

# Evolution of Methods to Measure Student Information Use

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Over the past decade, there has been an increase in the application of the case study method to investigate the process used by students in secondary school and undergraduate academic settings to locate and use information through the library. The case study method has, in most recent years compared to investigations of 20 to 30 years ago, become established as the primary research technique used to document student thought processes in topic focus and in source selection. Direct observation and interviewing successful library users, two tools common to the case study method, may also lead to examination of student selection and critical use of evidence for research projects as students move beyond the traditional library collection. These tools have also proven to be useful as researchers in recent studies are more interested in an analysis of student use of information as evidence rather than conducting studies which only document student location and citation of resources. Selected studies which illustrate this evolution are drawn from the dissertations and field studies related to secondary school and undergraduate bibliographic instruction.

Thirty years ago a critical review of library science research would include the charge that it was fragmentary and noncumulative, and there was heavy use of the survey method (Ennis, 1967). The high use of questionnaires was attributed to the researcher's desire to address immediate and local problems, and to conduct a survey tailored to specific needs. Surveys, however, were often carried out in isolation without the context of related research, concerns were often parochial, and the results not generalizable. Stroud (1982), after examination of over 100 dissertations defended between 1940 and 1980 related to school librarianship,

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concluded that survey research was most likely the favored method because it allowed for gathering of the data most desired during that time period. Baseline data which provided a reading on the number of items and description of holdings tended to represent the issues important to researchers. Questions concerning student actions and thoughts related to information use were not being raised. Further, it might be speculated, survey methods provided bulk or large numbers of responses and seemingly hard data. Qualitative methods, such as the case study, may have represented a softer and less expansive study than required by most dissertation chairs at the time. The research questions, however, have changed in the school library media field. This change is seen through an evolution of acceptable and favored methods for conducting dissertation studies, including the understanding of the value of data-rich case studies.

This article will illustrate the evolution from the dominance of the survey method to a growing acceptance of other methods in dissertations related to the study of school library media—especially, increased use of the case study approach. Much of the research in this field is represented by dissertation work, although there has been growth in the publication of research articles pertaining to this field since 1980 (Grover & Fowler, 1993). Associated with this evolution is a similar change in the greater attention given to qualitative case study application in the studies conducted in the practicing academic librarian field, especially related to bibliographic instruction. When examined through the shifts represented by school and academic settings, the most recent research questions appear to be more focused on what determines the actions and decisions of the student's behavior as learner. Earlier questions, prior to the mid-1970s, were centered on description of the facilities or collections which were expected to determine those actions with little consideration for student decision making.

## **EVOLUTION IN SCHOOL LIBRARY MEDIA DISSERTATIONS**

### **Shift from Survey to Case Study**

In 1991, Fitzgibbons and Callison reported that the percentage of dissertations related to the school library media field which were based on a survey methodology had increased during the 1980s to 77%, from the 56% reported by Stroud (1982) for the 1970s. The same comparison of these two decades indicated that there was little change in the percentage of studies written through use of historical methods (8% to 10%), and little change in the percentage of researchers who had employed an experimental methodology (6% to 8%).

Use of personal interview techniques received little attention during the 1970s as an acceptable method to obtain descriptive data. Survey studies were constructed almost exclusively on the written mail questionnaire. The use of case studies for in-depth observation was not identified as a methodology for school library media research in the 1970s. The method was not employed in any dissertations during

this time period. Fitzgibbons and Callison found the 1980s to be a decade in which greater use of interview techniques and isolated case studies were acceptable methodologies, although infrequently used. Of the 145 dissertations examined for the 1980s, 4% were written based on the application of personal interviews as the primary data gathering technique, and 3% of the 145 researchers employed the case study method.

