appeared in the news media (See Appendix for examples). This format helps make abstract concepts more concrete, particularly when scenarios closely resemble situations the students have personally experienced. For example, students have a vested interest in exploring a fictional student's right to download MP3 files if they or their friends have had similar files removed from their personal school directories. Or, if a student has been the victim of (or the perpetrator of) e-mail harassment, discussions on that topic are quite compelling. During the classroom discussion of the scenarios, we reveal when school practices and rules are the direct consequence of the original incidents that inspired various scenarios. Students are endlessly fascinated by this direct connection to their immediate reality.

However, other than the excitement these discussions generate in class, we have not been sure of the efficacy of our efforts. It is time to take a more systematic look at how students view the moral conundrums presented in each of these scenarios, and if exposure to these dilemmas prompts changes in behavior

or attitude. This paper is an exploration of how approximately five years worth of student responses to information and communication technology-based ethical scenarios might be analyzed in terms of current theoretical perspectives on moral education.

Proposed analysis model. Recognizing that any analysis process based on a single model may be limiting or even inappropriate, it is nonetheless valuable to explore data through the lens of such a framework. I have chosen to consider a modified domain theory perspective, classifying scenarios in terms of the social convention and moral issues they pose. In the student responses, I plan to look at how students identify these domain issues. What do their responses say about their perspectives on morality, social-conventional problems, and mixed-domain issues? I anticipate that students either (A) subordinate an issue to convention, (B) subordinate the issue to morality, (C) vacillate between both domains without coordination, or (D) integrate issues from both domains through coordination. Important contextualizing factors come into play as well: the students' individual levels of development, their moral reasoning types, their assumptions about the facts of each case, and prevailing cultural values.

It is useful to look at one scenario and ten sample student responses as an illustration of how the model might be applied. The following scenario has been in use throughout the history of the curriculum, because it represents a persistent problem that we have only partially been able to solve through technological means.

> "Ronald has walked away from a lab computer without logging off. Trish sits down and, still logged in as Ronald, sends inflammatory e-mail messages out to a number of students and posts similar messages on the class newsgroup."

In this situation, Ronald has violated convention by forgetting to log off. He has not committed an act that will hurt others, although he has broken a rule that was established to maintain order and prevent tampering. Trish, on the other hand, has committed a moral transgression by, in effect, stealing Ronald's identity and attributing immoral actions to him. Is this how students saw the situation? What follows are ten sample responses, labeled by domain-type categorization (in italics).

> "Ronald should have been paying more attention to what he was doing so things like this don't happen. It was a wrong thing for Trish to do, but it was still all Ronald's fault for allowing it to happen at all. This would have never happened if it wasn't for Ronald not doing what he is supposed to do, so it is mainly his fault. This can be solved by always logging off or punishing both of them, especially Ronald."

Subordinates to convention. Ronald is being blamed for Trish's immoral actions because he has broken a convention-based rule designed to prevent just such mischief.

"Boy, that's pretty harsh. Why should someone be punished for forgetting to log off?"
Subordinates to morality. This student makes a judgment about the severity of the action, concluding that breaking this particular convention-based rule does not rise to the level of punishment.

"Punishment? he didn't do anything wrong. I know u very well, and I know you're just as forgetful as he is."
Subordinates to morality. This student catches the first one in a contradiction, pointing out that the mistake is so common (and, in fact, has been committed by the first student) that it cannot be considered a culpable act.

"Don't you think that by having other people use your files you have learnt to log-off your computer? I'm sure I would've because you learn from your mistakes! Trish won't have to do that again unless Ronald forgets again! She's just teaching him something, the world is cruel out there, he's got to look out for himself!"
Subordinates to convention. Here, Trish's immoral actions are justified because they "teach" Ronald the consequences of his actions. Typical of Type A thinking, the writer is reasoning from a perspective of rules and authority.

"One behavior was Ronald's behavior. He should have been more alert to what he was doing. Perhaps an even worse behavior was Trish's. She did not do the right thing by sending e-mail messages on Ronald's account. She should have logged him off. Once she had already sent the messages, I think the right thing to do would be to apologize to Ronald."
Coordinates domains. This student aptly assigns responsibility and blame. Ronald has *responsibility* for creating the circumstances that Trish has *blame* for exploiting. Indeed, Trish ignored an obligation not only to refrain from the actions she took, but to rectify Ronald's error by logging him off.

"I disagree with you on the note that Trish's behavior was worse than Ronald's. I think it was very much Ronald's responsibility to be aware of the fact that if he left without logging off, his account would be open to the public. And if she sent out all those messages that were meant to hurt Ronald, she probably dislikes Ronald enough so that she won't apologize or even regret what she did."
Subordinates to convention. In addition to holding Ronald accountable for the situation, this student is a pragmatist about the likelihood of Trish ever

regretting her actions. This world view regards rules and conventions as being the only way to protect the Ronalds of the world from the Trishes.

"I feel that Trish is a bad, bad girl and Ronald is a stupid, stupid boy. I will admit that I have left my computer on before but that's because I am an idiot AND I had people that were around me that told me what happened and the other time they logged off for me. Trish is just plain evil to use the stupidity of Ronald against him!"
Coordinates domains. This student has an awareness of the universality of the situation, which is expressed by recalling a similar personal experience.

"I think what Ronald did was very careless and kind of stupid. He knows that you should never leave your computer on when you leave the lab, so it is partly his fault that the flames were sent. It was his responsibility to turn it off, but it doesn't make him accountable for the flames. He was just being careless and dumb. Trish, however, was very malicious for actually trying to frame Ronald for the flames and actually sending them."
Coordinates domains. This student is particularly explicit in assigning areas of responsibility and blame, as well making judgments about the severity of each action..

"I think it is partially Ronald's fault for leaving without logging off, but Trish shouldn't have done what she did. She should have logged his computer off when she found it. I think you should punish Trish, but Ronald already got his punishment."
Coordinates domains. The writer of this response defines Ronald's treatment by Trish as a punishment of natural consequences.

"She was very STUPID and deceitful
She should lose her computer privileges
He was very stupid too, because he did not log off
He should lose his privileges too!!!"
Vacillates without coordination. Though this student labels Ronald as being stupid and Trish as being deceitful as well as stupid, there is no distinction in the consequences assigned to each.

Limitations of this approach. While conducting this exercise, it became clear that the current incarnation of this analysis model will not work consistently throughout the range of scenarios and responses that comprise the data set. Questions emerged that domain theory did not seem to address. Is there a *culture* of youth that would explain why some moral issues are regarded by adolescents as being convention issues? For example, teenagers tend to view intellectual property issues as rule-based while most adults view them in moral terms. Perhaps this perspective is developmental rather than cultural, "idea ownership" being too abstract a concept at a typical adolescent stage of development. How should issues of pragmatism be classified? Some actions are

taken (or not taken) out of fear of the consequences or potential for retribution. Pragmatism also incorporates common sense and "folk wisdom." Some students who responded to the "Lester" scenario (See Appendix, #2) astutely observed that an e-mail message sent to 300 people could not be considered private. Therefore, any claims by Lester to violation of privacy by school administrators would be moot. Although domain theory certainly has a great deal to offer as a framework for this research, it may need to be informed by other theoretical perspectives as well. Methodologically, it also makes sense to borrow from research traditions such as ethnography, which might more easily incorporate the complexity of the issues and variables.

Conclusion. The purpose of most educational research is to inform practice. We operate under the assumption that a research cycle begins with uninformed practice, followed by theory-based empirical research, and concludes in informed practice. But the pattern does not always hold true. Kohlberg (1985) noted that despite the success of his trials with dilemma discussions, teachers did not continue with the process once the research period ended. Kohlberg ruefully noted that the operation was a success, but "the patient died" (Kohlberg, 1985, 80). There are potentially many reasons for this (probably not atypical) occurrence. Schools are places bound by restrictions, both internal and external. Research content may not fit curriculum mandates, or may be too complex for teachers to carry out once researchers have left the scene. Or, the research content is simply not valued enough in the school to upset the rest of the cart and change the larger practice. This last possibility takes us full circle, back to the librarians at Smoky Hill High School. If media specialists possess the broad perspective as well as the opportunity, shouldn't they especially step forward to assume the role of teaching online ethics? Having done so at my school, do we know exactly what students have been learning? Do our students coordinate elements from both domains? Further study of this curriculum will improve our understanding of student learning in this arena and help us improve our approach to the content.

The true measure of the success of this curriculum lies in our students' subsequent actions. We know that students can talk and write about dilemmas in ways they think we want them to, as evidenced by this student's comments:

> "Well, I already know what you want us to say but, here goes...
> Russ shouldn't tell Stuart where he lives, Stuart could be anyone.
> Now I can get on to my more interesting opinions."

But what happens when students are confronted by real dilemmas? It is one thing to respond to hypothetical scenarios, another to make personal choices in the heat of an actual situation. At our school, we know which students get into ethics trouble during subsequent years, but these individuals only represent the ones who are unlucky enough to get caught. At the present time, we do not really know how this particular educational intervention changes student learning and

behavior except through anecdotal experience. Recently, for example, the school's system administrator was contacted by a web site owner who discovered that one of our students had taken material from their site without permission and posted it on his personal web page. The company threatened legal action unless the student's web site was removed from our server. The student's immediate response was to ask – with hopeful anticipation – if this meant he would "become a scenario." This incident showed us that students remember the scenarios, even with fondness, but that they do not necessarily follow up on lessons learned.

Appendix

Sample Scenarios and Responses

Note: Each semester, six different scenarios are selected for this unit. Scenarios are added or selected based on their currency or applicability to specific school issues. A complete list of scenarios can be found at http://www.uni.uiuc.edu/library/computerlit.html.

1. Roberta's family just got a new CD recorder for their home computer. She and Todd are the DJs for the next school dance, so Roberta invites Todd to her house and they surf the web for their favorite MP3 sites. They download several songs and burn them onto a CD they'll play at the dance. Some of the songs are from big name groups and others are from new artists who are using the web to build an audience.

I don't see what's wrong. I do this all the time. CDs are overpriced so there isn't anything wrong with getting a little extra. Plus, it's for a school dance, its not like they are selling these burnt CDs.

MP3s are put on the web for the purpose of listening and copying, so Roberta and Todd were just taking advantage of their resources. I think this is very smart.

Hold up now. Aren't they not supposed to be burning CDs without permission or something? And the big bands could sue. However, since they are from MP3s... still... shame, shame on Roberta and Todd.

I agree with ****. I mean, you didn't buy it. It's like you stole it from them.

ok... I don't see what the problem is. I personally have no objection whatsoever for downloading free music. Any artist who is in it for the money should not be allowed to have their music played! they should be in it for the love of the music. Not the money.

I agree with ****, the MP3's aren't a big deal. They are legal, free, and are easy to obtain. There should not be any problems with using them. another thing is that there is no conflict in this scenario, so that there should be no need to question the use of MP3's.

I think that this is just a school dance and not a big or formal thing. If it was a ball for the queen of England, then I don't think they should have done that but since it's just a dance, I think it's ok.

It may be the same legally as stealing, but ethically, it is not too bad. It is the equivalent, basically, of taping cassettes off the radio.

I think that downloading these MP3s and putting them on a CD is okay. All Todd and Roberta are doing is getting free material off the internet. The artist that puts a downloadable song on the internet must acknowledge that the songs may be downloaded multiple times at different places. After all, putting a MP3 on a CD is just like putting a MP3 on a computer's hard drive.

I know that many people, such as the music industries think that this is wrong because it cheats artists out of their money. But, I personally do not think that this is wrong because the artists have enough money. It would be really expensive for people my age to have to buy every CD that they like. Especially if you only like a couple of songs on the CD. Burning a CD is an efficient and cheap way of getting your favorite CD.

As an answer to your first question, yes, people should be able to download MP3s. Why, you say? 'CUZ MP3S RULE.

2. Lester sends e-mail to the entire student body inviting them to a BYOB party at his house while his parents are out of town. Lester receives a message from a system administrator calling him in for a meeting with school officials. He objects because he feels that his e-mail is his own private business.

If the e-mail was his private business, he should have just sent it to his friends, or people he wanted to invite. It is wrong anyway, but if that's what he wants to do, that is none of my business.

But the question is, whose business is it? Some[one] has to stop these shenanigans, and although you aren't the one in charge, someone is. And they have to make the choice.

I don't really think that the school has a right to monitor our e-mail. However, if the school found out because someone reported him, that is a different matter. He should be punished just as he would be if a teacher caught him passing a note with that on it.

I think that what you think is wrong because if the party takes place and students drink and drive and get hurt or even killed, the school could be held responsible because they let the email be announced.

He did nothing wrong in school, so the school should not punish him. If the parents want to punish him that is their business.

If Lester is underage, his parents should definitely be told about the planned party. However, I do object to his e-mail being read, but only under certain circumstances. If the school has a policy that says all e-mail will be screened, he was asking for it. But if the school was informed that they should check his messages, his privacy was violated, although his actions aren't something I approve of.

This isn't an issue of what might happen at the party. It's an issue of whether Lester is having any rights violated by the school officials. In this case, no, because the officials can freely filter e-mail.

Lester should not have sent his message about the party via e-mail in the first place. For all he knows, it could have gotten forwarded to his parents. Also, the people he sends it to could forward it to other people who might then forward it to other people and then there would be too many at the party for him to handle. This just goes to show that his e-mail is not at all private so his argument is invalid.

First of all, Lester probably knew that officials would find out. Is he asking for trouble? Second, because he sent it to everyone it's not just his business, it's also theirs, and they can tell the school officials.

It does not matter whether it is a student or a school official, it is illegal to read other peoples' email without authorization or proof. What he did was wrong but they have no right to read his mail. Ends do not justify means. They both are wrong.

I think that email is your own personal thing, but it is email. You can't get all defensive when someone interferes with what you're doing over the internet, you automatically accept the consequences when you use email.

3. Sharon and Timothy are students at Big Suburban High School. They have designed a Web page devoted to their favorite rock band using their personal disk space on the school's Web server. They have posted song clips, lyrics, photographs of each band member, and articles they have found in various Web news sources. However, school authorities have asked them to shut down their site because of the obscene content of many of the lyrics. Sharon and Timothy object, noting that their First Amendment (free speech) rights are being violated.

I think that they should be allowed to, because I think it is their first amendment right. However, I also believe it would be more appropriate if they used a service like Angelfire or Tripod to do this, so the school wouldn't be held responsible.

Since it's on the school's website, they shouldn't put things on their page that offend or embarrass the school. But, the school should not just tell them to take the page off the web, they should just tell them to bleep out the bad lyrics.

The freedom of speech of the people should not be violated, and I really believe in this. The freedom of speech is one of the few things that America, as a nation, should uphold. Freedom of speech is POWER. Whatever people want to say, the statement should be able to be expressed to the public.

Freedom of speech *is* power, but what if it makes other people uncomfortable? What if it endangers their lives? Think about it. If someone yells, "FIRE!" in a crowded movie theater, well that's Freedom of Speech. But what if people get trampled in the frantic crowd while they're trying to get out of the building? *This* is *not* a good use of your freedom of speech. Should it be allowed in public places? In SCHOOLS?!?!

I think that what they are doing is perfectly right and that they should be able to post those things. Even if the lyrics are obscene I don't thing that they school should get into it because it is just music and the people will know the words anyways.

They shouldn't post that kind of information on the school's server. I disagree that their rights are being violated. The school should be able to control what is posted from their own server.

I didn't think of that, but it's true. The website with obscene lyrics would make the school look rather bad to the public, because they would think that the teacher and other staff members allowed the students to put things like that on webpages.

ok. If those pictures were copyrighted, then that's a good reason if they hadn't gotten permission. And it is a school server, so you really do have to do whatever they want. But I think that most of these bands don't have "objectionable lyrics" unless they feel that they need a reason to have it or that it emphasizes whatever they need it to. While it does make those lyrics harder to sing in public, I think that it does add something to the song sometimes.

As the site is hosted on the school's server, the school has every right to take down the site. *If* Sharon and Timothy have permission from the band, they should go to a free website server, such as Tripod or Geocities, to host the site.

4. Word gets around that Sylvester maintains a web site on the Geocities web server. Besides containing sexually explicit references about a couple of girls at school, the web site links to hard core porn sites. School officials find out about it and tell Sylvester that they plan to inform his parents about the web site.

Sylvester is a perv. However, I believe that it is not the school's responsibility to punish Sylvester unless he is using the Uni Server or is sending the site to Uni students at their Uni accounts.

Notify[ing] his parents probably won't stop the problem. If he is posting stuff about girls without their permission, legal officials should be involved.

Everyone at school has a collective effect on each other, and when a person has access to such materials, and others get involved... you have one heck of a problem.

I agree with ****--it's really wrong to do stuff like that. Even though it's the internet, and he's free to do what he wants, everyone involved should be notified.

I think that if the school had nothing to do with this web site (it was not hosting it or giving him permission to build it) it has no business in his websites. However, if another girl (lets call her Jill) from his school is being spoken of without Jill's consent, then Jill has the right to take this case to a higher level. The porn sites are also none of the schools business, as long as the school has nothing again, nothing to do with it. (The school could and should hand this over to the boy's parents)

But it **does** concern the school if it's getting spread around through the school. Schools have to take charge of bad situations sometimes.

I agree that the school officials should tell Sylvester's parents about the "site" he maintains, despite the fact that his "infatuation" with porn is none of their business. But because the website contains sexually explicit information about some girls in his class, that makes it very inappropriate and could hurt those girls badly.

I think that Sylvester should be required to remove the references to the girls if they haven't given him consent, but I don't feel that it is the school's job to inform his parents. This is not a school matter unless it has been assigned for a class. If they're going to inform his parents, fine, but it shouldn't be through the school.

I think that this is not correct. He is giving out pictures of privacy of people. Also, porn sites shouldn't appear in his page, it puts him down and his school.

It never said that the girls didn't like it. He should be able to keep the site but take off the girls!

It makes absolutely no difference if the girls like being on the website or not. Unless they have their parents permission, it's solicitation of a minor and if the girls don't file a suit, someone will.

5. After the September 11th terrorist attack, many students and teachers send related e-mail to the "all-student" or "all-faculty" mailing lists. Most of the messages contain information about the status of former students and about ways people can help in the crisis. But Penelope sends a long note with a heavy religious message. And Mr. Snidden sends out patriotic graphics and images. A small delegation of students takes their objections to the administration. They had understood that these all-school mailing lists, which are screened by the school's system administrator, were supposed to be used for school related, informational purposes only.

Penelope and Mr. Snidden have a right to share their opinions even if they are not informational. As for the rule about all-school mailing lists, that rule is violated several times each week and Penelope and Mr. Snidden are not the only ones doing this.

Just because everyone is doing it does not make it right. If there is anything I hate it is being pushed with religious influences.

If you don't care about these messages then don't read them!!!

Personally... I do read them....but they're not to the benefit of the whole student body so they shouldn't be sent to the whole student body.

I don't see what is wrong with Penelope's message. Her email is full of information about how she feels after the attack. Informing the school about how some of the people feel may bring relief to some. If students don't wish to hear about how she feels, then they can just delete the message.

I think it is O.K to do that. People were doing that on CNN and that's just for news purposes.

This is a universal message to all who are mad. WHY. No one has any right to care. if people started sending me stuff about a religion I didn't practice or whatever I just don't have to read it!!! And if you had anything to say you could too. u can talk about how much you praise the group that did it if you want.

I think that the September 11 attack should be considered a school-related subject. It affected so many people, and it is important that the school upholds its patriotism in this troubling time. So the small group of students shouldn't have objected to the administration.

There is nothing wrong with the patriotic images, since we are all living in America and there should be American spirit in everyone. I can understand that religious messages might be found offensive, but we can deal with that. It is fine to express their complaints, just as it is fine to express feelings through emails, but the school email system is not for this purpose so Penelope and Mr. Snidden should have used a home email or something else to do this.

This situation is a difficult one. Everyone is right in some ways, and everyone is wrong. Although I think both Penelope and Mr. Snidden meant well and were doing what they thought was right, some people might be offended by their messages. However, everyone is entitled to freedom of speech, and so they should be able to send messages with their own beliefs and opinions. I'm really not sure what should be done in this situation because everyone is right.

I agree with one student who said that as long as it says specifically in the subject line what it's about, I think it's fine. One can always delete emails! I read the religious email that was sent out after 9/11 and I am agnostic. I found the facts (hidden under all the Gods) to be quite interesting.

6. Several students have discovered a web site that promotes anorexia as a lifestyle choice rather than an eating disorder. It includes tips for weight loss, pictures that glamorize the anorexic look, a discussion board members use to support one another, and other material that promotes "anorexic pride." School counselors have asked that this site and others like it be blocked on the school network. They point out that anorexia is a deadly disease and that some students are particularly susceptible to this type of misinformation.

I think its good that they're blocking. I've seen what's happened to some people who were anorexic and it's really bad. Anorexia may be a type of lifestyle, but its a bad one and shouldn't be promoted. It's dangerous and I think that people should do all they can not to fall into it and if they do, then to try and make themselves better rather than support themselves and others to keep doing it.

I guess that's what I would do too, but maybe they could use that site for the evaluating web pages thing... it would be perfect for something like that. [Note: this student is referring to a previous class activity on evaluating web sites]

Websites have the right of speech because they can write anything they want. If they were to be blocked then like half of the websites will be blocked because there's so much anyways that's wrong. I mean yeah it is bad, but I mean they can do anything else to stop it. People do have free speech... even websites. I mean people are smarter than to choose anorexia and stuff.

I don't think that the sites should be banned in the school network. I think that the sites are bad, but if administrators feel strongly about this, they should teach classes or have clubs to show that anorexia is not a way of life, it's a deadly disease. The students should have the right to look at the sites that they want to, because that is what is good about the internet. I think that the students should be trusted not to go to sites like this.

I think that people are just trying to feel better about being anorexic. If they want to feel better about themselves they should be able to do so. They put on the website that anorexia is a potentially lethal disease and that you shouldn't try to get it

Anorexia is NOT a lifestyle! It's just like saying that I was born with homosexual behavior. People aren't born with it, they acquire it as they go along in life.

I think that the school administrators are right and that some of the students would be particularly susceptible and gullible and that sites like that and others that glamorize hazardous things should be filtered.

I think that there are better things they can do besides blocking. For every site they block, there are many that they don't. Instead, it would be better to teach about the dangers of anorexia in the health class.

I think that they're right. If there really are some people that might think that anorexia is a good thing, then it's for their own good that it's being banned.

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Chapter 10

Communicative Competence in the Classroom and in the Library

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Abstract

Communicative competence places students in a better position to effectively receive the learning and the library and information services that they seek in the classroom and in the library. As information technology has provided people with more opportunities to share information, one can ask if, contiguously, it has provided students with more opportunities to gain communicative competence in diverse settings, including the K-12 classroom and the library? I show in this paper that, in fact, communicative competence remains relevant today as there are issues about diversity and interactions that continue to challenge teachers and libraries.

Introduction

Diversity in the ways students speak and communicate in the library and classroom has long challenged librarians and teachers as they strive to teach and provide library and information services to students. It is a safe assumption that students who have the communicative competence to interact with teachers and librarians, as well as other students, are placed in a position where they are more likely to effectively receive the learning and the library and information services that they seek.

In an era of easier and wider access to global information, this paper seeks to find the relevance of the theory of communicative competence within the educational setting. In an era of easier and wider access to global information, some might posit that we are at a point when cultural boundaries are blurred and discussions about diverse cultures, as well as diverse ways of speaking, are unnecessary. As information technology has provided people with more opportunities to share information, has it contiguously provided them with more opportunities to gain communicative competence in diverse settings, including the classroom and the library? As students are growing up with easy, worldwide access – through the Internet and television, e.g. – to trends and lifestyles, are they growing up with the same ideals and worldview, so much so that there is less diversity among them?

In this paper, I aim to show that teachers and librarians must continue to pay particular attention to communicative competence in the classroom and in the library in order to effectively provide students with the learning and library and information services that they seek (in this paper, I specifically mean the classroom and the library in K-12 school settings). Cultural diversity and diverse ways of speaking are inherent features of society. In fact, diversity is now enhanced as more opportunities for movement from one cultural environment to another has increased. Additionally, cultures that have been so marginalized to the point of being nonexistent have moved to the forefront in many school settings.

Technology and the Internet have played a central role in the changing cultural dynamics of society. To be sure, technology and the Internet have become a part of the ordinary lives of children and young adults and are responsible for the digital culture to which these children and young adults belong. It should be pointed out, however, that in the digital environment, it is not just that technology and the Internet are shaping the culture of children and young adults into a digital one; technology, the Internet, and the digital culture are, in turn, being shaped by these children and young adults (Smith & Curtin, 1998).

Definitions

The notion of communicative competence continues to be discussed in the literature on education and sociolinguistics. These discussions provide varied attributions to the notion of communicative competence (e.g., Martin, et al., 1994, Collier, M. J., 1988). In this paper, I go back to when Dell Hymes proposed his theory of communicative competence as a theory of language acquisition and socialization (1974). According to Hymes, communicative competence is what a speaker needs to know to communicate effectively in socially and culturally significant settings. In looking at communicative competence, one is paying particular attention to the way social and cultural factors are integrated with linguistic behavior and language use. As Hymes suggests, one looks at the degree in which, in language use, something is "formally possible", something is "feasible in virtue of the means of implementation available", something is appropriate "in relation to a context in which it is used and evaluated", and something is "in fact done, actually performed, and what its doing entails" (p. 281).

The way a child learns to speak and socialize illustrates well the impact of social and cultural factors on language behavior. Hymes suggests that while there are underlying universals in the way a child acquires linguistic skills, it is the social conditioning of these skills that enables the child to interact in a cultural setting. It is through the impact of social and cultural factors on his linguistic skills that a child learns "when to speak, when not, and as to what to talk about with whom, when, where, in what manner." (1972, p. 277). In the final analysis, while a child may have linguistic competence, it is in the way he communicates in cultural settings, the way he is guided by social and cultural rules and norms – i.e., it is in having communicative competence – that he is able to communicate effectively.

Communicative competence is made explicit by sociolinguistic interferences (Hymes, 1972), which are conflicts that emerge when the rules and norms that govern discourse in a community are juxtaposed with the rules and norms that govern discourse in another setting. Discourse is defined here as the function, as well as the structure of language (Schiffrin, 1994). Finnegan (1992) points out that while one can analyze discourse by looking at the formal structure of language as well as the function of language, particular attention should also be paid to "*all* forms of verbal communication and performance in a culture" with "sensitivity to the ways dominant cultural ideologies can blind us to less visible forms" (p. 43). Sherzer (1987) suggests that there are cases in which there is difficulty, even impossibility, of translating into English poetic/magical lines of discourse in diverse settings; yet this verbally, artistic discourse cannot be ignored as it is "the expression of the essence of the relationship often unconscious, between language and culture" (p. 99).

To better understand communicative competence, one can begin by positing that in particular social and cultural settings, such as in a classroom or in a library, members of a community may not have the communicative competence to be effective participants in interactions and discourse in these settings. One can further posit that lacking communicative competence, these members of a community are unable to use and make use of these settings as effectively as they can.

Rules and norms that govern discourse comprise the verbal repertoire of a community or in a particular setting (Gumperz, 1995). Gumperz points out that the verbal repertoire of a community includes "all the accepted ways of formulating messages" (e.g., codes and subcodes) and provides "the weapons of everyday communication" from which members of this community choose (p. 284). If one, who is fluent in the verbal repertoire of his particular community, is able to gain fluency in the verbal repertoire of classroom learning and school library use, then he or she has the communicative competence that will be useful in learning in the classroom and in seeking library and information services.

Challenges of Communicative Competence in the Classroom and in the Library

Studies of the rules and norms that govern everyday discourse in diverse communities and the rules and norms that govern discourse in classroom settings have made explicit the central place of communicative competence in discourse and interactions. In her ethnographic study of Native American children in the Warm Springs Indian Reservation, Philips (1985, 1983), for example, suggests that the traditional classroom setting provides these children with conditions for speech use and communication that conflict with the conditions to which they have been enculturated in their home and community. Native American children have acquired language and socialization skills that place emphasis on social cooperation rather than individualistic behavior. What often happens in the classroom in the Warm Springs Indian Reservation conflicts with this view of cooperation and social activity. As part of students' learning experience, for example, teachers sometimes require students to speak or perform in front of other students, and allow for them to make mistakes in order that they will try harder the next time to avoid public failure. This approach to learning is not shared by Native Americans. As a result, "sociolinguistic interference" occurs as teacher and student do not recognize social and cultural differences in the rules and norms that govern their speech use and interaction. In the Warm Springs Indian Reservation, learning is a complex process that involves silent listening and watching with limited amount of verbal instruction and time for question and answer. It is only after one has fully mastered a process or a task that he stands before an audience.

In an extensive ethnographic study of the acquisition of language and socialization skills across three cultures – Samoan culture, the Kaluli culture in Papua New Guinea, and white, middle-class American culture – Ochs & Schieffelin (1984) found that in white, middle class culture, children are often encouraged to speak and to answer questions during the very early part of their lives. Questions, which are intended to challenge them, are often posed; however, as part of the learning process as well, they are provided assistance by parents and caregivers in sorting through the answers to these questions. Speech is simplified, for example, to accommodate comprehension. "This entire process," Ochs & Schieffelin state, "socializes the child into culturally specific modes of organizing knowledge, thought, and language" (p. 481).

In Kaluli and Samoan culture, parents and caregivers do not accommodate child-like speech. A crucial component of Kaluli culture, for example, is the belief that mothers cannot and are incapable of speaking for their children. Thus, as soon as a Kaluli child learns to say "mother" she is actively shown to speak correctly. "The cultural dispreference for saying what another might be thinking or feeling has important consequences for the organization of dyadic exchanges between caregiver and child. For one, it affects the ways in which meaning is negotiated during an exchange" (p. 487).

Across the three cultures in this study, the provision of verbal enrichment to children is crucial. Deviation occurs in the way this verbal enrichment is provided. As in Kaluli culture, in Samoan culture children are encouraged very early on to speak like adults,

even to use language that children in Western society are prohibited from using. Because of their social and cooperative structure, both Kaluli and Samoan culture regularly expose young children to multiparty conversations and discussions. In this we see that these two cultures are different from white, middle class American culture where dyadic interaction is more frequent.

Shirley Brice Heath (1996, 1983) also describes the contrasting way language and socialization skills are acquired in diverse communities. In one community, for example, children – even those in their preschool years – are frequently asked "open" questions. In addition, children acquire habits of talk that are similar to what they find in written materials. In contrast, children in another community grow up having almost no practice in having "why" questions addressed to them; the questions addressed to them are usually closed ("yes" or "no") questions. Heath suggests that these children, consequently, have almost no practice formulating answers to complex questions. They do not usually experience timed tasks and hence, do not learn to respond quickly or appropriately to "why" questions posed to them by their schoolteachers. The result of this is that their teachers have a negative view of them as learners and school children by their teachers.

My own research on language use in a South Pacific island community makes explicit the central place of communicative competence in the library (Salvatore, 2000). Sociolinguistic interferences emerge when the rules and norms that govern everyday discourse in this community are juxtaposed with those that govern traditional information-seeking discourse in the library. The rules and norms of everyday discourse in the community – i.e., the verbal repertoire of the community – include, for example, the common use of verbal play, implicit communication, and *roaming* language. Verbal play accompanies various forms of communication, and to insist that a library user seeks information from a librarian without the insertion of verbal play will be a great challenge to this user. In this South Pacific island community, language that is implied is equally important to language that is clearly and verbally articulated. The challenge for the librarian wishing to provide library and information services to a user from this community (and for that matter, the challenge for teachers as well) is to remember to pay particular attention to implicit communication as much as to verbally articulated communication.

The notion of *roaming* is another central feature of the verbal repertoire of this community. I provide this attribution to discourse in which the speaker "roams" around on the periphery of a conversation rather than directly articulating the message he is giving. The challenge for librarians, particularly since they have been trained to negotiate the information-seeking query, is to facilitate the information-seeker's language use so that he or she can be open to question negotiation and he or she can get to the point, instead of "roaming" around his information need.

Communicative Competence: Is it Still Relevant?

Students are being exposed to and are able to share, more and more, similar things. For instance, American children of immigrant parents have immersed themselves in a culture that is shared by children of parents who have lived in the United States all their lives. One might posit that these children of immigrant parents have easily gained the communicative competence that is necessary to perform and function effectively in the classroom, as well as the library. I propose that communicative competence remains central to understanding the way students perform and interact in the classroom and the library. I give two reasons for this: 1) students from different backgrounds still maintain some of the features of the verbal repertoire of their ethnic and cultural background as a way of asserting their identity, and 2) information technology, in fact, has created a digital culture in which new forms of literacy have emerged, which contribute to the challenge that teachers and librarians already face.

Verbal Repertoire and Identity

Erikson (1971), as cited in Makros and McCabe (2001), suggests that during the adolescent stage individuals are preoccupied with who they are. During this stage, students seek to define their identity and much more so, to assert their identity. Students from different ethnic backgrounds may share similar experiences and exposure to lifestyle trends; nevertheless, they come from diverse home communities, which they identity with. (In fact, I propose that to deny this is to deny that these students will grasp the opportunity to be proud of their ethnic cultures and diversity.) Quinn (2001) points out that Hispanic students engage in various celebrations. In recognizing this feature of their culture, we also celebrate one of the features of their Hispanic culture. At their schools, these students become marginalized when they bring features of their culture from home to school and then they begin to assume that these features may conflict with the dominant culture in the schools.

Ball (2000) reminds us that we can find identifiable features of the African-American verbal repertoire, such as "tellin' stories" and the call-response, in community-based organizations in African-American communities. In this verbal repertoire, for example, is what has been referred to in the literature as AAVE or African-American vernacular English. A word in this vernacular English, for example, is "dissin". "Dissin" is short for "disrespectful"; but it is used whenever someone wishes to call attention to someone else not in complete agreement with him or her. One would say that another is "dissin" him or her when he or she sees that the latter is not in complete agreement with him or her.

In her study of a rural, African-American community, Heath (1996) also finds this notion of "tellin' stories" to be symbolic of the African-American verbal repertoire. According to Heath, story-tellers use reality to set the stage for highly creative, fictionalized stories. They use few formulaic openings and do not structure their stories in chronological order, which conflicts with school literacy discourse events. As Heath (1996) writes, "the children's abilities to metaphorically link two events or situations and to recreate scenes

are not tapped in the school; in fact, *these abilities often cause difficulties*, because they enable children to see parallels teachers did not intend, and indeed may not recognize until the children point them out." (p. 32) On the other hand, in middle-class White communities, children engage in bedtime story routines which provide them with practice in interaction situations that are similar to classroom and teacher-student interaction.

The African-American storytelling skill is illustrated in hip-hop music. Rose (1994), as cited in McLeod (1999, p. 134), described hip-hop music as "a form of rhymed storytelling accompanied by highly rhythmic, electronically based music" (p. 2). In fact, the phenomenon of hip-hop makes explicit the interaction between identity, discourse, and communicative competence. McLeod describes the discourse in the hip-hop community as a conflict between the invocation of hip-hop as a central feature of the African-American identity and the challenge seen in the increasing immersion of hip-hop into mainstream culture. McLeod explains that the invocation of the authenticity of hip-hop is derived from members of a community that feels the threat of assimilation into mainstream culture, so that the identity of the community is muted. What begins to emerge in the discourse on hip-hop music is a scenario in which members of a culture continue to define, redefine, and assert their cultural identity, even as certain identifiable cultural features are becoming immersed in mainstream culture.

New Forms of Literacy

We see further this need for cultural identity in the emergence of new forms of literacy, particularly among children and young adults. Dourish (2001) explains that new forms of literacy have emerged as technology operating systems have expanded from the symbolic and textual to the graphical. This state of affairs facilitates a more interactive experience when working with computers and high technology. These new forms of literacy include "peripheral attention," "pattern recognition and spatial reasoning," "information density," and "visual metaphor." We need not look far to see the dynamic ways that children and young adults interact with and navigate computers. Smith & Curtin (1998) state, "the use of the Internet and increasing immersion in simulation, navigation and interaction will accelerate the creation of new cultures and new ways to see the world" (p., 224). New forms of literacy calls for a different kind of educational environment, one in which these new forms of literacy are integrated.

Conclusion

In this paper, I have attempted to describe the central place of communicative competence in the classroom, which can also be extended to the library. In an era when it seems that students are more apt to share and have access to similar experiences, students remain preoccupied with finding their individual identity. Hence, students continue to challenge teachers and librarians with their diverse cultures and diverse ways of speaking. In this era, we also see that people are more apt to move from one geographic location to another. This movement entails moving from one community with its own culture to another community with another culture. This, too, continues to

challenge the way teachers and librarians provide effective learning and library and information services to students.

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Chapter 11

Children's Choice of Information Sources and Their Perception of Information: An Exploratory Case Study

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Abstract

When children need to solve information problems, they interact with information sources in libraries as well as with adults who can help. This study attempts to draw a picture of how elementary school children use information to complete school assignments in a public library setting from the perspective of children's librarians and children. Using Taylor's Information Use Environment (IUE) model as an organizational framework, the study identified characteristics of children's information behavior using the public library to work on school assignments. Children's age, family background, and attitude toward their school assignment found to be the characteristics related to the *people* component of the IUE. The characteristics related to the *problem* component are unclear and incorrect assignments, teachers' preferences on assignments, and assignments given without consideration of children's cognitive and developmental aspects. The layout of the children's section of the library, adult guidance, and the children's behavior in using computers are the characteristics related to the *setting* component. Lastly, the children's preferences in doing research, teachers' specification and preferences for children's final product, physical features of sources –"attractive package"- children's concepts of relevant information and the usability of electronic sources are found to be the characteristics in the *resolution of problems*.

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Problem

Children come to the public library for a variety of different purposes. Many of the information tasks that children bring to the public library are assigned by schools (Gross, 1997). Children and their parents visit the library to do school assignments. Those who come to work on school assignments draw meaning and solve their problems by interacting with information sources in the library. How do children perceive and use the information that is in the public library? What factors affect their behavior in seeking, selecting, and using information to meet their objectives?

This study was conducted in a public library system that serves a jurisdiction in which school library media programs are not mandated. The public library provides the only library collection and services for many of the children in the community. The study attempts to draw a picture of children's information behavior in solving their school- based information problems using the resources of the public library. It is assumed that children solve their school-based problems by using information. The study goes beyond simple relationships between the surface features of the information sources and the responses of children by considering the whole context in which children interact with sources and with librarians for their problem solving.

Literature Review

Studies of how children access information have identified a number of critical issues related to their effective use of information. Summarizing all the studies on information seeking by children is difficult. Some studies focus on differences in users; others consider the information resources used, while still others focus on environmental factors. Many studies of school age children's information use focus on the school environment. The most dominant group of studies focus on elementary and middle school children's use of a specific information system – such as OPACs (Solomon, 1993; Borgman et al., 1995), CD-ROMs (Large et al, 1994; Large et al., 1998; Marchionini, 1989; Liebscher and Marchionini, 1988; Pezylo and Oliver, 1992; Small and Ferriera, 1994), and the Internet (Bilal, 2000; 2001; Fidel et al, 1999; Kafai and Bates, 1997; Large and Beheshti, 2000; Schacter, Chung, and Dorr, 1998; Wallace and Kupperman, 1998). These studies identified both the major difficulties that children have in using these information systems and the kinds of search strategies that children use to access information. The results of these studies have implications for system improvements and user instruction.

Elementary school children who used OPACs had difficulties in generating search terms that accurately reflect their information needs. Their searches often failed when they used abstract term but were successful when children expressed their needs with simple and concrete terms (Solomon, 1993). Children were successful in searching if search terms were provided as a question to input

or if search topics were easy to locate by browsing in a subject hierarchy. (Borgman et al, 1995).

If the system takes into account the specific needs of children (for example, spelling, typing skills, vocabulary, Boolean logic), children were generally successful in finding relevant matches. However, a critical problem in children's use of an online catalog was the mismatch between children's subject knowledge structure and the vocabulary and knowledge represented in that of OPAC and LCSH (Solomon, 1993). The Science Library Catalog used the modified version of Dewey decimal system for children's use in a four-level hierarchy. However, children still had difficulties finding certain information in that system because the information was located in a different place in the hierarchy than where children initially thought it would be (Borgman et al. 1993). For example, the term "fire fighting" was located under "engineering, " whereas children thought the term would be placed under "building for city services." In using three kinds of CD-ROM encyclopedias (Encarta, Castle Explore, and Exploring Castle), sixth grade students had difficulty in search strategy formulation and lacked the necessary sophistication in language use. As novice users using a full text encyclopedia, third, fourth, and six grade children often expressed search queries in phrases or sentences, which led to failures; they made this error because they did not have an appropriate mental model of the search system. Their searches tended to be "interactive" with the system as they searched rather than "planned" before they began searching (Marchionini, 1989).

There have been efforts to provide systems with interface features that address the needs of elementary school children (Borgman, et al., 1995). There are suggestions to create information systems using instructional design principles that could guide students as they come across problems during a search (Neuman, 1993: 1995). Another possibility is to add functions such as a thesaurus and a usage sensitive search aid to compensate for the lack of an appropriate mental model among the children who search an information system (Marchionini, 1989).

Differences in children's use of print sources and multimedia sources were identified by Small and Ferriera (1994) and Large et al.(1994). Middle school children (grade level six, seven, and eight) using multimedia source were more motivated and used more "finding" and "engaging" activities, while children using books used more "extracting" activities. Children's learning patterns were found to be different in their "pattern noting" behavior. Children using multimedia sources demonstrated more single words than children using books, and children using books used more phrases and sentences after using these information sources. According to Small and Ferriera, "multimedia treatment" children may have been more fragmented in engaging information since those children used more browsing, reading, and viewing, when they use the multimedia sources. Large et al. (1994) found that type of task affects six grade children's success in retrieving information. If the search task requires children to use more than one

concept, children were not successful in finding relevant information regardless of the format of the encyclopedia. Liebscher and Marchionini (1988) noted that high school students used a browsing strategy more than an analytic strategy and did not distinguish relevant information from non-relevant information because they lacked an internal organization of information at the query representation stage. However, they found that both analytic and browsing strategies were successful in finding relevant information.

Twelve-year-old children needed appropriate instruction in order to make full use of multimedia information (Perzylo and Oliver, 1992). Without instruction children were able to extract textual information from the multimedia source, CD ROM encyclopedia. With instruction, children were able to extract sound, graphical images, video from the information source.

Children use the Internet for many different purposes. Studies of children's information seeking on the Internet have identified typical behavior of children using the Internet and the difficulties they encounter. The most typical behavior of middle and high school students is to use only the basic functions of the Internet browser (Bilal, 2000; Fidel et al., 1999; Large and Beheshiti, 2000; Wallace and Kupperman, 1997). The back button, which takes the user back to the previous page, was the most used function. Also children repetitively use the same keywords and repetitively visit previously visited sites (Bilal, 2000; Wallace and Kupperman, 1997). Elementary and middle school children do not examine and evaluate the hits returned (Kafai and Bates, 1997) and take the information at *face value* (Wallace and Kupperman, 1997). Middle school children use browsing significantly more than keyword searching (Large et al., 1999; Schacter et al., 1998).

Fifth grade children's relevance criteria are different from those of adults because children have a more limited knowledge of the subject and of information systems in general (Hirsh, 1999). Children tried to seek "topical relevance" in examining the information. However, they looked for exact matches between their terms and the terms used in the sources. Wallace and Kupperman (1997) also found that six grade children evaluated the Internet sources as valuable if they found terms that they expected to find. "Novelty" was another criterion for children (Hirsh, 1999). As children looked for information during the search process, they tried to find new information that they have not already collected. "Interesting" was the criterion for selecting graphical information. Most children did not use authority as a criterion for their relevance judgment (Hirsh, 1999; Wallace and Kupperman, 1997; Schacter et al. 1998). These findings indicate that children tend to believe that information found in electronic sources is reliable.