Grover and Fowler (1993) based their data gathering techniques on the Fitzgibbons and Callison study of dissertations, but expanded the analysis pool by concentrating on journal article research publications related to school library media. Grover and Fowler found the questionnaire to be the dominant methodology in studies concerning technology, the library media specialist, and the library media center. They suggested, however, that there seemed to be an emerging trend in the use of multiple methods employed by many researchers during the 1980s to study the student information search process. They concluded that the information search process had been the dominant topic in research on school library clientele in journal articles since 1980, and that these studies were qualitative in nature with little attention to quantitative measures.

Recently, Callison (in press) conducted an analysis of dissertations related to school library media which were written between 1989 and 1995. His analysis showed a dramatic increase in the use of the case study method (Table 1), as well as a substantial increase in the number of dissertations based on experimental methods. The frequency of the use of the mailed questionnaire survey method was nearly half what it was in the previous decade. Content analysis also dramatically increased, while employment of historical methods and citation analysis declined. The shifts were similar regardless of the discipline area for the dissertation, educational administration or educational theory application (Ed.D.) or research and philosophy in education or library science (Ph.D.).

**TABLE 1**  
**Comparison of Research Methods in Ph.D. to Ed.D. Dissertations**  
**Related to School Library Media, 1980-1995 (Reported in Percentages)**

Method	Ph.D.	Ed.D.	Ph.D.	Ed.D.
	1980-88 <i>n</i> = 80	1980-88 <i>n</i> = 88	1989-95 <i>n</i> = 73	1989-95 <i>n</i> = 40
Survey Questionnaire	63	81	39	41
Interview	05	03	04	10
Citation Analysis	09	02	01	00
Content Analysis	00	02	15	15
Case Study	03	00	23	13
Historical	12	05	03	02
Experimental	09	07	14	19

### **Influence of Citation Analysis Method**

A bridge between frequent use of survey methods to case study methods seems to be employment of citation analysis. This represents a natural evolution in the questions raised related to student use of information. Citation analysis was the method used by Drott and Mancall (1980) to measure the use of various types of materials by high school students to complete typical independent study papers. Mancall had used bibliometrics, citation analysis, as the research method for her dissertation in 1979. Describing their application as a direct measurement approach, Drott and Mancall completed a series of articles to demonstrate that examination of the student's bibliography would reveal, to some extent, the kinds of materials students prefer and help media specialists determine areas of the collection that should be enhanced to support basic student research paper assignments.

Several of their findings set the stage for further studies concerning student selection of information. They noted that students tended to ignore the age of materials; students seek resources from a variety of library collections, not just the school library; students tended to be unaware of some types of special resources within their own school library; and students tended to favor books and magazines. Conclusions indicated the need for greater instruction of students in wider information access and more critical thought concerning source selection and use.

Further, their studies demonstrated that examination of the actual practice of the student within an environment which had not been manipulated by the researcher can lead to a wealth of data to identify problems often hidden from those who must devote their attention to the day-to-day operations as the library media specialist. Methods practiced by Drott and Mancall seemed to open the door to meaningful research of the natural environment and examination of student actions. Their citation analysis of student products was key to moving researchers closer to understanding that different methods were needed for reasonable analysis of user behavior.

### **Observations in a Natural Setting**

Kuhlthau demonstrated the value of the case study method in her observations of the library research process as practiced by 27 high school seniors. Her doctoral study, completed in 1983, included the use of extensive personal interviews of each student in order to document tasks, feelings, and directional needs at several stages of the research process. Kuhlthau's publication of *Teaching the Library Research Process* (1985), established another key piece of the foundation for documenting the actual student practice in information selection and use within a natural setting. Her findings included description of student anxiety and insight as they moved through the decisions for the research process. Interventions and actions for library media specialists and other teachers to enhance the process were identified and introduced.

Citation analysis and the case study method would be used by several researchers in the mid-1980s as questions were examined concerning the information retrieval behavior of students as well as their final use of selected information. There was a steady increase in the emphasis of the qualitative methodology over quantitative measures as students at various grade levels were observed in "natural settings" and depicted in "normal library activities" to determine the learners' actions in dealing with information search, location, and use.