Conceptual Framework

The present study was conceived as an attempt to begin to formulate a view of children's information behavior using a model that would relate findings from past research and that could guide the present study and future inquiry. Taylor's Information Use Environments (IUEs) was chosen as the framework. An Information Use Environment is defined as the "contexts within which users make choices about what information is useful for them at particular times"(Taylor, 1991, p. 218). Taylor identified four key elements of the IUE that affect information use: people, problems, settings, and resolution of problems.

The "people" element is a set of users – the nature of their work task and the user's assumptions about their work, demographic and non-demographic characteristics of the group. The "problems" element describes the nature and subject matter of typical problems of the users. The "setting" element looks at aspects of the setting in which the user operates and the affect of the setting on the user's information behavior. The "resolution of problem" element describes the user group's expectations for a resolution to their information problem, which influences the amount and kind of information that is used.

Taylor was not certain that the IUE model could be used to describe the information behavior of children. However, the model seems promising as a tool for analyzing the information behavior of children in the confined environment of the public library (The model would seem to be equally appropriate in analyzing student information use in the school library media center.). Results from previous studies can be viewed within the framework of the model even though the studies themselves did not employ Taylor's framework, providing a base for the current study. The study reported here draws upon previous research and extends it to describe the information behavior of children in the public library using the IUE model.

This study was exploratory. The primary goal of the study was to extend our knowledge of children's information behavior; a secondary goal was to test the appropriateness of the model as a tool for building an understanding of children as a user group. The focus of the study was permitted to rest briefly and unequally on all four elements of the IUE, according to the information gathered from participants. As a first effort to use the Taylor model with children, we were assessing the usefulness of the model in understanding "what information does to or for the recipient and for his or her problem or situation." (Taylor, 1991, p. 221)

Research Question

How do children use information sources in completing their school assignments?

Foreshadowing questions

1. What factors in the Information Use Environment affect children's choice of information sources?

2. How do children perceive information and information sources, and how is information retrieved for use in resolving their information problems?

3. How do children evaluate their success in searching for and finding information for school assignments and in resolving their information problems?

Research Setting

The public library system in which this study was conducted provides children and youth services at more than 20 branches. School library media services are not provided in all of the schools of the community served by the public library system; therefore, students use the public library as a major source of information for homework and school projects.

This study was conducted in a branch of the public library system located in a suburb in which the two predominant groups are Orthodox Jewish and African American communities. The branch library contained approximately 60,000 books, audiovisual materials, magazines, and government documents. Two computers with Internet access were located in the adult section of the library, and one computer workstation without Internet access was in the children's section of the library. In the children's section, one children's librarian was on duty to help children with their information needs.

Methodology

This research was a qualitative study. The methods used for data collection were *multimethod uses* of focus groups and individual interviews (Morgan, 1997). The benefits of the multimethod uses are that "preliminary individual interviews could indicate whether different cultural groups shared not just similar experiences and perspectives but also compatible ways of expressing and interacting around these experiences and perspective (Morgan, 1997)."

Two focus groups were conducted with children's librarians working in different branches of the library system. The first focus group with four librarians was conducted in a face-to-face format in November 1999. The second focus group with seven librarians was conducted on-line using the chat function of a web-

based instructional system in April 2000. The focus group sessions were based on prepared questions, but conversations were allowed to follow promising topics and lines of inquiry introduced by the participants.

Researchers conducted individual interviews with seven children ranging from a 2nd grader to a 6th grader. A focus group with four children followed the individual interviews. Both the interviews and the focus group were semi-structured. The children's librarian at the participating branch recruited children for the individual interviews and the focus group from among children who regularly use the branch library; the librarian secured parental permissions, as well.

All of the participants of the study were ensured of their privacy and were informed of their rights to withdraw during their participation in the study.

Data analysis from the two focus groups with children's librarians was conducted first, and data from a focus group with children and individual interviews were analyzed to support the findings from the focus groups with children's librarians. The patterns arisen from data analysis indicate the children's librarians' understandings of what it is important. QSR Nudist classic 4 was used for analysis of the transcribed data from focus groups and interviews.

Limitations of the study

The limitations of the study come from the sources of data.

1. Data for this study has been collected from children's librarians through focus groups and from children through focus groups and interviews. Teachers were not chosen as a data source, and thus, the study speaks only from the perspective of children's librarians and children who use the public library.

2. The children participants of the research reflect only part of the community that the library serves. All of the children participants were African Americans, but the community consists of two major communities, an African American community and an Orthodox Jewish community.

3. The findings cannot be transferred to other settings, although the rich description of the findings might allow them to be corroborated with the research findings from other settings.

Findings

Sets of People: The first set of findings relate to the Sets of People, or user group, element of the Information Use Environment model. The user group for the present study was children 8 to 13 years of age.

Age. The age of the child affects information behavior through age-related preferences for information resources and through age-related abilities. Younger children prefer books to other information sources, such as an encyclopedia in both print and electronic formats and other online sources. According to the children's librarians, children like having books that they can use, particularly younger children, who want attractively illustrated books. On the other hand, older elementary school children are more enthusiastic about using electronic sources, the Internet and the CD-ROM products for children. They know how to use electronic resources and are able to have some success in using these resources.

Children's librarians observed that it is important for children to have a hard copy of the information. Children like having books in their hands, particularly younger children in lower grade level, who are satisfied with books that are an "attractive package" with pictures. Children look for books with colorful and attractive pictures, even if the book contains less information than other books in the shelf. This explains one phenomenon in the library: even children up to fifth graders read and play with picture books for their pleasure because the books are easy to absorb and have attractive graphics.

Age-related abilities and experiences of children affect their information behavior, as well. Children below age nine, in particular, have difficulty accessing and evaluating information obtained via a computer. Many of these children do not have experience in using computers and online sources. Even if they have experience, it is hard for them to understand and follow the steps necessary to retrieve relevant information. Children below fifth grade indicate that books are their favorite sources for information because books for their age level are easy to understand.

Older children have different preferences. By the time they reach the upper elementary grades, children are beginning to express a preference for electronic information sources. Children at that age can use electronic sources because they have developed skill in using computer hardware and software. Older elementary school children play online games and use the chat function. They know how to enter keywords or topics. Teachers often assign research projects that require older elementary school children to look at different kinds of information sources, including the Internet. The older child likes to use these electronic sources because results are obtained quickly.

The information skills of individual children are important. Children's skills in accessing, evaluating, and using information vary, as shown by these examples. A third grade child did not know how to use the Internet or encyclopedia to find information for his assignment and often went to adults or older siblings for help. By contrast, two fourth grade children exhibited developing skills in finding and evaluating information. One fourth grade child knew that if she wanted specific information she had to find the category that the information might fall into in

order to find the information as well as to use the index of a book. Another fourth grade child was able to say that "good information is one that is relevant to your topic and bad information is one that is not relevant."

Family Background. Family background is a factor affecting children's use of information. Two attributes of family background were identified in the current study. The parent's skill in finding information affects the child's use of information sources in the library. One librarian pointed out that if a parent tries to help with the child's assignments but does not know how to find the right information, the parent becomes frustrated and that frustration is delivered to the child. As children become more independent in using information sources in the library, their parents' information skills do not affect them as much as when they are younger and have to rely on their parents.

The second attribute of family background that affects children's information behavior is the culture of the family. Two children's librarians gave the example of a branch that serves two distinct cultures: African American and Jewish. According to the librarians, the parents in each community respond differently toward children's responsibility for school assignments. According to the librarians, the parents in one group push their children to work hard and usually let the children work by themselves to finish their project; these parents let their children take responsibility for their work and let the children ask for help from the librarian if it is needed. Parents in the other group tend to help their children finish assignments and themselves seek help from the children's librarians if they do not understand their children's assignments.

As the current librarian describes the differences between the two cultures, it became obvious that parental response to their children's assignments makes a difference in children's information behavior in the library. She described her experience with one group:

> "I have particular situations where the parents are ...completely frazzled by the assignment. They're trying to help ... trying to participate in their child's education and take them to the library, but the assignment is really...so befuddling to the parents that they become frazzled and that in turn frazzles the child and then you just sort of have this really tense situation....I mean I have one mother that does this every time. She ..... goes completely to pieces over assignments ....she unravels her child every time and we just have this...complete break down... "

Of the other group, she said:

> "In these cases, the parents are not doing assignments. The parents are not coming in saying, 'Give me this book... I can take it home for my kid to do.' The kids ...[have the] responsibility. They

> [use] their sources and you know whether frustrated or not, or whether they need a lot of help from me, but the parents are not doing those assignments in that particular group...."

Attitudes about School Assignments. Children's librarians observed that children do not seem to claim ownership of their school assignments. Both parents and children focus more on finishing the assignments than on learning through doing the assignment. Librarians agreed that they see more parents than children working on the children's assignments in the library. It may be that parents decide to do the homework themselves as a time-saving measure; they believe that they can complete the assignment more quickly than they can coach the child through the assignment. In these situations the educational value of the assignment is compromised or lost.

Children's librarians expressed the opinion that children do not accept learning as a personal responsibility. One fourth grader child mentioned "I save the assignment until I get home and ask my mom if she can help me," Another fifth grader said as "...my mom tells me to do this math assignment, I get confused ...because I don't like studying."

Problems: The next set of findings relates to the nature and structure of typical information problems that the user group encounters. In the present study, problems are defined as the information problems that children bring to the public library. The problems that children bring to the library are primarily related to school assignments. Findings relate to several aspects of school-based problems.

Unclear and Incorrect Assignments. Children often do not understand what they are required to do for their assignments, and they rely on their parents or the children's librarians for clarification of and help with the assignment. It is easier for the librarian to help younger children if the children have a printed description of the assignment. However, children often lose the printed description or do not bring it to the library. Older elementary school children copy the assignment from the chalkboard; parts of the assignment can be skipped over or mistakes are made during copying and translating.

Often times, parents who come to check out books for their children's assignments ask librarians to help with them without the parents knowing exactly what the assignments are. As one librarian said:

> "...that becomes very frustrating on our end and then the parent gets frustrated with us because we haven't produced a book, but we don't know what exactly we're looking for....[For] example, a parent came in for a fourth grader assignment where the child had to list all the cities in Asia. ...and I thought this has to be a mistake. ....I said, countries or is it list...10 cities, 20 cities? No, as far as I

> know, it's just list every city in Asia. And I thought well, you better just go home because...you don't have enough paper...."

Teacher Preferences. Teacher preferences for and experience in using information resources are important in shaping the information problems that children bring to the public library. According to the children's librarians, it appears from the school assignments children bring to the library that younger teachers tend to know about electronic information sources and to require that children use these sources, while older teachers tend to assign traditional print sources that they have been using for a long time, such as *Readers' Guide for Periodical Literature*. Neither group of teachers seems to be aware of and use a broad range of information sources in homework assignments, which led the children's librarians to suggest that teacher preparation should acquaint teachers with the range of available information sources.

Children's librarians also found that it is difficult to help with children's assignments because teachers prohibit children from using a particular source or type of source, such as an encyclopedia. Librarians think that the children miss very good information because of limitations on the types of information sources that can be used.

Another problem that children's librarians noted is that teachers sometimes give assignments apparently without knowing about available resources. According to one librarian:

> "Teachers aren't really researching their assignments very well. They're assigning books that [the library system] only owns two copies of in the whole system and one is missing and the other is checked out. Or ...in February for Black History month, [students are told to] bring in an individual biography on an obscure figure in history who is going to ...maybe have a paragraph in specialized encyclopedias....but the teachers are saying, 'You need to bring in a biography --- with a picture, yes, definitely.....' "

Cognitive and Developmental Aspects. Another aspect of the information problems that children bring to the library is that school assignments are sometimes given, seemingly, without full regard for children's cognitive ability or developmental stage. One librarian described her experience as follows:

> "I had another teacher who assigned her gifted and talented to make a book report... to read Toni Morrison. And those children were in fourth grade. And I happened to know this mother and know that she didn't want this child to read Toni Morrison.... And I said, 'Well do you know what is the point of the assignment?' -- it was right after she won the Nobel.

> And she said, 'Well, she is an excellent writer."
>
> I said, 'Yes, she certainly is --for adults.'
>
> [The mother said,] 'My child is a very good reader and she can understand anything.'
>
> I said, 'Trust me, you don't want your child to understand Toni Morrison. You may be unhappy if she understood Toni Morrison.' "

Setting: The next set of findings address the attributes of the environment in the user group works. The public library was the setting for the present study.

Children's Sections. All branches of the public library system in which this study was conducted have a section designated for children. One feature of the children's sections is that they are designed to be "cyber free" and to emphasize print sources for children's use. The children's section of the library branch used in this study had one computer terminal with audio equipment where children could use educational games and the CD-ROM encyclopedia. The programs installed in the computer were preloaded and managed by the central library.

Adult Guidance. Adult guidance is critical for children working on school assignments. A fourth grade child mentioned that doing a school assignment was easier than solving personal information problems because she could ask the librarian and her teacher about the school assignment. Children indicated that they asked their parents, librarian, and teacher to help them do their assignment. As mentioned earlier, one fourth grader child noted that she saved her homework until her mother was available to help her.

Computer Use. Children's librarians observed that children who are frequent users of the computer tend to use the educational games preloaded on the computer but seldom use the computer for their research. When the children want to use the Internet, they had to go to the adult section of the library and use one of the workstations located there.

Children's using the Internet display a work style that is different from that of adults. When working as a group, children split their work. One fourth grader said, "We both do our assignment or whatever, and I do one piece and she does another piece." Children's librarians also observed that the children's concept of working together involves each child taking a role in using the sources, the Internet in particular. One librarian describes this as follows:

> "The computers are never used in isolation...even for research.... But I think that part of it is coaching each other. One is doing the reading, while the other is clicking or...we have reader and non-

> reader. You may have a non-reader on the computer, [who] needs the reader to get them through the instructions. And I think some of it starts out with teamwork. But it's something that you observe as you're going by, you see someone reading and the other person responding."

Children's librarians pointed out that children move around and cluster for their recreational use of the Internet:

> "One the adult side we have three computers and there will be times when there will be pre-adolescents on those three computers. And it's a dance they do. They're clustering computer to computer. You start out with three children, one on each computer, then they're over on this computer, and one breaks away and goes back, then they're there. And then they're around the other side. They're constantly moving...Because somebody's pulled up something much more interesting than what the other person has...I think if we had 20 computer banks we would have a moving cluster."

Resolution of the Problem: The fourth set of findings relates to the resolution of the problem, which includes consideration of the kinds of information that the user group anticipates using, filtering mechanisms, attitudes toward information, and criteria for selection of information. A final aspect of the resolution is consideration of what information does for the user group in a particular setting. For the present study, the resolution of the problem is the children's idea of the product of the school assignment and the process of completing the homework or project.

Children's Preferences. A child's satisfaction in doing an assignment or solving an information problem comes from finding out the answers. Children often try to find an answer without going through the necessary process of looking for that answer. One child mentioned that when she had a question about how fast an eel can swim, she tried to get the answer from the librarian online.

Children do not seem to understand how to do research. When children ask the librarian for help in finding information, they seem to be trying to find the easiest and shortest way to the information. Often children ask the librarian to find detailed information for them. Children prefer to be handed the information in a simple form, for example in a page with an answer, presented using large fonts and pictures. For school assignments, children want the answers using the easiest and quickest methods without going through a whole chapter or an entire book. One librarian said, "...the shortest route...when you pull that hefty tome off the shelf...you can see the panic in their eyes. They do not realize it's

alphabetical and you're going to go to [one] page for them. All they see is that massive book."

Teacher Specifications and Preferences. Children's anticipation and perception of the resolution to their information problem often comes from the assignment requirements as given by the teacher. Teachers often specify a physical requirement, such as the number of pages or kinds of sources, and children tend to use this measure in anticipating an answer. The answer is defined as the information that is found in the designated type of information source or in the requisite number of pages.

A child may try to please the teacher by making the homework or project attractive or visually pleasing. The child will print colorful photographs from the Internet and prepare the assignment on the computer. One children's librarian quoted a child remarking as she printed out a photograph, "It's pretty, and my teacher likes it."

Physical Features of Information Sources. Physical features of information sources are very important for children. All of the children's librarians agreed that children do not want to use any information source that looked old, thick, heavy, and that did not contain pictures -- the "attractive package" effect. One librarian summarized this situation as follows:

> "....when you were talking about shiny books...this happens a lot....that really that's probably not the best books for them because it's going to have less information than they will probably really use in their report. [But] They're very happy with the shiny book and willing to leave more needy books – that may not have pretty pictures –on the shelves."

Younger children, in particular, select books according to the book's physical attributes. Colorful pictures attract children to an information source, whether it is a book or an electronic source; children expect to see colorful pictures. They do not want to read many pages to find information. Reading a short caption sentence with a picture in a book is a very common behavior among younger children. As one children's librarian describes it, children like pictures with short sentences that the children can easily understand:

> "...And I've seen more and more and I've started many kindergartners with reptiles. Oh and I read what page that has fascinated them. I will just read under the picture to them and that's their whole world at that moment is right there. And they keep pulling the same book out and over time, over the time of a year, a year and a half, they would be reading sidebars. And with books they have their favorites. They will constantly go back to the same

> book. The same subject area and [they] almost memorize what is in that area."

Relevance and Other Attributes. Children in the upper elementary grades had a developing sense that information has characteristics and can be evaluated. A fourth grade boy indicated that he knows that there is relevant and non-relevant information and the information that he doesn't need for his school project is non-relevant information. The children's librarians cautioned that, in general, children do not distinguish the most relevant and least relevant information. Children often take the first book listed or given to them without reading or examining which book may be most relevant to their task. If a librarian locates the page that contains the answer to a question but doesn't point out the sentence or paragraph, a child may look for the answer in the first paragraph; if the answer isn't there, the child is likely to quite searching on the page.

Children above fourth grade level also understand that the sources that they use to find information determines the quality of the information, whether or not it is "good," in their terms. However, they perceive a good source to be one from which they can get a lot of information. Thus, they believe that an encyclopedia and the Internet are good sources because both give large amount of information from which they can select.

A fourth grade child pointed out the importance of organizing the information that she found. She mentioned that she must organize the information in order to receive a good grade on her assignment.

Electronic Sources. Electronic sources, particularly the Internet, are attractive to many children. Part of the attraction is the fast response time compared to searching through books and the presence of attractive multimedia information features. However, children's librarians pointed out that young children frequently do not have cognitive ability to understand electronic information from the Internet.

> "..In lower grades ... I think it's still true that the electronic resources require a certain facility of language that younger children don't have. ...even if you pull it up on the screen for them, they can't read it. And there's something more... there's something slower, I guess, for lack of a better word, about having it in front of you as a book, and you can sound out the words, or ask someone, instead of just looking at computer screen or printing it off and then trying to do it later. "

Internet sources generally are not easy for children to read. Children's librarians indicated that children below the fifth grade do not respond well to online sources, particularly to Internet sources, because the physical features of the Internet sources are not suitable for children's use. The qualities of children's

books, such as large font sizes, appropriate language, and appropriate caption text with pictures, are not present in Internet sources. While the content is for children, the sources do not have appropriate features for children's use. One librarian describes the problem as follows.

> "I haven't seen internet sources specifically for younger children in terms of font size…[or other] things that we [expect] about books for young children - a certain number of pictures, a certain font size, a certain page limitation, a certain way the index is set up. The publishing industry has really come up with a formula that I think works most of the time ….if it's for younger elementary grades, its type size is going to be bigger and darker, the index will be simpler, there will be more pictures, there will be captions that related to the text on the page. There's relational connection between text and the pictures that isn't true on on-line sources at this stage. There are on-line sources for young children, but they tend to be… just content."

Encyclopedias in both electronic and print formats are difficult for young children to understand in terms of vocabulary. Children report that it is hard to understand the information because of the difficulties in understanding some of the words in the encyclopedia and they also like to use a dictionary to find out the definitions of those words. If a child's academic ability is below average, it is particularly difficult for him to use an encyclopedia. However, librarians said that the structure of encyclopedia makes more sense to children compared with the Internet sources, since the encyclopedia is organized alphabetically and then under topics with different headings, in straightforward ways.

As mentioned earlier, pictures are favorite information sources for children, and the Internet seems the most popular source of the pictures for children. Children's librarians report that their most frequent use of the Internet is to locate and print out colorful pictures for children.

> "I'm having at least – at least one request a day from a child from a child who needs a picture. Doing a report on Maryland and need pictures of the State bird, or the State flag. And really… to photocopy black and white [at], 20 cents per page doesn't make sense when I can print off the Internet and get a huge picture for them, beautiful and in color and the children are just beside themselves when they realize that this is going to embellish their report. And that I've been using a lot."

Children's librarians indicated that children like to use the Internet because they can find current information. If they need the latest information about a topic, children know that the Internet is the best source. A fourth grade child mentioned that if she would go to the Internet to find information about certain newer

subjects rather than looking in books and encyclopedias because these sources have old information.

Conclusion and Implications

This study explores how children perceive and use information for their learning tasks, that is, school assignments. Taylor's model of information use environments was used to structure the collection and analysis of data from individual interviews and a focus group with children and focus groups with children's librarians.

The findings indicate that age of the child, family background, and attitude toward education are the factors related to the people component of the children's IUEs. Using the findings as background knowledge, children's librarians could be able to speculate that it would be beneficial to direct younger children to print sources, such as books, rather than to expect them to use electronic sources. Older children can be expected to be more enthusiastic about using the electronic sources, such as the Web or other CD-ROM product.

Family background should be researched through community analysis. Since culture is an important determinant of children's information behavior, children's librarians need to know about the groups in the community. The study has shown that parents' information skills affect children's information behavior. Children's librarians help not only the children but also their parents in solving children's problems. By recognizing parents as a group for services, children's librarians can develop ways to help children through helping parents.

Attitudes toward education were found to be a problem area for children, since children do not claim ownership of their school assignments. Children's librarians might need to address this issue with parents as opportunities come.

The findings for the problem component are concerns for children's librarians, since the findings suggest the need for more cooperation between teachers and school library media specialists, if any, and public librarians. The study demonstrated that children often lose or misinterpret their assignment, which creates problems as children's librarians try to help children. Teachers were found to be using the same sources over time without an attempt to turn their attention to broaden the range of alternatives, if any. Also, they appear do give assignments without consideration of its appropriateness for the children cognitively and developmentally.

All of these can be addressed if teachers and children's librarians can collaborate. Establishing a relationship, however, should not be left as an individual effort between a children's librarian and a teacher. There should be a systematic way to build relationships between public libraries and schools in order to serve children more effectively. The benefits coming out of the

relationships will go to the children who try to solve their problems, because both public libraries and schools constitute children's information use environments.

The findings on settings component leaves more intrinsic question for children's librarians in regard to providing services to children. Children demonstrated a typical behavior in using computers in the library, clustering and moving around. Often, children's librarians discourage such behavior in the library. However, children's information use settings need to accommodate their style of behavior rather than trying to fit the children into an inappropriate setting. Just as children need special chairs and tables in children's section, they need physical arrangements that fit with their typical information behavior. Arranging computers in a way they can work together is one example of such accommodation.

Children's ideas of the final product and the process of finding answers for their assignment in the public library were identified in the resolution of problems component. Children were found to prefer "the easiest" and "shortest" way to accomplish their assignment and do not understand the process of research. Teacher's specifications in the assignment description and teacher's preferences affect children's process for finishing their work. Physical attributes of the sources were very important for children, because they prefer an "attractive package" to less attractive sources containing more relevant information. Children's behavior in choosing relevant information was another concern for children's librarians. Children seem to know what is relevant and irrelevant but do not distinguish the most relevant information and least relevant information. Electronic sources that children use, however, need more accommodation in terms of designing the appropriate interface for children.

The findings suggest that children do not understand the process of research. The difficulties children have in using an encyclopedia and other sources should be acknowledged by teachers when an assignment is given. Children's librarians, school library media specialists, and teachers all should understand how children accomplish assignments that require research. The implication for the publishers and the system designers is to support the needs of children through appropriate system design. Particularly, designing the interface and the knowledge structure of electronic sources so that they are suitable for children's use is crucial.

Finally, the appropriateness of Taylor's Information Use Environment model for understanding the information behavior of children should be addressed briefly. The findings of this study seem to indicate that the model can be useful for structuring research results and shaping future inquiry with the goal of developing a comprehensive understanding of how children work to solve their information problems.

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Chapter 12

Think About It: Using Think Alouds, Think Afters, and Think Togethers to Gather Information-Seeking Process Data

Jennifer L. Branch

There are many methods that qualitative researchers can use to gather data about specific situations. Interviews, observations, surveys, and focus groups are just some of the methods that provide researchers with data. A less common but equally useful method is verbal protocol analysis.

For qualitative researchers interested in getting a rich source of data, the verbal protocol analysis method is an excellent choice. Wilson (1994) emphasized that inspiration can be gained from people's conscious thoughts. Pressley and Afflerbach (1995) expanded the idea by noting that "spoken language is the data used in protocol analysis and the richness and variability of language are the greatest assets and liabilities of the verbal reporting methodology" (p. 2). Verbal protocol analysis is a way to gain information about a participant's cognitive thought processes using verbal reports. Verbal reporting is bringing thoughts into consciousness, making the ideas verbal if needed and then verbalizing them (Ericsson & Simon, 1984).

This paper will explore the use of verbal protocol analysis to gather information-seeking process data in three different studies. It begins with definitions used in this paper and an overview of verbal protocol analysis. Next, there is a literature review of recent studies in the fields of education and library and information studies that have used verbal protocol analysis methods. Finally, results and insights from three studies as well as successes and challenges of using the method will be presented.

Definitions

Verbal protocol analysis is used in this paper to refer to verbal reports of thought processes that are obtained from participants who are asked to describe what it is they are/were doing and thinking as they complete/completed a task. For this paper, there are three types of these verbal reports of thought processes that will be explored: Think Alouds, Think Afters, and Think Togethers. The first, concurrent verbal protocols, is referred to as Think Alouds in this study. Think Alouds are verbal reports that are gathered while a participant is completing a task, e.g., searching for information on the Internet. The second type, retrospective verbal protocols, is referred to as Think Afters in this paper. Think Afters are verbal reports gathered after a participant has completed a task, e.g., watching a videotape of their CD-ROM encyclopedia search and then being asked to recall their actions and thoughts while they were completing the task. Think Togethers is used to describe a group of participants doing Think Alouds together, i.e., discussing their information-seeking processes as they complete a group or individual research project.

Verbal Protocol Analysis

Ericsson and Simon (1984) based their work on verbal protocol analysis on the constructs of short-term and long-term memory from information-processing theory. They hypothesized that all human cognition is information processing and stated, "that a cognitive process can be seen as a sequence of internal states successively transformed by a series of information processes" (p. 11). The way that this information is organized is highly individual. Long-term memory contains a vast amount of knowledge, both procedural and factual, that can be accessed. Short-term memory, on the other hand, is extremely limited, especially if the information is not acted upon. External stimulation and associations from long-term memory are the basis of short-term memory. According to Pressley and Afflerbach (1995), short-term memory can be quickly accessed and the contents reported. It is this short-term memory that verbal reports tap. Ericsson and Simon (1984) used this conclusion to validate think aloud data that was gathered earlier in the century and to promote its continued use today.

Protocols done properly, according to Russo, Johnson and Stephens (1989), "ask subjects to report their thoughts, not to explain them" (p. 759). Ericsson and Simon (1984) discuss the history of verbal reports and introspection in the first chapter of Protocol Analysis: Verbal Reports As Data. They suggest that the method is a very old one. Philosophers such as Aristotle and Plato used introspection to inquire about the nature of man by examining their own cognitive processes. Van Someren, Barnard & Sandberg (1994) explained that the main advancement with the method over the years was that verbal reports began to be treated as data instead of conscious processes. It was near the end of the 1960s that the method was revived again. As interest in cognitive processes grew, the interest in methods that could provide information about these processes grew as well.

Newell and Simon (1972) used this methodology to build very detailed models of problem-solving processes. According to van Someren, Barnard and Sandberg (1994),

"this work had a major influence, because it showed that very detailed explanations of verbal data can be obtained" (p. 31). The method was used when design of expert computer systems began to grow. The need to find out about a human expert's knowledge to create these computer systems made the method more popular. According to Ericsson and Simon (1984), "the real breakthrough came when the Think Aloud method could be given explicit meaning in terms of a formal model of the thought processes that could be simulated on a computer" (p. 61). Ransdell (1995) pointed out that protocol analysis "is one of the few methods available in cognitive psychology that gathers data with sufficient temporal density to test models of online, second-by-second behaviour" (p. 89).

The greatest strength of the method is the ability to use it to generate hypotheses. According to Cacioppo, von Hippel, and Ernst (1997), the method is "particularly useful when one either has no predetermined ideas about the cognitive dimensions that are relevant or has only a few untested hunches" (p. 929). Pressley and Afflerbach (1995) note that verbal protocol analysis provides a way of gathering data on cognitive processes that, otherwise, could only be studied second hand. The method also allows an insight into affective processes as well as cognitive processes. Wilson (1994) made a point of mentioning the method's versatility and this can be seen in the variety of research areas in which the method has been used. The method can be used successfully with naïve users as well as experts.

Studies Using Verbal Protocol Analysis

The Think Aloud method is now accepted by a large part of the research community and is being used in a variety of different research areas. Hayes and Flower (1983) and Ransdell (1995) have done extensive research in the area of writing. Whitney and Budd (1996) used the method to study text comprehension and other researchers have used the method to study reading comprehension strategies (Davey, 1983; Garner, 1982; Kavale & Schreiner, 1979). Cacioppo, von Hippel and Ernst (1997) cite the many uses of verbal protocol research in clinical and counseling psychology. Murtaugh (1984) used verbal protocol analysis to study the grocery shopping decision-making process. Sullivan and Seiden (1995) assessed the online catalogue user's education needs using the method.

More recently, it has been used as a method in research projects more similar to this researcher's interests. McGregor (1994) used the Think Aloud method to analyze the thinking in the research process of high school students. Nahl and Tenopir (1996) used the Think Aloud method as faculty and graduate students searched a full-text online database of magazines. The researchers were interested in the search strategies and the affective, cognitive and sensorimotor behaviours of the participants. Yang (1997) used verbal protocol analysis and observation to study six cases of information-seeking behaviour in university students as they accessed information in the Perseus Hypertext System. Yang had each participant practice the Think Aloud method before asking them to think aloud while working on the problem. Hughes, Packard and Pearson (1997) also used the Think Aloud method in looking at reading in a hypertext environment. They introduced the method to the participants using a video of other computer tasks so that

the method was demonstrated without "suggesting strategies for using the intended target of research" (p. 5).

Xie and Cool (1998) used the Think Aloud method to study end-user online searching. They found through the use of this method that "much insight is gained into the problems encountered by searchers and the adaptive strategies they employ in such situations" (p. 329). Tallman and Henderson (1999) used the Think Aloud method to look at the mental models of teacher-librarians as they taught students about electronic resources. Hirsh (1999) used the think aloud method to study elementary students' relevance criteria and search strategies during a school project. Her results have implications for how we teach students about information literacy and for the design of systems.

Agosto (2001) used group interviews as a research method to gather data about how 14-15 year old girls evaluate Internet sites. The method is used so that multiple perspectives and opinions can emerge. For Agosto, "group interviews differ from focus-group interviews in that the major goal of focus group interviews is to achieve group consensus, whereas this is not a goal of group interview research" (par. Group Interviews). Think Togethers is another way of referring to this type of group interviews.

Challenges to Verbal Protocol Analysis

The Think Aloud method has been better received than the Think After method. Many of the concerns about retrospective protocols focus around the problem of forgetting and fabrication. Retrospective protocols may be influenced by a "motivational shift [that] can occur whenever subjects are informed that they will have to generate a subsequent verbal report" (Russo, Johnson, & Stephens, 1989, p. 765).

Both methods have long histories and have experienced much criticism. The first and most often cited criticism states that verbal data is incomplete and that behavioural and performance changes cannot be gathered by the method. Hayes and Flower (1983)pointed out that because the method is so idiosyncratic, a participant "may fail to verbalize a considerable part of the information that passes through the short term memory" (p. 61). They added that this type of reporting would cause the distortion of cognitive processes even if a person were to be aware of the processes. Ericsson and Simon (1984) suggested another criticism that they call the epiphenomenality or irrelevance argument. This argument "is that the verbalizations may report an activity that occurs in parallel with, but independent of, the actual thought process, hence provides no reliable information about the latter" (p. 61).

Researchers have suggested that the production of verbal reports may change the cognitive processes being studied. Fawcett (1993) suggested that in certain situations the participants will be so focused on the task that they will be either unable to think aloud or the thinking aloud will interfere with the process. Verbal reports have also been criticized as not being generalizable because they are so idiosyncratic. Hayes and Flower (1983) suggested that verbal reports are not objective and are not scientific. Steinberg (1986) also suggested that "the presence of the person arranging for the

protocol and of the tape recorder and the very nature of the protocol session distort the cognitive processes of the [subject] giving the protocol" (p. 699).

These criticisms have been leveled at almost all research involving fieldwork such as observation and interviews. Although the work of Ericsson and Simon is recognized as seminal in the field of verbal protocol analysis, these three research studies followed a modified approach to verbal protocol analysis. It did not feel comfortable sitting behind the participants while they searched. There was not the concern of "intruding" into the search as the researcher. As a matter of fact, I was very important to the research. The terms used by I was interested in spending time with junior high students while they searched. I wanted to be open to what would happen in the research setting.

Ericsson and Simon's verbal protocol analysis is firmly set within the positivist paradigm as they are concerned with reliability, validity and generalizability. In the naturalistic paradigm, "realities are multiple, constructed, and holistic" (Lincoln & Guba, 1985, p. 37). Qualitative research is, therefore, concerned with credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). The researcher and the object of the research, in this case the participants, interact to influence one another and the inquiry is value-bound. For Lincoln and Guba, "the aim of the inquiry is to develop an idiographic body of knowledge in the form of "working hypotheses" that describe the individual case" (p. 38). These research studies were influenced by my values as expressed in my choice of these particular cases and problems and how they were framed, bounded, and focused.

THREE STUDIES OF INFORMATION-SEEKING

Study 1

The first study (Branch, 2000) explored the use of both concurrent and retrospective verbal protocols, Think Alouds and Think Afters, in a study of early adolescents who were accessing information from CD-ROM encyclopedias. The objective of this research was to analyze the effectiveness of the two methods, concurrent and retrospective verbal protocols, in obtaining information about the processes that 12-15 year olds use in searching for information on Microsoft Encarta Encyclopedia 98.

The five participants from Edmonton, Alberta were read a script describing the searching activities and were given the opportunity to practice the Think Alouds. After completing the practice session, participants were introduced to Microsoft Encarta 98 and given an introduction to the searching capabilities of the electronic encyclopedia. The participants then began the four search activities. The search activities were:

- Describe the male cardinal bird.
- In what year was Queen Elizabeth II born?
- What year was speed skating first in the Winter Olympics?
- Who was the first woman in space?

The first woman in space and speed skating questions were derived from the work of Gary Marchionini (1989). For more information on the methodology, see Branch, 2000.

Study 2

The second study (Branch, 2001) was a research project that looked at the information-seeking processes of junior high students as they accessed information using CD-ROM encyclopedias. The study took place in Inuvik, Northwest Territories, Canada in the autumn of 1999. Twelve participants, recommended by their teachers, participated in the study. Each participant completed 12 searches so that at the end of the study there were 144 Think Aloud protocols. The participants searched the encyclopedia for answers to four researcher-generated questions, four teacher-generated questions, and four self-generated questions. Search session 1 required all of the participants to search for the answers to four researcher-generated questions. The questions were:

- Who was the first woman in space?
- Describe the cardinal, a bird.
- Who was the first man in space?
- Describe the boxer, a dog.

Search session 2 had four teacher-generated questions based on the social studies curriculum for each grade, i.e., Alaska for Grade 7, Egypt for Grade 8, and Inland Canadian Waterways, Latitude and Longitude for Grade 9. The final search session required participants to search for the answers to four self-generated questions. These questions included topics on sports (hockey, soccer and rugby), Halloween (scary stories, trick or treat, black cats and witches), Northern topics (Fort McPherson, Inuvik, snowmobiles, and the Northwest Territories), popular culture (Pokemon, Blair Witch Project, and horror movies), Anne of Green Gables, and countries and major cities of the world.

Study 3

This study followed a small group of students in a grade 9 class as they worked together over two months to complete a research project on a topic of their own choice. During this time, the students shared their information-seeking strategies and their reflections on the research process. Participants were selected from a grade nine class of students and were followed as they completed a research project over the course of 13 80-minute classes (approximately 6 weeks). The participants selected a topic of their own choice, received instruction from the teacher-librarian, and worked on the research project. Throughout the research project, participants were asked to do Think Togethers by sharing their ideas, processes, resources, and plans. They were asked questions not only about their research process but also about how they were feeling about the research project. The group consisted of four students selected by the teacher-librarian. Participants also completed Think Afters; students responded to questions posed by the researcher and responded using a personal tape recorder.

FINDINGS

Study 1

Similarities emerged in the detail of data generated by the two types of verbal protocols. The Think Alouds and the Think Afters provided information about the participant's cognitive and behavioral processes in finding the answers to the questions. Similar accounts about search strategy and decision-making can be gathered from Think Alouds and Think Afters. However, in the Think Alouds, much more detail about the affective nature of the information-seeking processes was also given. The Think Alouds more clearly provided the data about frustration during searches. The Think Alouds also provided data about success and excitement in searches.

The Think Afters provided a "path of least resistance" approach to describing in an electronic encyclopedia. Some of the participants did not discuss the dead ends and incorrect search terms in retrospectively describing the search process. With particularly difficult searches, the participants apparently found it difficult to remember their complete search processes.

The Think Alouds provided the most complete and detailed description of the information-seeking processes. Not only did Think Alouds provide the specific search terms and decision-making steps but they allowed a glimpse into the affective nature of the information-seeking process as well. The points where decisions were made were also clear in the Think Alouds. However, the reasons behind the decisions that were made were often explained in the Think Afters. The Think Alouds provided the richness of data associated with verbal protocol analysis. However, valuable data also came from Think Afters. For this type of research, where an understanding of adolescent's information-seeking processes using CD-ROM encyclopedias is desired, both methods are valuable and necessary.

When asked which method they preferred, Think Alouds or Think Afters, participants were mixed in their opinions. Several felt that it was easier to do Think Alouds because it was difficult to remember all the steps at the end of the search. Alice preferred the Think Alouds because in "the Think After you really had to go back and remember all the steps that you did". Carl also preferred Think Alouds because it was easier "telling you (the researcher) what I did while I was doing it. It was easier to remember". However, two of the participants preferred the Think Afters. Brandon described the reason this way:

> *Cuz then I can focus on going through and finding something and then once I found it let you know afterwards. Cuz if I go through and I get to a point where I know it is not going to be there then I have to go back and start again. It is easier to tell you at the end.*

Eliza preferred Think Afters as well and explained the reason:

After I think because when I was doing it I got kind of absorbed in it and I was almost forgetting to tell you things.

Despite the differences in preferences, the researcher saw no differences in the extent to which participants spoke freely and openly in the study.

Study 2

Study 2 found that Think Alouds and Think Afters provided rich data about the information-seeking processes of junior high students accessing information from CD-ROM encyclopedias. The addition of videotaping of the search screen allowed participants to follow their search and respond to their Think Alouds provided more information about specific decision-making situations. However, while transcribing the 144 Think Aloud protocols, it was noticed that some participants had what could be called incomplete Think Alouds, that is, very brief Think Alouds or very procedural Think Alouds.

Some of the participants were not able to generate complete Think Alouds while performing the searching tasks. There has been much written about why this can happen. Stratman and Hamp-Lyons' (1994) list of factors is a good one. These include poor Think Aloud directions, limited capacity in short-term memory to do task and Think Aloud, hearing the sound of one's own voice, increase in learning due to Think Alouds, and influence of researcher's verbal and non-verbal cues (Stratman & Hamp-Lyons, 1994). It was the notion that some participant's may be unable to do a task and Think Aloud at the same time that was most interesting to this researcher. Study 2 explored the 48 Think Aloud protocols from Search Session 1 using the theory of Biemiller and Meichenbaum (Biemiller & Meichenbaum, 1992; Meichenbaum & Biemiller, 1998; 1992).

During Search Session 1, participants had many more Think Aloud statements because they had a more difficult time finding the answers to the questions and spent more time searching. With practice students became more efficient searchers and the mean number of Think Aloud statements decreased from 86.4 in Search Session 1 to 58.6 in Search Session 2 to 50.1 in Search Session 3.

The average number of statements for all sessions was 181. Chris, Paul and Fran generated a lot of Think Aloud data. Other participants such as Sue, Mary, Ken, and Eric generated much fewer statements than the average. Biemiller and Meichenbaum (1992) noted in their research that highly self-directed learners generated more than twice as many statements as less self-directed learners.

Participants had two very different types of questions. The answers to the first question, "Who was the first woman in space?" and the third question, "Who was the first man in space?" were quite difficult to find. These questions were chosen because they were quite complex. Several of the participants did not have any planning statements while searching. Explanations for the few planning and monitoring statements can be explained by the work of Biemiller and Meichenbaum (1992). When learners in the

acquisition role are faced with a new task it "creates "overload", or at least occupies the student's full attention" (p. 76). Mary and Carol were unable to do the task and also think about it at the same time. Lynn and Sue, on the other hand, were very familiar with the task and searching for an answer was an automatic process, one that needed little self-talk or thought.

Several of the participants had a high number of planning and monitoring statements. These participants, Chris, Bob and Eric, were likely in the consolidation or consultation role (see discussion). They felt comfortable doing the Think Alouds and generated more planning statements than the group as a whole. They were all familiar with computers, had one at home and spent time searching on the Internet. It may not be surprising to note that the boys tended to be more familiar with computers and to do some planning and/or monitoring in each search.

Two of the participants had no planning or monitoring statements in either search. Mary and Carol are both novice users and were very quiet during their searches. Although Mary continued to be very quiet during her searches, Carol actually began to use more planning and monitoring statements as she progressed through the searches. This may indicate a movement from the acquisition role to the consolidation role.

The second and fourth questions were much easier for most participants. Most of the participants typed in the word "cardinal" or "boxer" and immediately found the answer. It is interesting to note how much Think Aloud data Fran generated even in these very simple searches. She was very talkative throughout the study and had more evaluating statements than any other participant.

Even though finding the answer to these two questions was easy, Bob, Paul and Chris still did some of planning and/or monitoring in each search. Bob was a very interesting participant. He had just moved to Inuvik from California about a month before the study began. He spontaneously used language to solve the task and also to relate this search to his own background knowledge and experiences. Meichenbaum and Biemiller (1998) propose that students like Bob are in the *consultation* role and "they come to understand the task, and to be able to call upon the associated skills (in a literal, verbal sense) when new situations occur in which the skills are relevant" (p. 77).

Study 3

Participants in study 3 are currently working on their PowerPoint presentations of their research project. The participants have completed 3 Think Togethers and have done two Think Afters on tape recorders. Preliminary data analysis indicates that students are much more open to sharing information and ideas in the Think Together situation. They feel comfortable with their fellow participants and use ideas and conversations as a springboard for their own ideas and concerns. The Think Afters have yet to be analyzed as students still have their tape recorders at home. Some spontaneous Think Alouds have also occurred during the study. These are simply conversations where I ask the student to talk about what they are currently doing, i.e., making notes from a book on

witches and organizing information into a web; creating a PowerPoint slide about the perfect golf swing; doing an Internet search for "Friends" hairstyle trends.

DISCUSSION

Think Aloud, Think After and Think Together methods provide ways to gain a greater understanding of many aspects of the work of teachers, librarians and students. But, just like other methods, there are important considerations to keep in mind when using the methods to gather data. Study 1 found that Think Alouds provided important and interesting information about the information-seeking process. Think Alouds provided great insight into the cognitive and affective behaviours of a search. However, Study 2 found some things to be cautious about when using Think Alouds with students.

The work of Meichenbaum and Biemiller (Biemiller & Meichenbaum, 1992; Meichenbaum & Biemiller, 1998; 1992) provided one way of looking at the participants in this study and their ability to generate Think Alouds. Their work with self-directed learner seemed, at first, totally incongruous with this work on information-seeking processes and verbal protocol analysis. Yet, on closer study, the researchers are interested in the very same thing – the nature of thinking out loud as one does a task. Meichenbaum and Biemiller's research, conducted over the past 15 years, involves studying the most and least self-directed students in elementary schools as identified by their teachers and peers. In a study involving 70 high and 70 low self-directed learners, the researchers recorded what the students did and what the students said. This involved recording the students' self-talk, their talk to peers, and their talk to teachers. As a result of this work, Biemiller and Meichenbaum (1992) developed a coding system to analyze the "children's discourse about tasks" (p. 76).

This coding system enabled the researchers to compare high and low self-directed learners and to "infer the nature of their cognitive and metacognitive self-regulatory activities" (p. 76). This task-related speech, or Think Alouds, provided a way of accessing the cognitive processes of a learner. Biemiller and Meichenbaum (1992) determined that "children whose level of cognitive development exceeds the complexity of tasks they are being taught have "surplus mental capacity" permitting them to "think" (self-dialogue) about what they are doing" (p. 76). On the other hand, children who are less cognitively advanced approached a task with fewer skills. As a result, they encountered an overload or, at the very least, needed their full attention to complete the task. These low self-directed learners had "little or no capacity left for verbal thought processes while conducting the task" (p. 76).

Specifically, Biemiller and Meichenbaum (1992) found that highly self-directed learners generated more than twice as many statements as less self-directed learners. The statements were coded as defining, planning, conditional planning, monitoring, or evaluating. These coding categories were used in Study 2 to analyze the Think Alouds of Search Session 1. The following is an explanation of the coding categories:

> Defining: Statement or question labels and notes features of tasks, procedures, and objects ("It's John's game." "That's red paint.").
> Planning: Statement or question about what will or should happen next ("Can I do X?" "Mix some soap in the paint." " Where are the sparkles?" "I need...").
> Conditional Planning: Statement or question relates a plan to a condition or specifies the basis for choosing between alternative plans ("If we make noise, then we won't have recess.").
> Monitoring (ongoing task): Statement or question notes progress, or lack thereof, on the task (You're going too fast." "Slow down.").
> Evaluating (completed or aborted task): Statement or question concerns conclusions on ending the task – regarding the product, the child's ability, or the experience of doing the task ("This is my best one so far!" "I can't do it!" "The math squares are fun!") (Biemiller & Meichenbaum, 1992, p. 78).

Biemiller and Meichenbaum (1992) found that both groups had similar rates of defining and evaluating statements but highly self-directed learners had more planning and monitoring statements. The authors suggest, "spontaneous planning and monitoring statements are crucial indicators of the degree to which a child is functioning with expertise in a specific situation" (Biemiller & Meichenbaum, 1992, p. 76). Seventeen task-directive statements per hour were received by less self-directed learners from their teachers. Highly self-directed students received only two statements per hour from their teachers. Teachers were "thinking for" the less self-directed learners by giving them planning and monitoring statements (Biemiller & Meichenbaum, 1992).

Meichenbaum and Biemiller (1998) identified "three phases of self-direction: *acquisition*, *consolidation*, and *consultation*" (p. 75). In the *acquisition* role, the learner "observes, imitates and acts under the guidance of the instructor" (p. 75). In this role, learners are less likely to be able to do the task and to also be able to talk about it at the same time. In the *consolidation* role, the task begins to become more automatic. This automaticity "reduces the attentional and memory load associated with the skill, freeing up cognitive capacity to attend to other features of the task or to talk or think about the task while doing it" (p. 76). In the *consolidation* role, the learner becomes more able to plan and ask questions, and, as a result, becomes more efficient. Learners who have reached the *consultation* role "can perform requisite skills and plan specified applications, provide assistance to others as needed, collaborate effectively with others in planning large tasks, and consult with themselves when they encounter difficulties or problems in accomplishing tasks" (p. 77)

Biemiller and Meichenbaum's work is very interesting, especially when considering the problems that some of the participants in Study 2 encountered when doing Think Alouds while searching CD-ROM encyclopedias. Stratman and Hamp-Lyons' (1992) list of reactivity factors includes "limited short-term memory capacity for talking and attending at the same time" (p. 95). To determine if the *acquisition, consolidation and consultation* roles could be applied to junior high information-seeking processes, the coding scheme

developed by Biemiller and Meichenbaum (1992) was used. See Branch (2001) for the complete study.

All learners are unique and bring to a task their own skills, experience and vocabulary. The researcher has to keep this in mind when using Think Alouds as a way of gathering data. The work of Biemiller and Meichenbaum helps to explain why some searchers experienced difficulty generating complete Think Alouds. Those students who are not in the *consolidation* or *consultation* role in the given task may have difficulty generated Think Alouds. To get the best and most complete data then, researchers must ensure that learners are given time to become familiar enough with the task so that they can speak about what they are doing. However, learners must not be so familiar with the task that it becomes so automatic that they are unable to think out loud about the task.

There is a delicate balance that must be reached by the researcher and, obviously, one that is difficult to do with a group of junior high students. Biemiller and Meichenbaum (1992) suggest that others in the classroom including teachers, teacher's assistants and more able students sometimes do the thinking and planning for less self-directed children. It may be unreasonable to expect those students to generate complete Think Alouds without preparation and time to move away from the acquisition role. These learners have come to depend on others to do their defining, planning and monitoring activities. As a result, this becomes a "self-maintaining cycle" (Biemiller & Meichenbaum, 1992, p. 77).

Biemiller and Meichenbaum (1992) suggest that those interested in working with children "should strive to systematically monitor their students' social and self-discourse in order to infer the children's level of knowledge, strategies, and motivation" (p. 77). These are important clues to each student's level of competence and expertise. A researcher should do the same thing. Time should be spent before the study observing and listening to the self-talk of each student as they search so as to infer what role they were in. Those students who were in the *consolidation* or *consultation* role would then be ready to generate Think Alouds. However, those students in the *acquisition* role should be allowed more time to become familiar with the task before being asked to do Think Alouds.

There are concerns too about getting the best possible data from Think Afters. Three participants from Study 1 told the researcher that they experienced some difficulty in doing Think Afters because of forgetting. The idea of forgetting is consistent with the work of Ericsson & Simon (1984) who found participants may forget information in retrospective verbal protocols. In doing the Think Afters, participants tended to describe the shortest route to finding the correct answer. This usually included the first search term and the final search term used but eliminated some of the dead ends that occurred in the middle of the search. To allow students to better describe their information-seeking processes, however, it seemed that some other method of recording data was needed. Study 2 included videotaping the computer screen so that after each search activity the videotape could be played back to help participants to remember their information-seeking processes better. Videotaping allowed participants to hear their

Think Alouds when replaying the search. The researcher and the participant were able to interact with the video and discuss the cognitive, affective and behavioral processes involved. There are other ways available to record the information-search process on a computer including keystroke capture and screen capture software.

Think Togethers provide another way to gather information about information-seeking processes. The participants in Study 3 seem to like to share experiences, ideas and concerns as they complete their research project. The participants need to feel comfortable with each other and with the researcher. Some preparation time is definitely needed to develop the sense of trust necessary for students to speak openly and honestly about their research process. Data gathered from time spent with each participant individually and from the questions posed as Think Afters are providing additional information about the research process.

CONCLUSION

Gathering information about the information-seeking processes of people is a tricky business. Using Think Alouds, Think Afters, and Think Togethers, along with observation and videotaping of teaching and searching, can help gather a rich collection of data. Because forgetting and fabrication may influence Think Afters, researchers should attempt to use a combination of verbal protocol analysis and other methods such as observation, screen captures, transaction log analysis or videotaping the search to gather the most complete data. In order to gain a deep understanding of the information-seeking processes rich data needs to be generated.

Study 1 found that it depends on the nature of the search question as to whether Think Alouds or Think Afters provide the greater amount of data. The data generated from Think Alouds and Think Afters is quite different. For researchers interested in looking at a phenomenon as it happens, Think Alouds provide rich data. However, some participants may find it difficult to generate Think Alouds while carrying out a new task or a task that involves a lot of cognitive processing.

Biemiller and Meichenbaum (1992) suggest that "students who are more expert have the ability to nurture their own self-regulatory skills" (p. 77). Because teachers often provide planning and monitoring information, they may not "provide the less competent child with the same opportunities or tasks to practice to develop his or her self-regulatory competence" (p. 77). As a teacher and a researcher, it is disheartening to hear my own talk during the search sessions. At the time, I was just "trying to help" but now realize that I was influencing the kind of Think Alouds that some of the student's generated. The work of Biemiller and Meichenbaum will be very important when designing future research.

There is no way to know whether the ability to generate Think Alouds in Study 2 can be attributed only to the role the learner was in, i.e., *acquisition*, *consolidation*, or *consultation*. As Stratman and Hamp-Lyons (1994) suggest there are several other factors that may have influenced the Think Alouds. There could have been confusion as

to what the researcher wanted when asking for the participant to Think Aloud. There was a cultural difference between the researcher and some of the participants that may have influenced the Think Alouds. There may have been gender issues or learning style issues that influenced the Think Alouds. Any or all of these may have contributed to incomplete Think Alouds.

However, Biemiller and Meichenbaum present a very interesting theory that appears to hold true in this situation. Their suggestions for helping all learners become more self-directed are good ones. Teachers and researchers will have difficulties because students "vary in the areas in which they have expertise" (Biemiller & Meichenbaum, 1992, p. 77). Researchers need to be aware that differences exist and help learners move from the *acquisition* role before trying to gather Think Aloud data. Not only will this be of benefit to the learner; it may also help to generate the best Think Alouds possible.

Using Think Alouds, Think Afters, and Think Togethers along with observations and videotaping means a lot of data to work with as a researcher. Bringing together the data will require the use of a software program such as Ethnograph or NUD*IST. Assistance with transcription will also be required.

Think Alouds, Think Afters and Think Togethers pay attention to information-seeking processes and provide rich data. As with any method, there are some challenges to overcome but the method is easy to use. More and more researchers are using the method for research into Internet use. But, there is still a need to know much more about how people search for, use, and evaluate information found on the Internet. This researcher plans to continue to use verbal protocol analysis to gather that kind of data.

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Chapter 13

Information Literacy Skills of College-level Virtual Library Users: An Exploratory Study

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Virtual libraries have proliferated in the past decade. Through the Web, these systems provide full-text and abstracted documents to K-12 and college library patrons. Currently, there is very little empirical research exploring how the existence of digital libraries affects the acquisition and practice of information literacy skills.

In this qualitative study, we observed student interactions with a virtual library in the search phase of a resource-based project, gathering data about students' information usage patterns and strategies for handling information tasks. Results from the study illustrate eight of the *Standards,* and provide an opportunity to explore the cognitive processes involved within information usage tasks.

Background

Around the United States, many colleges and universities have mounted virtual libraries. Virtual libraries are online systems through which patrons can access scholarly information. Large database vendors have provided increasing amounts of their holdings in full-text digital form, and databases indexing citations and abstracts are available in most subject areas. Georgia's virtual library, GALILEO (GeorgiA LIbrary LEarning Online), was launched in 1995, making it one of the oldest of these systems.

GALILEO provides services to academic, public, and K-12 school library patrons. Access is controlled through password entry, and the menu of databases varies according to the patron type. For example, K-12 users can access *EBSCO* products for primary and middle school children, while university users may access scholarly databases such as *Current Contents, GEOBASE,* and *PsycINFO*. GALILEO works via a web browser. Users may login from any terminal at home or on campus, although certain databases may be limited to certain campuses depending on licensing arrangements. Once logged onto GALILEO, patrons may search secondary indices of periodicals, multimedia encyclopedias, or primary databases containing full-text articles from journals and newspapers.

Now that the system has been in place for several years, questions have arisen. Media specialists and librarians observe patrons using the system as a shortcut by performing research based solely on online abstracts and by limiting research to articles that can be found as full text, leaving expensive print journals languishing unused on shelves. Teachers and professors, with a lingering suspicion of web-based resources, wonder how they can design pedagogically sound projects that incorporate virtual libraries. Educators also wonder if students have the information literacy skills necessary to use the system effectively. They would like to take advantage of provided resources and to prepare students to use the kinds of information systems they will encounter after graduation.

These practical concerns reveal a gap in our understanding of user behavior. In this relatively new information environment, how are the skills denoted by information literacy standards coming into play? Specifically, are undergraduate students able to find information, evaluate it, and apply it in the specific ways suggested by the standards? Under authentic circumstances, how often are these skills needed and how well are students able to apply them?

This paper maps the data gathered through an intensive study of ten undergraduates using a virtual library onto the information literacy standards. We explore both K-12 and college standards (ACRL, 2000; AASL/AECT, 1998) in order to consider whether or not the K-12 standards provide a smooth passage to the information skills required of college students. To facilitate this process, we incorporate similar data gathered from ten high school students where appropriate. The purpose of this study was to explore how the use of digital libraries might affect the acquisition and practice of information literacy skills.

Research questions for this exploration included:

- How does the behavior of undergraduate students pursuing authentic information-based inquiry projects in virtual libraries align with the K-12 and collegiate information literacy standards?
- From the aspect of instructional design, how might a media specialist or librarian diagnose the current information literacy skills of a student, specifically in the early phases of information use?

Methodology

This qualitative study involved two participant groups: 10 undergraduate students and 10 high school students. All participants conducted searches of an extensive virtual library as part of research projects for their classes. In sessions lasting from one hour to ninety minutes, qualitative data about participants' information use were gathered through four techniques: 1) interview questions, 2) retrospective accounts of previous GALILEO sessions, 3) think-aloud protocols and observation concurrent with an online GALILEO session (Ericsson & Simon, 1993), and 4) stimulated recall (Marland, 1984). In addition to audiotaped interviews and observation notes, electronic activities were captured through the recording application *ScreenCam* (1997). Through these techniques, we observed students' interactions with the virtual library in the search phase of a resource-based project, gathering data about students' information usage patterns and strategies for handling information tasks. Undergraduate sessions were held in a faculty office located in a building approximately a mile from the main campus library. High school sessions were conducted in the school media center.

Because we were interested in studying information use in authentic situations, efforts were made to observe users under conditions that were as authentic as possible. For this reason, we asked participants to bring one or more current research projects to the session. Data were collected in spring of 1999. Participants were paid a small honorarium for their participation.

Each session followed a general pattern of pre-interview, think-aloud/observation, stimulated recall, and post-interview. The pre-interview included questions about the participant's past GALILEO use, demographic factors, opinions about GALILEO, the topic for the day's search, and any prior knowledge about that topic. Next, a think-aloud procedure was conducted in which participants sought information, describing their thoughts as they did so. Detailed instructions for performing think-alouds were given, in addition to modeling by the interviewer. Because we avoided interrupting the participant during the think-aloud process, this activity was followed by stimulated recall in which we asked the participant to explain actions taken during the think-aloud or statements made that needed clarification.

We analyzed the data using a multi-step process. Interviews, observation notes, and *ScreenCam* files were transcribed first. Next, we began the long process of open coding, which involved reading through each piece of data, seeking unique meanings within them, and tagging individual text units with labels identifying their content.

The entire analysis process was facilitated by *QSR NUD*IST*, a software package that creates a database of text units with their assigned codes and allows sorting and multi-layer categorization, as well as complex search functions. After open codes were assigned to text units in each piece of data, they were sorted into a hierarchy of

categories. Next, we sought gaps in the open-code analysis. Finally, emerging patterns generated new questions that were pursued.

Several conditions limit the trustworthiness or value of this study. The study relied heavily on verbal reports of several kinds, which have been criticized as being filtered through participants' biases in several ways (Bernard, 1988; Brown, Bransford, Ferrara, & Campione, 1983; Ericsson & Simon, 1993; Kelly, 1995; LeCompte & Priessle, 1993; Moll, 1987; Murtaugh, 1985; Smith & Wedman, 1988). The technique of observation brought to the study the possibility of several unique sources of error (Bernard, 1988; Evertson & Green, 1986). Also, the methods used to recruit participants may have created a bias toward users with positive feelings about GALILEO, as is often the case with volunteers. Seventeen of the twenty respondents were seniors (either high school or undergraduate), creating an upperclassman bias. The high school students, by virtue of their enrollment in an Advanced Placement calculus class, were probably among the highest achieving and most motivated students in their school. These factors combine to form a possible elite bias as well.

Ericsson and Simon (1993) and Whitney and Budd (1996) assert that the listed limitations and biases are problems of validation and propose the use of multiple data sources to mediate them. Particularly, combining concurrent reports with retrospective accounts and electronic logs provided three windows that helped reveal the cognitive processes of the participants. Electronic logs provided a specific view of the objects of thinking and helped to capture the specific parts of documents participants studied. Smith and Wedman (1988) suggest that limiting verbalization to thoughts, rather than explanations of thoughts, helps to avoid the problems of invalid reports and cognitive overload. In addition, LeCompte and Preissle (1993) and Bernard (1988) recommend using observation to triangulate verbal reports of all kinds. Thus, we used participants' thought verbalizations, two modes of observation of behavior matching those thoughts, and stimulated recall to provide four data sources describing the same period of behavior.

Qualitative research results are often criticized for lack of generalizability (Yin, 1994). Stake (1995) asserts that if the parameters of a problem are adequately described, readers can decide for themselves whether findings apply to other situations. In short, the research context included students pursuing typical research assignments within the virtual library. We intend to describe procedures and the analytic path from data to conclusions thoroughly enough to provide readers with the necessary information to evaluate the efficacy of the process. Readers are free to apply methods and findings to personal situations and to construct their own conclusions.

Results

Because relevance and motivation are linked by many educational theorists (Dewey, 1902; Frick, 1991; Tyler, 1949; Vygotsky, 1934/1962), a qualifying condition for participating in the study was that participants bring to the interview an active project for

which they expected to use GALILEO. Also, unmotivated people are less likely to exercise their full range of judgmental ability (Flavell, 1981; Simonson & Nye, 1992). Interview questions verified that each participant's project had at least one motivating element beyond the honorarium paid as an incentive to participate in the study.

Students in this study were involved in the initial stages of information use. Hence, the data are rich regarding online library usage patterns, searching, interface problems, and initial judgments of information quality and relevance. Also, at the time of data collection, we were most interested in Standard 2 (evaluating information critically and competently). Because of this interest, we concentrated our interview questions and observation tactics upon constructs related to this standard. As the study progressed, we realized that we were incidentally collecting information about the broad spectrum of information use, despite our fairly narrow focus. Two articles have been published regarding these targeted results: Fitzgerald and Galloway (2001a) explores relevance-judging, evaluation, and decision-making in depth; Fitzgerald and Galloway (2001b) explores practical aspects for application. In this paper, we broaden our focus to consider the data in light of the information literacy standards. Table 1 provides a representation of the relative distribution of data resulting from this study.

Table 1. Data depth in relation to the Information Literacy Standards

Standard No.	Data depth
1. Access	Deep
2. Evaluation	Deep
3. Usage	Moderate
4. Personal interest	Moderate
5. Literature	Shallow
6. Excellence	Shallow
7. Democracy	Moderate
8. Ethics	Nonexistent
9. Groups	Moderate

This paper focuses on information use in the undergraduate volunteers who participated in the study. However, we collected similar data from high school students. At times, the data regarding an information literacy standard are thin amongst the college students. At other times, examining the high school data contributed greatly to an understanding of the transition that occurs between high school and college. Therefore, we will delve into the high school data at times during this paper to add additional insight, clearly labeling these instances.

Participants

The ten undergraduate participants were volunteers responding to an advertisement in the college newspaper or flyers soliciting students using GALILEO for a research project. The ten high school students were all part of an intact Advanced Placement

calculus class. We collaboratively planned a project with the teacher of the class, who gave the students a list of mathematical topics to research. Each participant was paid $20.

Participants consisted of 8 males and 12 females. High schoolers averaged 17 years, and undergraduates 21.5. The high school group (HS) consisted of 9 seniors and 1 junior, while the undergraduate group (UG) contained 8 seniors, 1 junior, and 1 sophomore. Table 2 summarizes data about the participants.

Table 2. General information about participants.

Partici-pant	Gender	Group	Age	Edu-cation	Content area or major	Topic/project
Al	M	HS	18	12th gr.	NA	History of computers: group research paper
Ann	F	UG	21	Senior	Psychology	Paraphilia; self-disclosure in romantic relationships: lit reviews
Apple	F	UG	22	Senior	International business and MIS	Production company or film festival: database creation
Ben	M	UG	22	Senior	Economics	Centralization vs. decentralization in organizational management: term paper
Chris	F	UG	19	Soph-omore	Cellular biology	Any psychology article: 2-page report on article
Cleopatra	F	UG	22	Senior	Psychology	Prejudice against light skin color in black communities: literature-based research project
Crusty	F	UG	21	Junior	Psychology	Validity of polygraph testing: group term project, presentation w/ bibliography
Edward	M	HS	17	12th gr.	NA	Benjamen Banneker: report
Erin	F	UG	22	Senior	Real estate	Employee compensation, tied to DialAmerica interview: presentation
Gidgit	F	HS	17	12th gr.	NA	Women mathematicians: group report
Julie	F	HS	16	11th gr.	NA	Women in mathematics: group report
Katie	F	HS	17	12th gr.	NA	Women in mathematics: group report
Michelle	F	UG	21	Senior	Psychology	Philosopher: 7-page critique of article
Mike	M	HS	17	12th gr.	NA	History of computers: group report
Mond	M	HS	17	12th gr.	NA	Women mathematicians: group report
Pat Sullivan	M	HS	17	12th gr.	NA	History of computers: group report
Robert	M	UG	23	Senior	Economics	Vending machine management: research paper
Savannah	F	HS	17	12th gr.	NA	Women in mathematics: group report
Sharon	F	HS	17	12th gr.	NA	Women mathematicians: group report
Teddy	M	UG	22	Senior	History, political science	Permian-Triassic extinction: 15-page paper

We now present findings regarding each information literacy standard, using the K-12 Standards as an organizational scheme. Corresponding or related ACRL Standards are given as well.

Standard 1: Accesses information efficiently and effectively

Related ACRL standards: 1. Determines the nature and extent of the information needed; 2. Accesses needed information effectively and efficiently
Two themes emerged regarding this Standard: searching and convenience. Due to its importance in the modern information climate, we will spend considerable space presenting data related to searching. The theme of convenience – where students made decisions based upon the quick availability of resources – is a much smaller finding in this study, but a prominent one nonetheless. Therefore, we will present the evidence related to it as well.

Searching: General information. Due to the capture of electronic files during the think-aloud portions of the interviews, a substantial amount of information involving searching was available. Specifically, present data allow a description of participants' initial plans of attack, the mechanics of their search processes, search strategies, and how participants sometimes learned from searching itself. Misconceptions and gaps in participants' knowledge also emerged in our examination of their searching procedures.

Searching: Plan of attack. We found that participants varied in their initial plans to attack their searching problem. We asked participants what they planned to do first in GALILEO and then how they would proceed to find information about their topics. This question revealed information about how much participants knew about GALILEO in general, and also how they organized their searches. Table 3 presents a typology of participant plans of attack.

Table 3. Participant plans of attack.

Category	Explanation	Participants	Example
Specific resource	Named specific resource as a target	Ann, Chris, Al, Crusty	Without any deliberation, Ann planned to use *PsycInfo*.
Search term	Listed search terms as focus of plan	Apple, Ben, Crusty, Katie, Mike, Mond, Edward	Crusty planned to look up "polygraph" and "lie detector."
Trial and error	Planned to try several different procedures, not sure which would work best	Apple, Ben	"I would probably have to experiment" (Ann).
Category	Named specific category as focus of plan	Chris, Michelle, Teddy, Erin	Chris named the Health and Medicine category as her destination.
Specific feature	Named a specific feature as focus of plan	Cleopatra, Katie, Michelle	Michelle named "abstracts" as her target.

Browse through databases	Planned to browse through database titles	Julie	"Mmm, I think I'm gonna look down a little bit. …It didn't go down any further. <Pause> Um, would it...have anything under education?"
Look for something "interesting"	Mentioned "interesting" as a target characteristic	Chris, Mike	"I'm gonna try to find something that seems like it would have something interesting pertaining to the history of computers." (Mike)
Multiple choice	Intervention: due to lack of system knowledge, we provided several alternatives from which participants chose	Savannah, Mike	Mike admitted he was choosing at random.
Where partner left off	High schoolers worked in groups; partners planned to start where their predecessor had stopped	Pat Sullivan, Gidgit	Al and Pat Sullivan were partners. Al found more resources than he could browse in the Internet Resources, and bookmarked them. Pat Sullivan expected to use these bookmarks.

Also, Teddy described plans of attack for both of his current projects, and the one he pursued is included in the above categorization. The other project, however, required a different plan of attack. For that one, an exploration of Christian Samurai warriors, he expected to begin with books:

> Because with a topic like that I'd go try to find books to get some general, um, at the same time I'd also just run in here [to GALILEO] and ... Christianity and Samurai, something like that, searches. And go for that. Skim through some of those, some of the journal articles and such. And just see kind of basically what they're saying, and then go for the details. Because details don't do you any good until you're like, okay, so this is what they're talking about.

Searching: Narrowing, limiting, and broadening. Focusing searches presented a considerable challenge for participants. Participants did not always change the scope of their searches in accordance with standard principles of searching (e.g., Katz, 1997). In studying the use of this concept, examination of how participants used the Limit feature is useful. Also, participants sometimes sought to limit their searches in other ways. In this discussion, "narrowing" refers to setting up a precise search initially, and "limiting" refers to reducing a large list of returns when the searcher judges it to be too large.

Some participants used no limiting at all: Al, Ann, Michelle, and Pat Sullivan. They did not mention the concept of narrowing or limiting in any way. For example, Ann scrolled through 70 of 5,747 returned citations in one search, despite having a firm topic focus. She explained that she deliberately used a broader term to give her "a wide variety of things to look at." Ben likewise spent a good deal of time looking through *Encyclopedia Britannica Online*'s outlined list of 1,722 returned items. In the other cases, however, the need for limiting may simply have not been present. Al, for example, found only fourteen items in his search, and the other participants produced similarly low numbers. Pat

Sullivan had difficulty finding any information at all. Michelle's assigned topic was extremely broad, and within the loose confines of her assignment her list of 131 returns did not seem too long.

Several participants voiced a wish or need to limit their searches, but did not seem to know how to do so. Mond, Savannah, and Sharon, all high school students, fell into this group. Mond asked for help in limiting a list of 42 returned items. Sharon, who experienced difficulty in finding relevant information, wanted to make her searches narrower. Thus, she understood the concept of limiting, but did not understand how to apply it appropriately.

Five participants used a type of limiting we label "manual." In these cases, participants used a broad search initially, and then started over with a narrower set of terms. For example, Edward began with the search term "Banneker" and later narrowed it by starting a new search using "Benjamin Banneker." This procedure seemed to work well for each of these participants when they could identify the appropriate terms with which to limit their search..

Three participants used the Limit feature provided by GALILEO, but experienced difficulties with it: Apple, Cleopatra, and Robert. Robert misunderstood that he was specifying that the words "cash cards" appear in the title of citations by typing them into the "other terms" box, and gave up when the search was completely unsuccessful. Apple and Cleopatra experienced similar problems when they failed to notice that the search engine was limiting in ways they did not intend. Distracted by adding a succession of limiting terms, one after the other, they overlooked that GALILEO was reproducing a previous search for each new limit. They both did not realize that they were beginning with lists of zero returns, and that they were continuing to try to limit that empty list further. This oversight happened despite the fact that the problematic words automatically appeared in the "Your Search" box each time on the Limit screen.

Finally, two participants showed a sophisticated understanding of the Limit feature, and applied it to great advantage. Crusty used a combination of simple limits like dates of publication and broad limiting subject terms in an overall strategy of synonym substitution, methodically switching databases until she felt she had found enough information. Teddy began with an overly narrow search, broadened it through deletion of terms, and then subsequently added in one limiter at a time until he produced a list of 39 satisfactory results. He made one major error by trying to limit results to English, using "English" as a descriptive keyword instead of a language. When no citations were found, he backed up one step, discovered his error, and corrected the problem.

One final observation is that participants varied widely in how many results they thought required limiting. Crusty applied a limit to a list of 37 results, although most participants seemed satisfied with lists this small. At the other extreme, Ann looked through the first 70 of 5,747 citations before launching another search. Often, participants looked through the first set of these large lists to determine if their search was on target before

limiting it further. Apple expressed another dilemma: "I'm sure there's a simpler way to make this more focused, but I don't know right now, I don't want to lose what I have."

Searching: Boolean and Precision Searching. Participants knew very little about the more powerful types of searching. Although we did not pursue Boolean logic as a standard interview question, occasionally the concept emerged in the dialogue. In situations where combination searches were needed, it occasionally occurred to us to ask participants if they knew about it. Julie, Sharon, and Gidgit answered "no" to this question. In Gidgit's case, someone had exposed her to the idea of Boolean searching in the past, as evidenced in this question: "You think it should be women AND algebra or women?" She did not know the concept by name, however. More important, in the entire study, no participant used Precision Search, a form of "advanced" search that allows the user to fill in multiple boxes.

Searching: Strategies. Participants demonstrated a number of searching strategies in their attempts to find relevant information. For example:

- Cleopatra examined descriptors and subject headings of likely citations to help her find additional citations. She jotted these terms down in a notebook for current and future reference.
- Gidgit found names within an abstract of two female mathematicians (her topic), on which she then performed searches.
- Crusty listed synonyms to help her construct search terms.
- Erin and Crusty both used an overall plan of using a series of search term combinations sequentially in a number of different databases, demonstrating their understanding that databases cover different but sometimes overlapping territory.

Searching: Learning content through the process of searching. Three participants made comments about learning content knowledge through the searching process. Apple's goal for her session was to establish effective search terms and the location of likely information resources. Her earnest gathering was to take place at a later date. To accomplish this goal, she felt she would remember the types of information she found in her fast and broad-ranging searches. Thus, she expected to learn her objective information, at least temporarily. Erin, seeking information about a local telemarketing company as background for an upcoming site visit, expressed surprise at the "good bit" she learned through her searches. She said that her abstract printouts would help her study further and remind her of what she had seen. She did not intend to track down the articles themselves. Robert spoke of absorbing "bits and pieces" of information from his searching, contributing to one of his goals of staying current with developments in the topic area. Teddy summarized:

> I don't know how much, you know, mainly today's stuff has been based on what the title was. I don't know how much learning you can really get done from that. Although, I definitely have learned some things about some crinoids. Um, no, I'd say most of, a vast majority of the learning takes place when you're actually

> sitting there reading it. Although, yes, you do learn some from the abstracts, if it, the abstract is very important.

Searching: Participant knowledge. Shortcomings in searching concepts appear above in presentations of data about limiting, Boolean, and Precision searching. Numerous shortcomings in participants' knowledge about the mechanics of searching were evident as well. Apple spoke of the frustration caused by searching difficulty:

> At times it can seem frustrating, because you're looking for something and it seems difficult to find, or if you find something with the information you want, it doesn't give you enough information and you can't get further, so at times it's frustrating.

Later, during her think-aloud, she struggled with finding a specific person and said, "It *should* be easy."

Many shortcomings in participant knowledge about searching demonstrated themselves as questions or problems concerning syntax. Apple puzzled over names: "I'm not sure how to look up names....complete name, I wonder if that includes the middle name...." Gidgit wondered if she should use punctuation between multiple terms. Katie asked if a term (SAT testing) should be capitalized, and Sharon had a similar question.

Spelling also caused questions. Apple jokingly said "I'm very dependent on spell-check" after mis-typing a search word. When a search was unsuccessful, she double-checked her spelling and wondered if capitalization was the cause. Chris and Cleopatra had similar problems. Edward's search for "Benjamen Bannakar" was completely unsuccessful and his search floundered until we intervened and suggested that he check spelling. Gidgit likewise had trouble figuring out the problem when her search for "mathamatics" returned nothing. On the other hand, Ben, who had serious spelling problems and was aware of this difficulty, typed "industrail management" into *Encyclopaedia Britannica Online.* The database compensated for his error and produced a satisfactory list of items. Ben never noticed this particular spelling error.

Searching: Problems. A couple of participants juxtaposed GL with Internet search engines. Mond wanted to know if GALILEO had a relevancy ranking feature, like Internet search engines typically do. At least one person – Robert – felt that *Yahoo* was easier to use that GALILEO:

> MAF: You said that GALILEO was much different from *Yahoo*. How is it different?
> Robert: Okay, well, if I could, you know, because I'm not used to trying to find out when to use search limit and so forth on the GALILEO. I've never done that, but on *Yahoo* you can just type in "vending machines" and it will find everything in vending machines.

This passage illustrates two important points. First, Robert may have assumed that *Yahoo* performs a thorough and exhaustive search of the Internet, a common

misconception about Internet search engines. Second, Robert felt that *Yahoo* was easier to use than GALILEO.

Convenience. We examined the reasoning participants used to accept and reject information, a decision that was directly observable as participants chose whether or not to print or save items. Most often, these reasons revolved around relevance and information quality, to be discussed below. In a significant number of instances, however, the reasons revolved around convenience. Table 4 presents these episodes, taken from both undergraduate and high school data:

Table 4. Data related to convenience.

Reason	Explanation	Decision	Example
Full text	Because it's there	Accept	"That sounds pretty good, since we've got the whole article." (Katie)
Available	Easy availability increases attractiveness	Accept	"That looks interesting and it's in BF, and I'm always in the Main Library, so..."(Ann)
Vocabulary	Difficult to understand or inconvenient	Reject	"... but it looks like there's a lot of long words and I'm typing this, so I probably wouldn't choose this one." (Chris)
Difficult	Difficult to comprehend; confusing	Reject	"I was just thinking it sounds confusing when you read it." (Julie)
Not available	Print version difficult to access	Reject	"This one also doesn't have display location, so I just wasted that time." (Crusty)
Full text	Lacking	Reject	MAF: "The ones with the dots are the ones that do have [full text]."... Mike: <laugh> "So, I mean the ones with the dot are the ones I'm looking for." (Mike)

Standard 2: Evaluates information critically and competently

Related ACRL Standard: Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system

For data related to this standard, we sought episodes where participants displayed some kind of critical thinking regarding information, whether subtle or explicit. For example, Crusty, seeking information about polygraphy, expressed direct evaluative thinking in the following episode:

> Mmm, [pause] this is something about, from the American Bar Association. That should be good. This looks like some kind of compromise for everybody. It talks about reliability, and it's around 90%. I tend to doubt that, but it's good to have

other people's opinions. Otherwise I look like I'm presenting one side. This also has to do with some stuff we talked about earlier in the semester. So I'll print this, and hopefully it will be good. And I'll go back. I'm gonna try a different database now.

In this episode, Crusty noticed that a citation, from *Lexis Nexis' Academic Universe,* was in the *American Bar Association Journal,* a factor she interpreted as lending the article credibility through authority. She disagreed with the thrust of the article, but recognized the value of acknowledging opinions from an opposing perspective. She also recognized material in the article that agreed with her prior knowledge, another factor that leant credibility.

Table 5 presents evaluation-related reasons expressed by other participants:

Table 5. Evaluation-related reasoning.

Reason	Explanation	Partici-pants	Example
Good	Verbatim; no specific reason given	8	"Okay, it's about drug abuse. And medicine and tolerance. That looks good. Okay. Basically, what I do now is print it out." (Chris)
Context	Item appears in questionable context	4	"A lot of these are book reviews, so that's not gonna work." (Michelle)
Methodology	Scientific method seems sound	4	"I can use all these statistics and we can compare them later." (Andrea)
Perspective	Presents an alternate view	4	"This one would be good because it's a contrast between what I just printed..." (Ben)
Insufficient	Not enough information presented to be of use	3	"I'm not sure if it's gonna be enough." (Ben)
Author	Well-known, familiar, or important author	3	Teddy noticed the multiple occurrence of a single author within the same hit list.
Currency	Item is too old	2	"This is also a 1994." (Robert)
Wrong methodology	Avoid specific methodological types	2	"Oh, wait a minute. This is a study. I'm not really interested in studies." (Patricia)
Obvious	Item seems silly, unimportant	2	"...expecting...sell...should be paid for it. Ah. Obviously." (Erin)
Strange	Item contains feature that seems "strange," "weird," "crazy"	2	"But, um ... um, this is very strange." (Ann)
Disagree	Participant disagrees with the item	1	"I see something that says polygraph testing has overall accuracy rates of 98%, and I'm automatically skeptical of that....*General Child Sexual Abuse*...I don't think I'll use this one..." (Crusty)

Reason	Explanation	Partici-pants	Example
Authority	Recognized professional association or business	1	"...from the American Bar Association..." (Crusty)

Other evaluation-related reasons included triviality, comparison to some other piece of information or idea, consideration of study results, comparison to similar situations, finding that it is interesting, comparison to prior knowledge, comparison to personal experience, thinking about what would happen if a recommended course of action were followed, level of specificity, and others.

Evaluative strategies. "Evaluative strategies" were procedures used by participants to assess information. In analysis, we coded sections of think-alouds and interviews in which the participant seemed to be making judgments about information. These incidents were examined closely for expressed strategies. For the purposes of this study, these strategies are broken down into the smallest discrete unit, as expressed by the participant. For example, Ben discussed the difficulty of choosing between four or five prescriptive theories of business. He said, "...sort of looking for a more persuasive argument, or, but not so much that 'cause, you know, a great speaker can talk about whatever he wants to." In this excerpt, he alluded to evaluating the worth of arguments, while warning against being persuaded by superfluous rhetorical elements. Thus, assessing the quality of arguments, a cornerstone of logical analysis, was a strategy clearly used by Ben. However, logic is an extremely complex system of heuristics, and Ben did not describe his analysis further. Therefore, the smallest unit we could break this strategy down into, in this case, was "Choose the most persuasive argument."

On the other hand, Michelle spoke of using logic in a slightly more specific sense:

> Well, just looking at the argument that the philosophers and, actually I took a logic class and...I mean, at the conclusion and seeing actually how they, first of all, came up with the premises. And, that leads to a good conclusion.

In this example Michelle indicated some prior knowledge about logical analysis and condensed the procedure into the examination of premises and conclusions. Her strategy was probably similar to Ben's, but she explained it in more detail. Therefore, we were able to summarize her strategies as "Examine assumptions (premises)" and "Examine the sequence of arguments leading to conclusion." Neither of these is sufficiently detailed to teach a novice how to perform them, but they communicate the process well to someone who already understands the procedures involved.

Often, strategies were simply the questions participants asked themselves about information as a way of determining its quality. They used the answers to these quality questions to clarify their thoughts about the information. In many cases, no evaluative strategies were explicit. Thus, the total set of strategies used by these participants in these information interactions is likely to be larger, possibly much larger, than those found in this study.

After extracting strategies and sorting them by type, we then examined numbers of strategies demonstrated by types of participants. Counting separate strategies only once per participant, the following statistics were obtained:

Table 6. Strategies demonstrated by participant type.

Type	Number of different strategies demonstrated[1]	Avg.	Total strategies executed[2]	Avg.
High school	19	1.9	20	2.0
Undergraduate	70	7.0	89	8.9

Thus, high school students demonstrated a total of 19 different strategies, or an average of 1.9 each, and 20 total, or 2 each. In contrast, undergraduate participants demonstrated 70 different strategies (7 each), and 89 total (8.9 each).

Relevance. Often, as participants considered citations, they verbalized reasoning that related to relevance. For example, Michelle considered an article in this think-aloud portion:

> Um, now let me see what this writer is. Is he for it or, if he argues for it or against it ... The writer questions one of the motivating assumptions of this disagreement. Okay, 'cause he's looking at – no, um, space. Compared with Leibniz. And that would be a, ok, I mean, I, I said I would like to just concentrate on one that seems like it would be in line to kind of see two different point of views. Not really sure exactly what side he's on, but it's, that seems like an interesting article, seems like something that I would want to do ... I would print this out. Well, I would go to "display location" and I would print it out....

This excerpt displays all of Michelle's verbalized reasoning concerning this specific item while viewing the abstract of a piece obtained in a search for "Leibniz," 69th in a list of 144 from *Humanities Abstracts.* She reviewed the content of the piece and interpreted part of it in her own words. She considered how she might put this piece to work (by using it to show another perspective of her topic) and mentioned that the article seemed

[1] Not counting duplications in individuals

[2] Counting all strategies demonstrated including duplications in individuals on different items

"interesting." Thus, there are at least three relevance constructs in this episode: content review, usefulness, and interest.

We analyzed all undergraduate episodes in this way for relevance reasoning. Table 7 displays some of these reasons and examples.

Table 7. Relevance-related reasoning.

Reason	Explanation	Partici-pants[3]	Example
Interesting	Verbatim	10	"Yeah, this one actually looks interesting, so I'll probably print this one out. Yeah, I will take it." (Chris)
Specific idea	Names specific relevant idea sought	9	"Ah! I hit the jackpot. Dark skin males, fair skin males. Ah, lovely. All right, let me mark that." (Patricia)
Useful or helpful	Verbatim	7	"…maybe I can use that somehow…" (Andrea)
Specific use	States purpose this information will serve	6	"'Fetish in a Man With Learning Disabilities.' [Reading.] Um, I might look at the development of paraphilia as like an introduction to my paper." (Ann)
Banned idea	Item contains a specific idea participant does *not* want	5	"*Armageddon*, I don't want *Armageddon*." (Andrea; she sought another movie instead.)
Divergent	Encounters idea not considered before	3	"I didn't think of coming up on something about the company." (Erin)
Specificity	Judges whether the information is too specific or too general	3	"It might just be too specific for me to use. Um, totally concentrated on New York…" (Ben)
Back-ground	Piece provides background or general information about the topic	2	Erin found information about what telemarketers do, which gave her background information for an upcoming site visit.
More is better	Not sure about relevance, but keep it anyway just in case	2	"I do have doubts about it, but I'm going to copy it anyway because more is always better than less." (Patricia)
Essential	Important part of the issue; would be negligent to leave it out	1	"It's slightly off the subject, but it's something I have to address." (Ben)
Serendipity	Relevant to some other project	1	"This actually would be pretty good for, um, my other one." (Ann)
Prior knowledge	Covers familiar territory	1	"This also has to do with some stuff we talked about earlier in the semester." (Carolyn)

Other reasons related to relevance included geographical relevance, relation to personal information problem, personal benefit, theme reoccurrence, year of publication, and others.

Much as participants executed strategies to evaluate the quality of the articles they accessed, the reasons related to relevance stated above can be interpreted as

[3] Undergraduates only

strategies. At times, this strategic reasoning is explicit, while more often, only a descriptive reason was given.

Standard 3: Uses information accurately and creatively

Related ACRL Standard: ...uses information effectively to accomplish a specific purpose.

To explore the standards related to information usage, we examined the types of projects participants were doing. We also examined accounts they gave of previous information projects. These data are summarized in the sections below.

Table 2 (General information about participants) provides a listing of each participant's current project. In the pre-interview, we asked participants how they had used the GALILEO system in the past. This question produced a range of information regarding past information usage projects and needs. Several categories of past information usage are apparent.

Table 8. Examples of past information usage.

Usage category	Description	Participants	Example
Professional	Direct support of job responsibilities	Robert	Robert needed to keep abreast of current industry information regarding his vending machine business.
Leisure	Pursue topics of personal interest or curiosity	Erin	Erin reported that she used GALILEO "for fun."
School research	Assignments for courses	Ann, Apple, Ben, Chris, Cleopatra, Crusty, Michelle, Mond, Robert, Teddy, all 10 high school students	The most common assignment was to write a "term paper" or "report" on a self-chosen but course-related topic.

Of the school research topics, by far the largest past usage category, projects fell into several categories:

Table 9. Breakdown of GALILEO usage in educational settings.

School research category	Description	Participants	Example
Papers	Find and synthesize literature on a course-related topic	Ann, Ben, Chris, Cleopatra, Crusty, Michelle, Teddy, all high school students (10)	Ann had written a paper on body image for a psychology class; Teddy was writing his senior thesis.
Information gathering	Collect facts on a given topic	Apple, Crusty, Mond	Crusty was gathering information to form a bibliography for a professor's research project.
Practice	Use some element within GALILEO as a study tool	Chris, Erin	Chris found that the *Psych Web* resource within GALILEO's Internet Resources provided practice quizzes that closely correlated with her coursework.

Standard 4: Pursues information related to personal interests

Related ACRL Standards: none

We asked questions about participants' projects and their motivations for completing them. Interview questions were designed to verify that each participant's project had at least one motivating element beyond the money paid as an incentive to participate in the study. Factors motivating participants to perform their information searches were extracted from statements describing their projects, plus spontaneous comments made as they answered other interview questions or commented during the think-aloud portion of the session.

Four motivating factors were found:

- academic (based upon the need or desire to graduate from high school or college)
- interest
- professional
- personal relevance

We assumed that all students (high school and undergraduate) were concerned with the need to graduate, especially since a high proportion (85%) were seniors about to graduate. Their projects, as part of course requirements, were steps on the path leading to graduation. No data suggesting low motivation appeared in these two groups of students. Statements indicating an interest in the subject of scrutiny beyond academic aspiration added an additional motivating factor. Robert's project revolved around his business. Cleopatra pursued an academic topic about skin color prejudice in part because she felt that she had been a victim of such prejudice in the past. One student

indicated that she chose a topic because she was interested in it and already had a considerable amount of prior knowledge about it.

For the most part, students had some degree of latitude in choosing their projects, where their project was an assigned academic project. In most cases, professors and teachers had asked the students to choose a project topic that fell within the general topic area of the course. Cleopatra and Robert stood out as individuals who were seeking information directly related to personal interests or needs. Ben and Teddy also were remarkable because they contributed data related to their senior theses, topics they had studied deeply and were motivated to work on beyond the normal motivation to achieve a good course grade.

Standard 5: Appreciates literature and other creative expressions of information

Related ACRL Standards: none

There is little data in this study to support the hope that students are building an appreciation for literature. Ben mentioned, in passing, that professors assigned book reports that he felt consumed valuable time he would rather spend researching his semester-end project. Chris was enrolled in a multicultural literature class, but made no statements to indicate that her interest in literature was anything beyond course credit. The high school students contributed several interesting data snippets in regard to literature. Edward admitted that he did not like reading books very much. Three girls spontaneously described using the Internet to help them find information about books they were reading in their literature classes, implying that they had read the texts, but used online resources to broaden and deepen their understanding. However, Al baldly stated that the Internet helped students he knew find information about books they were assigned to read but had not. On the other hand, Al was the only study participant who mentioned reading as an enjoyable activity: he liked reading Tom Clancy novels "more than anything."

Standard 6: Strives for excellence in information seeking and knowledge generation

Related ACRL Standards: none

Evidence regarding the excellence standard is scarce in this study due to less vigorous pursuit of this construct. Most often, the desire to do well in seeking information and generating knowledge occurs as a part of desiring good grades. Among the undergraduates, Ben talked about getting "lousy grades" and spent a substantial amount of time analyzing why this was so. Teddy was very cautious about using the Internet as a resource because he was afraid professors would criticize his information-finding process and give him a lower grade. Ben made an interesting comment about correcting misconceptions. He said that he welcomed the chance to do so, because he felt learning something wrong and correcting it made a greater impact, and that if he could retake tests he would make "great grades." Among the high school students,

Mond (like Ben) refers to getting bad grades. However, both Mond and Edward made direct comments related to the desire to do a good job on their projects and get good grades. Gidgit talked about how using the Internet had helped her expand her information resources in a project and directly resulted in receiving a good grade on a previous report. Al mentioned that his teachers thought he was a good writer, but that writing was not easy for him.

Standard 7: Recognizes importance of information to a democratic society

Related ACRL Standard: none

Several undergraduates made side comments that directly or tangentially revealed knowledge of the importance of information in a democratic society. Ben and Teddy had conducted extensive research (their senior theses) on topics with themes related to this standard. Ben's topic had to do with centralization of knowledge, exploring the issue of when it is important for everyone in an organization to *not* know pieces of information because it would confound the mission of the organization. For example, soldiers are sometimes better able to accomplish military tasks if they do not know all of the intelligence relating to a tactical situation. He contrasted this scenario with political situations in which it was important to "get at the other side we never hear about" in order to inform individual political decisions. Teddy's thesis had similar overtones: he was researching public perceptions of presidents, whether correct or incorrect, and how these perceptions affected elections and other political outcomes. These two individuals expressed a deep understanding of this information literacy principle.

Two other students offered opinions that showed awareness, although not in depth. Chris discussed the Clinton/Lewinsky scandal and its relationship to political reality, deeming it not important. Crusty had researched elections during a political science course, and discussed the presence of liberal biases in two local newspapers, recognizing her own moderate stance. Both of these students, simply by discussing these issues, indicated a subtle awareness of this standard.

Standard 8: Practices ethical behavior in regard to information and information technology

Related ACRL Standard: Understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally

Despite extensive searches of the data, we found no references to wrongful information use, cheating, plagiarism, or lying. On the other hand, we found no overt references to honesty in regards to information use. We concluded that the data gathering techniques of this study were not sensitive to this issue.

Standard 9: Participates effectively in groups to pursue and generate information

Related ACRL Standard: ...individually or as a member of a group...

As evidence related to this standard, we sought references to group participation. We also searched for negative information concerning group participation. On the positive side, Ann referred to working in a group for her current project and reported that her group had been formed by the professor according to topical interest. As the group refined its psychology topic, she said they "came to a consensus." Cleopatra reported working with a partner on her project. Crusty was also working with a group on her topic, and the end product was to be a presentation. All but one of the high school students were working in pairs or threesomes. The lone worker had chosen a topic that no one else was interested in. Despite extensive searches through the data, we found no complaints or problems related to working in groups. Further, we found no references to preferences for working alone.

Discussion

In this discussion, we discuss three significant themes arising from the data in this study: searching, differences between high school and college students' strategy use, and convenience.

Searching

In our opinion, participants lacked knowledge about searching to a critical degree. Most did not understand Boolean searching. Our observations of problems with the Limit feature, browsing through huge lists of returned citations, and the failure of anyone to initiate a Precision Search support the finding that participants understand searching to only a rudimentary degree. It seems clear that searching technique is a new literacy skill that needs to be integrated into curricula beginning in the early grades. For the current generation of students and graduates that have never had the opportunity to learn about searching, we suggest the creation of an online information skills course. We further suggest that undergraduates should experience such a course as a part of their core curriculum, or alternatively demonstrate competency.

Spelling presents a substantial obstacle to GALILEO users, according to data from this study. While improving spelling skills in users would be the best course of action, this goal becomes less likely as automatic spell-checkers become available in many computerized contexts. As we observed with Ben's spelling error and the "intelligent" response of *Encyclopaedia Britannica Online,* some databases already have this capability. Perhaps the possibility of adding an optional spell-checking capability could be explored. We do not recommend that search interfaces incorporate automatic spell-checking, however. Sophisticated users need the power provided by literal operation.

A final complicating factor is illustrated by Robert's stated preference for *Yahoo* as a user-friendly, exhaustive Internet search engine. This minor incident shows the influence of Internet search engines or possibly other databases on the searching process. Virtual libraries typically contain several different search interfaces, which themselves change with rapid upgrades over time. Add to those interfaces the many different Internet search engines, all operating according to their own set of rules, and this variety of differently-behaving search engines inevitably causes memory errors due to cognitive dissonance. Users can cope by limiting search engines to a few familiar ones, reading the help files to discover this information, and learning in-depth how to use those. Search engine developers could do much to alleviate this difficulty as well, but their behavior is beyond the scope of this report. Perhaps this complex problem will eventually disappear, but it seems reasonable that developers may have to agree upon a standard at some point.

Differences in evaluation between groups

From Table 6, it is clear that high school students performed far fewer evaluative operations than the college students. These data are insufficient for a detailed statistical analysis, but the findings are suggestive. Epistemologists (e.g., King & Kitchener, 1994) predicted and observed that older, more educated people engage in deeper reflective and critical thinking than younger people. Although their findings apply to critical thinking ("reflective judgment") rather than evaluation itself, the constructs are closely related. Thus, the findings of this study harmonize well with theirs. It would be interesting to investigate whether evaluative behavior truly increases with age and level of education in terms of information evaluation.

Recall that undergraduate sessions were conducted in a faculty office in quiet surroundings, using a relatively new computer with a fast network connection. High school students were operating in a busy media center on a similarly new computer, but with a dial-up modem line that disconnected frequently. Conditions during the high school sessions were less than ideal, due to students' unfamiliarity with GALILEO and serious telecommunication problems. Perhaps these conditions created such a high cognitive load that their higher-order thinking was constrained. We would like to conduct further studies with high school students to explore this issue.

Despite the differences in conditions, the realities involved in these two contrasting data collection situations point to a deeper issue. Data concerning number of strategies executed reveals a dramatic difference between the two participant groups. If the study conditions contributed heavily to this difference, then we must consider how these conditions translate into real life situations. Distracted students using unreliable technology may not be able to think as well as students in a quiet environment using reliable technology. Yet, crowded facilities and unreliable technology are pervasive conditions in K-12 education.

Convenience

Table 4 reveals some disturbing patterns in these data, and we suspect that the availability of a virtual library has enabled users to cut some corners in scholarship. By providing a rich array of resources, more than students can possibly use, they are able to be more selective. However, this selectivity is artificially enhanced by eliminating all items not located in the library. Even though Crusty had used the OPAC to find periodical locations before, she now considered this step an extra cumbersome one, further limiting her list of possible citations. Ann preferred items which were located in a branch of the library that she could easily visit. At the undergraduate level, in the context of a minor course project, this tendency toward efficiency may be appropriate. However, it is not a practice that can be considered rigorous in a scholarly sense. In another study, doctoral students were observed on occasion limiting their searches by availability as well (Fitzgerald, 1998). This problem is one that can be addressed in an information use course, but will need to be systemically considered by college faculty of all subjects requiring library research.

Limiting searches to full text is another potential source of problems in scholarship. In full-scale literature reviews, using limits based upon full text availability would be unconscionable. The participants observed using full text limits (Crusty and Edward) were not performing full-scale literature reviews, however. Within the context of their information tasks, their choices seem reasonable. In the universe of information available, which was far greater than they could apply to their needs, they opted to examine the items that could be obtained in three mouse clicks. It is encouraging that this behavior was not observed in students performing more intensive projects. However, the question of compromising scholarship through artificial and convenience-based limits remains open for exploration.

Another concern is raised by abstract-only research. In addition to the one overt case observed, we were surprised to hear four participants comment about how learning can take place through searching, presumably primarily the browsing of abstracts. These observations alone are not problematic, because they all seem reasonable in context. However, their occurrence raises the question of whether students use similar shortcuts on a routine basis. If students depend upon abstracts for all of their research, their learning will be shallow at best. Also, no author of a research study can possibly communicate the full context of findings in a one-paragraph abstract. We feel this question needs exploration, if only to lay the concern aside.

Implications and Conclusion

The data in this study provide several baseline patterns of problematic and sophisticated information use. Results provide specific information regarding all but one of the information literacy standards, in the form of concrete characteristics and

observable behaviors. *Information Power* provides indicators and levels of accomplishment related to each of the standards, and these naturalistic results provide enrichment and illustrations for some of them. We hope that data such as these may contribute information towards the goal of constructing a reliable and reasonable assessment of information literacy.

Our final observation is that the gap between the information literacy skills of high school and college students in the settings we observed seems large. Although the high school students were in their final semesters of high school, they did not seem ready to approach the information tasks required in college. The college students, for the most part, were also nearing graduation. The stories they contributed relating to their information literacy backgrounds indicate that our observations of high school students were not far off the mark. We can only surmise that the college students had bridged the gap while in college, and often as a result of their own trial-and-error efforts.

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Chapter 14

Publication Options for the School Library Media Researcher

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Research and publication are considered to be of substantial importance in the academic community. Library and information science, which follows a graduate program model, uses research and publication as the primary criteria for the evaluation of faculty (Blake, 1994). Consequently, where one chooses to publish will have compelling implications for promotion and tenure as well as establishing a reputation in the field. This Treasure Mountain session focused on an overview of publishing in the field of school library media as well as in-depth analyses of the advantages and disadvantages of publishing in different venues.

Advice to Doctoral Students

Guidelines developed by Motes (1989) to prepare doctoral students in meeting future publishing demands provide a framework for discussion of publication options of prospective educators in school library media.

1. Be aware of your strengths and weaknesses. In seeking initial employment as a school library media educator it is important to attain a good fit between the publication expectations of the institution and your own self- interests. The balance between research and teaching will vary between large Research I universities, which traditionally have high publication standards, and smaller colleges, which may focus on curriculum. Fortunately, there are current job openings in almost all types of settings.

2. Become familiar with promotion and tenure criteria. Promotion and tenure performance criteria as they relate to research are not always clearly communicated even when they are presented in written form; substantial room exists for individual interpretation. For example, the stated standard may specify that you must publish in refereed journals, when what is actually meant is to publish in Level A journals only (Motes, 1989). Promotion and tenure criteria may also change as higher-level administration changes. A school can increase its research expectations dramatically based on the proclivity of a new president or provost (Wilson, 2001).

3. Establish a workable research and publication strategy. Although there are different expectations at different academic institutions, a popular paradigm emphasizes the submission of research results to what are considered to be the leading journals in the discipline, and if rejected, the manuscripts being directed toward journals in the same category and then to those of less stature (Motes (1989). This "trickle down" approach takes a great deal of time and effort and may result in little or nothing to show during your first three to six years in the profession (Motes, 1989).

4. Pursue both quality and quantity. As a new professor you will be expected to do both. An advantage of research in school library media is that it can be presented to different audiences with various focuses. This author's dissertation research, presented in Table 1, has been adapted for nine publication venues over an eight-year period.

5. Develop a balance between co-authored and single-authored publications. Co-authoring, more of an issue in the pure sciences, can be advantageous in making the transition from doctoral student to faculty member. By pairing with established researchers in the field, you can increase productivity. A disadvantage exists in determining how workloads are allocated – a problem not encountered with single-authored manuscripts (Motes, 1989).

6. Try to become known for something. Name recognition, and a reputation for quality work and significant contributions are goals we would all like to attain, yet to do so generally requires a substantive research focus (Motes, 1989). It is easier to accomplish these goals by selecting a topic you are passionate about and developing related research strands. Carol Kuhlthau's extended concentration on research of the information search process can serve as model to school library media faculty.

7. Recognize that you can publish but still perish. Motes (1989) points out that you might be denied tenure if your publications are primarily in journals that are perceived to be of low quality or if the majority of those articles deal with a topic outside your primary discipline. Also, research interests may have to be altered to suit the position for which you have been hired.

8. Be aware of other collegial sensitivities and views. Biases will exist within your department. In our field, these biases can be aligned with library science, information science, computer science, communications, information technology, education, and even type of information setting. The tendency also exists to assess research quality based upon perceived prestige of professional journals (Tjoumas & Blake, 1992). It may be ultimately more important where you publish than what you publish.

The concept of journal prestige in library and information science has been found to be ambiguous within the sub-specialty of school library media. Library and information science faculty with a specialty in school media had a perceived hierarchy of prestigious journals (Blake, 1991) that differed markedly from that of deans of schools of library science (Kohl & Davis, 1985). When participants of this Treasure Mountain session were presented with the conflicting lists, they reached many of the same conclusions as Blake (1994):

- School library media faculty are at a disadvantage for tenure and promotion because their traditional publishing outlets are not deemed some of the most prestigious by deans. Mentors who are preparing for tenure and/or promotion expressed concern about the need to educate members of committees about the value of these traditional school library media publications.

- Some of the publications regarded as most prestigious by deans are not likely publication avenues for school library media faculty due to their limited scope (*College and Research Libraries* and *Special Libraries*) and that none of the six of the ten most highly respected had published a significant number of articles concerning school library

media centers in the six-year period of the Blake (1994) study. Since 1994, several of the publications on the Kohl & Davis (1985) list have solicited submissions in the area of children and youth and school library media centers. Although it may be more difficult to publish in some of the more general library and information science journals, an attempt must be made to expand to them to facilitate tenure and promotion.

- Both lists of perceived journal prestige (Blake, 1991; Kohl & Davis, 1985) need to be updated to more accurately reflect the current status of school library media faculty and deans' perceptions of journal prestige as well as incorporating journal titles which have emerged since 1991.

Publication Options – Advantages and Disadvantages

Beyond implications for tenure, promotion, and gaining a reputation in the profession, there are distinct advantages and disadvantages to publishing in each of the various venues that are available to school library media academics. In order to facilitate discussion between the mentors and scholars in this session, the entire group was asked to brainstorm a list of publication options. The audience's responses included:

- refereed journals;
- conference proceedings;
- book chapters;
- reviews;
- reference work contributions;
- technical reports;
- books;
- edited journals; and
- web-based resources.

Participants were divided into discussion groups based on a type of publication. A mentor led the group in identifying advantages and disadvantages to each type of publication.

Refereed Journals

Advantages:

- Holds the most weight for publication of research.
- Holds the most weight for prestige.
- Holds the most weight for promotion.

Disadvantages:

- Few in the school library media field – (*School Library Media Research* and *School Libraries Worldwide*).
- Many practitioners do not read experimental articles.
- Time consuming to develop and write.

Conference Proceedings

Advantages:

- Easy to publish in.
- Dual benefit of presenting at a conference as well as gaining a publication.
- Might be refereed – specify on your CV.
- May turn into another publication opportunity.

Disadvantages:

- Not always disseminated broadly; ordinarily doesn't reach practitioners.
- May be looked upon as less rigorous for promotion and tenure.

Book Chapters

Advantages:

- Allows for specialization on a topic.
- Aligns you with a group of scholars who may be well known in that subject area.
- Good preliminary step to a book.

Disadvantages:

- Published in editor's name.
- Research I universities do not always recognize (dependent on who referees).
- Contribution gets lost.

Reviews

Advantages:

- Get to read great material and keep the book.
- Short amount of time to produce; little effort.
- Service to the profession.
- Visibility and autonomy.

Disadvantages:

- Not much tenure credit.
- Eats up time and can distract you from y our focus.
- Heavy editing in some journals.
- May have to be more positive to get published.

Reference Work Contributions

Advantages:
- Inclusion in a work signals prestige.
- Provides opportunity to synthesize and integrate a body of research.

Disadvantages:
- May have to wait to establish your reputation before getting invited to contribute.
- Contribution may be buried.
- Unevenly weighted; valued importance may vary by school.

Technical Reports

Advantages
- May be able to publish later in a journal.
- Lack of space restrictions allows for inclusion of all data and tables.
- Satisfying for an author; can supply considerable detail.

Disadvantages
- Not widely disseminated.
- Not indexed widely.
- Not peer reviewed – or at least not blind review
- Not always useful for tenure.

Books

Advantages
- Easy to get a book contract.
- Practitioners' text will reach greater audience.
- May get you known for something.
- Royalties
- Publisher provided "support team."

Disadvantages
- Time and labor intensive.
- Who publishes the book is a concern.
- Ancillary tasks – proofreading, indexing.
- Contractual issues
- Editorial process may make refining work more difficult.
- Limited number of publishers.

Edited Journals

Advantages
- Read by practitioners.
- Not "pure" research.
- Economics – price of journal is cheaper.
- If electronic, much more widely accessible.

Disadvantages
- Not read by tenure and promotion committees.

Web-Based Resources

Advantages
- More are being indexed in reputable indexes.
- Peer-reviewed journals are becoming web-based.

Disadvantages
- New – varying degrees of weight with tenure committees.
- Uncertain – may be removed.

There are numerous publication options available to school library media academics. In addition to the traditional outlets in the field of school library media and library and information science, articles can be directed to journals in the field of education and its divisions – administration, reading, and even curriculum areas such as social studies or science. The emphasis on these other fields will be determined by the propensities of one's department, college, or school. Publishing does not necessarily have to begin with a completed dissertation. Initial dissertation chapters, such as the literature reviews and significance of the research, generate interesting reading, discussion, and contributions to the profession.

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TABLE 1

Publications related to *An Analysis of the Work Activities of High School Library Media Specialists in Automated and Non-Automated Library Media Centers Using Work Sampling* by Nancy Everhart, Florida State University, 1990.

Peer-Reviewed Refereed Journals - International and National

(2000). Time use of school library media specialists: A review of the research. *School Libraries Worldwide*, *6* (1), 66-88.

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Edited Journal – National

(1993). Time for What? *The Book Report, 12*(2), 21-23.

Refereed Journals – Regional

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Book Chapters

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TABLE 2

Comparison of perceived journal prestige between library school deans and school library media faculty.

Average Rankings Library School Deans (Kohl & Davis, 1985)

1. *Library Quarterly*
2. *JASIS*
3. *College and Research Libraries*
4. *Library Trends*
5. *Journal of Education for Library and Information Science*
6. *Library Resources and Technical Services*
7. *Special Libraries*
8. *Information Technology and Libraries*
9. *Journal of Academic Librarianship*
10. *Journal of Library History*
11. *Library Journal*
12. *RQ*
13. *School Library Media Research*
14. *American Libraries*
15. *School Library Journal*

Average Rankings School Library Media Faculty (Blake, 1991)

1. *Journal of Education for Library and Information Science*
2. *School Library Media Research*
3. *Library Trends*
4. *Library Quarterly*
5. *School Library Journal JASIS*
6. *Journal of Youth Services in Libraries*
7. *Library Journal*
8. *College and Research Libraries*
9. *Journal of Academic Librarianship*
10. *Library and Information Science Research*
11. *V.O.Y.A.*
12. *Teacher-Librarian*
13. *Library Resources and Technical Services*
14. *Public Library Quarterly*
15. *JASIS*
16. *Journal of Youth Services in Libraries*
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24. *Public Library Quarterly*

Treasure Mountain and Judy Pitts Scholars Biographical Profiles May 2002

Candace Aiani

My work, my interests, my projects, and my hopes for the future are literally and figuratively "global."

My current position is with Taipei American School in Taiwan. This is my third year in an overseas school, a situation that presents some unique challenges in providing access to information. The effort to meet those challenges has required that I expand my own definition of a school library, and encouraged me to push for services that might be considered outside of what is traditionally necessary in an urban high school, services such as document delivery and participation in the host-country, information-sharing network.

Another challenge for overseas librarians that is not unique, but perhaps exaggerated by oversea work, is a sense of professional isolation and a lack of readily available professional development. To combat this problem, I am working on a project right now with a small group of international librarians to establish support for a new consortium called Schools International Library Consortium (SILC-Asia). This exciting grassroots effort is gaining momentum and the benefits to libraries across Asia and the Pacific Rim are tangible.

My hopes for the future include continuing the exciting work that I have found with the international library community as well as enjoying personal opportunities for travel and exposure to diverse cultures.

Joan Bessman

As a doctoral student in Library and Information Science, Assistant Program Coordinator of the School Library Media Program at the University of Illinois at Urbana-Champaign, and a former middle school language arts teacher, I am highly invested in examining and promoting reading in its varied though often elusive roles. I am interested in reading as a method of information seeking and as a source of entertainment, but view reading practices as much more dynamic than these categories connote.

My research agenda is currently focused on an ethnographical investigation into the daily reading practices of actual rather than theorized persons, an investigation into the practices that should inform the creation of information systems, educational methods, and services for real readers of all ages. Using collective reading (i.e. book discussion groups or literature circles depending on the population) as my point of access, I intend to study how and why people read, why people make the reading selections they do, and how the spread and use of technology transform the act of reading.

As an educator in Library and Information Science, I hope to bring an awareness of reading practices to the education of our field's future leaders, particularly those striving to cultivate and assist lifelong readers.

Lourdes Cervantes

I have recently been named the librarian for a new elementary school in my district. Working directly with teachers and students in a library setting will provide me the opportunity to explore the integration of curriculum and information science. My previous experience as a classroom teacher has shown me the importance of information literacy and the need to instruct students in the skills needed for information seeking. My Masters in Education is in Instructional Technology and I am currently seeking a PhD in Information and Library Science with an emphasis in curriculum integration.

My research interests are the integration of information science, technology, and curriculum to insure that students are provided the opportunity to learn how to find information and use this information to solve problems. Developing projects that integrate technology and information seeking in a meaningful setting so that students can learn lifelong information literacy skills is one of my highest priorities. Training teachers to become knowledgeable in information seeking strategies that they can pass on to their students is also part of my objective. I feel that participation in Treasure Mountain expands my knowledge base and provides the opportunity to network with others taking part in similar research projects.

Jinsoo Chung

I am currently a Ph.D. candidate at College of Information Studies, University of Maryland. I am originally from Korea where there was no school library media program in its formal educational system when I left the country. As I have been studying for my advanced degree here in the States, I have found that the school library media program was one of the critical educational elements that was missing during my formal education in Korea.

My interest then shifted to the issues related to children's use of information for learning and I am passionately pursuing this interest now. My dissertation, "Information Use and Meaningful Learning," which is currently in progress under the guidance of Dr. Delia Neuman, deals with how high school students seek and use information to learn. I believe "how children learn by using information and how they learn differently using different information sources" are some of the crucial questions that we need to explore more, particularly since we are dealing with a great amount of information in a variety of formats everyday.

My MLS is form the School of Library and Information Management, Emporia State University, and my BA is from Sung Kyun Kwan University, Seoul, Korea.

Stephen DelVecchio

I have over twenty years of experience as children's librarian, school librarian, and teacher. After serving for several years as a children's librarian in the Bronx and East Harlem, I was selected to be the Pilot Project Director for the New York Public Library (NYPL) and DeWitt Wallace Reader's Digest Foundation's Connecting Librarians and Schools Project (CLASP). In that capacity, I helped develop a pioneering program that has since been publicly funding and expanded to all three of New York City's public library systems. At the Family Academy, an innovative public school in Harlem, I established the school's library and worked closely with the National Book Foundation and the Harlem Writer's Guild to design and run a model author residency program.

I have Master of Science degrees in both Library Service (Columbia University) and Telecommunications and Information Management (Polytechnic University). My articles and reviews have appeared in Wilson Library Bulletin, School Library Journal, and Teacher Magazine. For two years I was a contributing writer and children's book columnist for Teacher Magazine. Prior to entering librarianship, I served as a Peace Corps Volunteer, teaching junior high and high school mathematics and science in Fiji.

I am now a first year Ph.D. student at the Information School of the University of Washington in Seattle and a research assistant on the Keeping Found Things Found research project. My research interests include children's everyday life information behavior. I hope to pursue work as a research and teacher that will support and strengthen our ability to serve children's information needs as children's librarians, young adult librarians, school librarians, teachers and parents.

Judah Hamer

I've worked in libraries since high school. Student teaching taught me that I didn't want to teach English. Public and school librarianship would be far more diverse and challenging, I though, especially since funding can be so precarious. For four years I was a middle school media specialist. At the same time I earned my M.L.S. and managed to survive the $1.2 million construction project that became our new media center. As the Young Adult Services Coordinator for Bergen County Cooperative Library System, I often get to the committee member whose employer actually makes it easy to attend meetings. Recently I've helped rewrite the *Guidelines for Young Adult Services in Public Libraries in New Jersey* and implement our state library's *Symposium for Youth Services*. This spring I'll co-present a program on school-public library cooperation to the Long Island Library Association.

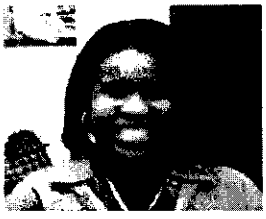
While I love serving patrons, I'm increasingly drawn to analyzing people's information seeking behavior. I believe that acquiring new information plays a key role in self-actualization. When I'm trying to avoid clichés, I just say *knowledge is power*. For instance, if I had known as a gay adolescent that there were lots of other guys like me, I surely would have had a much fuller social life. If someone understood the real or perceived barriers to filling relevant information needs that existed for me, I might have felt empowered. I'm still interested in looking at how gay adolescents find information. However, I'm more intrigued by the information seeking behavior of *all* males, because I suspect the social and psychological patterns influencing this area of male lives supersede the matrix of male sexuality. Learning more about the ways males interact with information providers and systems will provide valuable insight for research in other disciplines, and by agencies and individuals concerned with male behavior.

April Hatcher

I am a junior high school library media specialist in the Three Village Central School District in New York. Prior to becoming a school library media specialist, I was a children's librarian in the public library system. I am a history buff and an avid reader with a special interest in historical fiction and multicultural children's literature. An aspiring writer, I am currently working on a historical novel about African American pioneers.

I have a Bachelor of History degree from the State University of New York at Stony Brook, and a Master's degree in Library Science from St. John's University in New York. I am currently pursuing a doctorate in Information Studies at C.W. Post-Long Island University as well as post-graduate certification in Education Administration from the State University of New York at Stony Brook.

In the future, I hope to become a professor of Library and Information Science with a specialty in school library media. My interests in this area include collection development, information literacy, and the use of educational technology. I am also interested in the evaluation of library services. My doctoral research focus is on the role of educational administrators in school library evaluation. I hop that my work in this area can help improve overall school library services.



Joquetta Johnson

I am the Library Media specialist, Technology Liaison and Webmaster for Milbrook Elementary in Baltimore, MD. I am also an Adjunct Faculty Member at Baltimore City Community College and Master Teacher for the National Teacher Training Institute. Recently, I was selected to serve as a member of the Elementary Dance Curriculum Writing Team. In 1999, I was a Fellow in the 1999 Maryland Technology Academy and nominated for the Computer Educator of the Year Award. I have presented at local, regional, and national conferences and workshops.

I received a BS in Telecommunication from Morgan State University and completed graduate studies in Mass Communications at Towson State University. Afterwards I taught Developmental Reading and Speech 101 at the Community College of Baltimore. In 1994 I began my career as a Media Specialist in Baltimore City Schools, switching to Baltimore County in 1998. I will receive my MS in Library Media in May 2002 from Western Maryland College and plan to pursue a PhD next fall.

I recently completed "The 3 R's of Diversity: Race, Religion, and Region—Resources and Materials for Teaching an Education That's Multicultural." This project is an annotated bibliography intended for classroom teachers, library media specialists, reading specialists, and ESOL teachers.

Kym Kramer

I have been in public school education for 13 years. I taught second and third grade for six years before becoming a media specialist seven years ago. As a classroom teacher, I held the philosophy that students learn most effectively when subjects are integrated. Luckily early in my career I discovered there is a particular teaching philosophy called Integrated Thematic Instruction (ITI) that validates my beliefs. After just nine years of working in more traditional schools with fragmented curricula, I was hired as a

media specialist at Fishback Creek Public Academy. I am currently part of a staff that shares the vision of integration, and my school is a recognized leader in ITI. It's a perfect fit for my views on effective education.

Changing to the field of media allowed me to further broaden my thoughts on what integration can encompass. During the past two years, I have developed and refined the *Dream Weavers* integration model that allows multiple curriculum areas to be integrated around a core project. Thus, specialty areas such as art, music, and physical education are intertwined with classroom curricula for up to twelve weeks at a time. This area of professional investigation continues to be refined project after project.

Denise Levitov

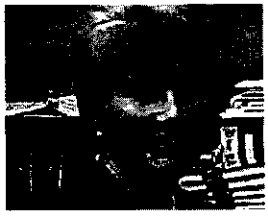
I am Coordinator for Library Media Services for Lincoln Public Schools in Lincoln, NE, a district of over 30,000 students with 51 schools. Before moving to the central office position ten years ago, I served as a school library media specialist at both the elementary and secondary levels. My main focus as Coordinator is making curriculum and instructional connections through the integration of information literacy skills and the use of resources, using a research process. I coordinate related staff development opportunities for teachers and library media specialists.

I served as the staff development coordinator for a Dewitt Wallace Reader's Digest Library Power Initiative from 1993-1997. I was also the co-chair for the Nebraska Information Power Committee. On that committee, I helped secure a $79,000 IMLS Grant entitled "Librarians Online to Information Literacy" and assisted in developing an online course for library professionals in Nebraska through that grant. I am active in her state professional associations. I also helped in the publication of two books, *The Lincoln Public Schools Guide to Integrated Information Literacy Skills*, Lincoln Public Schools, 1999-2002, and the *Guide for Developing and Evaluating School Library Media Programs*, Libraries Unlimited, 2000.

I have a B.A. in Social Work with an Elementary Teaching Endorsement and a M. Ed. in Educational Administration with a Supervisory Certificate, K-12 and a Library Media Endorsement, K-12 from the University of Nebraska. I am in the process of applying to doctoral programs.

Cory Little

I am a middle school social studies teacher who recognized the unrealized potential of most school library media centers, particularly at the elementary and middle school levels. Knowing that it is difficult to champion a cause that one is not part of, I returned to school for my K-12 School Library Media certification and capped that with a Masters degree in Instructional Technology. Still not ready to take on the forces against change, I took a one-year sabbatical and started a doctoral program in Instructional Technology through Utah State University. Rushing through my coursework, I plan to begin dissertation work this fall on the role of school library media specialists. My goal is document the value of a robust school library media program and lobby for increased support of both secondary and elementary programs at local, district, and state levels.



Mary Frances Long

I have been the teacher-librarian to a student body of over 1,000 students and 100 staff at Wilson Middle School in Plano, TX for the past nine years. I serve as chair for the campus' Technology Committee, chair the Technology Subcommittee for the campus' School-Based Improvement Committee (SBIC), and am the Webmaster for the school.

I created and sponsor three book discussion clubs for students and one for staff members who read and discuss two to three young adult books a month. I also encourage student writers through a creative writing club I sponsor and I involve students in planning library programs and activities through the Library Teen Advisory Board (TAB).

Currently, I chair the Margaret A. Edwards Award—2002 committee sponsored by YALSA/ALA and co-chair one of the component committees revising the school library standards for the State of Texas. I have also chaired YALSA's Quick Picks for Reluctant Young Adults Readers and on the state level chaired the Texas Lone Star Reading List Selection Committee, creating annual recommended reading lists for middle schoolers. In 1999, I was honored as a TALL Texan and attended the leadership development program sponsored by the Texas Library Association.

I earned my MLS from Texas Woman's University. I am currently working on my doctorate in education at Nova Southeastern University.

Marcia Mardis

I am a former K-12 media specialist in Michigan and Texas. Currently I am an Internet and Information Media Specialist at the Center to Support Technology in Education at Merit Network, Inc. at the University of Michigan (Ann Arbor). I serve as the Project Director for Michigan Teacher Network, a clearinghouse for K-12 educators, and as the Co-Principal Investigator of a National Science Foundation digital libraries project.

I am also on the faculty of the Department of Teacher Education at Eastern Michigan University's College of Education. I teach graduate educational media and technology courses. In addition, I am pursuing doctoral studies in the Department of Educational Leadership. I have published and presented widely on my passionate interests of Web searching, information literacy, and school library media advocacy issues.

Janet Martin

I am a third-year doctoral student in the Instructional Technology Department at the University of Georgia (UGA). My activities as full-time doctoral student include serving as Secretary of the Instruction Technology Student Association, serving on the School Library Media Pre-Service Program Advisory Board, and teaching three undergraduate classes as instructor of record. My honors include induction into Kappa Delta Pi Honor Society, receipt of the State Normal College Scholarship, receipt of the Armed Forces Communications and Electronics Association Scholarship, and publication of feature articles in *School Library Media Activities Monthly* and *Teacher Librarian.* I believe my greatest honor was receiving outstanding course evaluations from undergraduates enrolled in my classes! I want to contribute in significant ways towards forwarding racial diversity in library schools through my academic work and research.

Before attending UGA, I worked as a 6th grade teacher and elementary school librarian while earning my MLIS degree from University of South Carolina. My creative and innovative energy as a librarian brought media coverage to my Title-I school on several occasions. My fondest memory as a school librarian was when author Dori Sanders celebrated Children's Book Week with my students.

Nancy McGriff

Currently I am the K-12 media specialist for South Central Community Schools in Union Mills, IN. I was President of the Association for Indiana Media Educators (AIME) and I currently am the chair of AIME's Information Literacy Skills Task Force. In 2001, I was awarded the Peggy Leach Pfeiffer Service Award by AIME. Additionally I am a member School Library Media Specialist Leadership Cadre of the Indiana Department of Education.

Claudette McLinn

As supervisor of Title VI Library Nonpublic School Services for the Los Angeles Unified School District, I believe that the purpose of the library program is to promote literacy serve the underrepresented populations. "Librarians are powerful change agents who must take into their heart to actively learn and embrace the needs of their customers and to satisfy their customers individually."

I participated on the California Department of Education's working committee to revise the state's *Recommended Literature: Kindergarten through Grade Twelve*. I served on the boards of the California School Library Association and the Los Angeles School Library Association. I was recently appointed to the ALA's Council Committee on Cultural Diversity and served as liaison member on the ALA Special Presidential Task Force on the Status of Librarians, which produced a final report addressing the status and salary issues related to librarians.

I am currently a doctoral candidate at Pepperdine University specializing in Organizational Leadership. I received a B.S. in Education and M.S. in Library Science from Wayne State University, and M.S. in Education Administration from Pepperdine University. I am an expert in the area of children's multicultural literature and plan to publish and lecture on this subject.

Sharon McQueen

I am a doctoral candidate at the University of Wisconsin - Madison, School of Library and Information Studies. I hold a doctoral minor in Early Childhood Education, with an emphasis on Emergent Literacy. My areas of interest include: Library Services for Youth, Emergent Literacy, Librarytime (Storytime), Children's Literature, Young Adult Picture Books, and Homeschoolers & the Library.

I have taught in the graduate programs of both the University of Wisconsin – Madison (Children's Literature) and the University of Wisconsin – Milwaukee (Public Libraries). I have also presented on Young Adult Picture Books for The University of Wisconsin – Madison's biennial children's

literature conference. I have served as the Convener of the Doctoral Students SIG (Special Interest Group) for ALISE (Association for Library and Information Science Education) and currently serve on the ALISE Membership Committee. I am pleased to serve on the Planning Committee of LRSII (Library Research Seminar II), which will be held in Kansas City, MO, in October of 2004. My first book, *In-House Book Binding and Repair*, is due to be published by Scarecrow Press.

Prior to my decision to pursue a career in librarianship, I was a professional theatrical. I enjoyed a successful, fifteen-year career as a performer, director, artistic director, and producer. At twenty years of age I moved from Wisconsin to New York City, where I procured an agent within two weeks and produced my first off-Broadway show within five months. Upon returning to Milwaukee, I founded my first theater company. In 1984 I founded my second theater company (currently operating under the name Next Act Theatre) and served for seven years as both the company's Artistic Director and Producer. I believe that my former career will serve me well as I continue to grow in the library world.

Erin Meyer-Blasing

I expect my Master's degree from the University of Wisconsin-Madison School of Library and Information Science (SLIS) this August and will begin the doctoral program at SLIS in the fall of 2002. I currently hold a Project Assistantship as a solo librarian at the Woodman Astronomical Library and plan to continue the assistantship throughout my doctoral studies.

My areas of research interest include bibliographic instruction, reference service, information seeking behavior, and the history of library service as well as service to marginalized groups such as those with limited English and incarcerated populations. I have been a volunteer with the Jail Library Group since the fall of 2000 and enjoy providing library service and programming to the inmates of two Dane County jails. I held the position of group Coordinator from December 2000 to January 2001. I recently presented a workshop on Internet resources for librarians serving Spanish-speaking patrons to public and school librarians from throughout the Midwest.

In the realm of school media research, I have interests in children's and young adult literature (particularly multicultural literature) and intellectual freedom issues. Recently, I assisted Dr. Dianne Hopkins with a study of challenges to materials in Wisconsin school library media centers. This summer I will be taking a course on action research in school library media centers.

Gabriella Miller

I received my BS from Syracuse University in Communication Disorders and my MS from the University of Pittsburgh in Speech Pathology. I am currently employed as a speech/language pathologist in a school district located north of Pittsburgh, PA. I spent many hours in the library researching lessons for my students and developed a wonderful working relationship with the middle and high school librarians. This was the impetus to my taking a sabbatical leave so that I could pursue an MLIS degree from Clarion University.

As I progress in the library science program, I find that my mind still focuses on how this degree can assist me in helping students with learning needs find enjoyment in reading and improve their literacy skills. I am interested in utilizing current theory and technology to capture the interest of reluctant and struggling readers so that their learning experience is more successful. By

developing lessons in which multiple formats are used and collaboration between teachers is emphasized, I believe that more children will become enthusiastic readers and library users.

Christina Petrus

The growing importance of information literacy in our society, as well as interest in computer and Internet technologies, love of literature, and pleasure working with children resulted in my decision to pursue the M.L.S. with school library media certification. Last year, I had the opportunity to work as a school library media specialist (SLMS) long-term substitute teacher for three elementary schools in a suburban town in Connecticut. The experience afforded me firsthand knowledge of some of the issues facing today's SLMS including the need to promote the value and technique of collaboration between the classroom teacher and SLMS.

After completing the school year at the suburban town, I pursued my degree full-time. This year of full-time study has allowed me to conduct research on school library media topics and co-organize a conference on collaboration. With Dr. Mary E. Brown, Principal Investigator, I am examining the perceptions of teachers, administrators, and SLMSs on the role of the school library media program in the overall educational mission of the school and on standards that should be adopted in support of that role. The Conference on Collaboration was created, with fellow student, Ann Johnson, to promote the profession and increase communication and understanding between the education community and SLMSs. Specific objectives included describing and modeling teacher/librarian collaborations, discussing ways to market the SLM program and specialist, and examining how to create strong relationships with administrators (http://www.geocities.com/ct_school_media/index.html).

Leslie Preddy

I have spent ten years as a school library media specialist at Perry Meridian Middle School in Indianapolis, Indiana. I feel that the support I receive from my building administration has given me ideal working conditions. That support has given me the freedom to take on a leadership role and work tirelessly to help her school to incorporate information literacy, write and implement grants, develop high-level collaborations, and participate in professional growth opportunities.

Since 1998 I have remained on the board of the Association for Indiana Media Educators (AIME) in a variety of roles. Among my volunteer commitments, I have served as the Young Hoosier Book Award Chair, regional Media Fair host, and organized the first annual AIME College Scholarship Fundraising Auction. Currently she is AIME Vice President and 2002 state conference chair.

I am a participant of the Indiana Department of Education-Office of Learning Resources SLMS (School Library Media Specialist) Leadership Cadre. Among the professional development opportunities this has afforded me was a chance to develop a program to facilitate schools, classroom teachers, and library media specialist's integration of student inquiry in the research process, which is currently being tested in five K-12 schools throughout Indiana.

Lorine Sweeney

I am from Vermilion, Alberta, Canada, and I am presently employed as School Improvement Coordinator for a rural school division near Edmonton, Alberta. I have been a teacher and teacher-librarian for many years in the division and continue to be interested in designing library programs and facilities suited to unique demands of students. As part of my present school improvement duties, I am working with a team responsible for assisting teachers in the integration of the information and technology curriculum with the core curriculum.

My MEd thesis involved a study of teachers and teacher-librarians working together and I continue to believe in the strong benefits of this collegiality. Presently I am enrolled in a doctoral program through the faculty of Elementary Education at the University of Alberta. I am interested in seeking insight into the experiences of teachers and students who have participated together in technology-related professional development activities. I believe in working together as a school community, and in the area of technology I think that students and teachers learning together has the potential to be both motivational and rewarding. Students are a huge untapped resource!