Studies in the late 1980s were dealing specifically with the impact of the emerging computerized information tools and resources. Documented application of the citation analysis method and the case study method influenced these studies conducted from the mid-1980s through the current 1990s.

Callison and Daniels (1988) piloted the first use of the H. W. Wilson WilSearch software with high school students in 1987. Observations of and interviews with the more successful users of the new software documented that these students conducted preliminary searches; confirmed new search terms from the first materials retrieved and from the subject tracings given by the software; and the most successful students returned to conduct more specialized searches based on specific and focused information needs. As had been indicated by Kuhlthau's work, the successful student used materials gathered at early stages differently than at later stages and gained focus and confidence as they read and gathered widely to begin, later concentrating efforts based on a realistic and workable focus. Once focus was obtained, student use of information was away from sources and toward evidence.

Callison (1988) further reported from the WilSearch study that bibliometric methods helped to identify databases favored by students, although interviews and observations were required in order to determine why some were favored over others. As in Mancall's studies, students tended to favor location of books even though the new computerized databases gave extensive leads to hundreds of journals. This study, conducted prior to full-text and CD-ROM options, reinforced the conclusion valid in the late 1980s that students tended to value book resources and certainly found the book format more convenient to manage than dealing with numerous journal articles. Students were clearly in need of additional direction in understanding the potential value of journal information and how to manage acquiring such articles and critically reading such materials. Analysis of student bibliographies indicated several key resources obtained from other libraries were significant in the focus of the student's paper. Media specialists and other teachers involved in this pilot test of computerized searching software were not previously cognizant of such analysis, but soon learned to apply such findings to collection development and information skills instruction. This information directed purchases of relevant materials identified and used by students from libraries other than their own school's.

Craver's 1987 dissertation employed a combination of similar techniques. She tested the influence of the availability of an academic online catalog on the research papers written by college-bound seniors. She conducted a citation analy-

sis of the bibliographies produced by two groups, one with access and the other without. Craver concluded that students do use journal articles and fewer books and magazines from just one library if they have access to an online catalog for the local academic library and know how to acquire journal materials. Collection development in terms of more extensive interlibrary loan agreements to increase access for high school students was recommended as a policy change. Greater use of bibliographic instruction to inform seniors of journal resources and how such information might be used were among the final recommendations.

### **Dissertations Since 1990**

During the last seven years of doctoral studies related to school library media programs and bibliographic instruction, there has been a dramatic increase in the emphasis on case studies in which students in natural library settings (allowing for access to all normal services without controlling for one isolated factor) are observed. Many of the quantitative measures through citation analysis have been dropped in favor of more in-depth and content rich interviews on specific tasks and decisions students encounter.

As examples, McGregor (1993) and Pitts (1994) applied the Kuhlthau research process model and case study method to their doctoral work. McGregor observed and documented students as they moved through the writing phases—including planning, organizing information, drafting and revising. Pitts concentrated on student selection and refining of a topic and the tasks for preparing to present through a video format. Both found that students tended to be more cognizant of the intended final product than understanding the reasoning and decision-making processes they were experiencing.

Participants were categorized as either those whose mental models of the assignment lock them into the activities of locating, rearranging, and reporting facts, or those whose mental models encourage them to bring about a dynamic change of their understanding of a particular topic. McGregor (1994) found that although most students showed no evidence of attention given to process, the few who did reveal awareness of processes, such as learning, thinking, researching, or sense making, were different from the others in two ways. They did not copy from original sources, and they evidenced more complex thinking skills. She concluded that these students showed a greater inclination to manipulate the information, to process it more deeply, to internalize their topic.

Friel (1995) used the case study method to determine how direct intervention in assisting 17 low-achieving high school students through the library research process would help the student focus and achieve success. This study suggests ways in which educators can provide learning experiences that will help to prepare students, regardless of their achievement levels, to access, evaluate, and use information. Friel concluded that studying and understanding the process of change and learning during the information search process as outlined by Kuhlthau can facilitate the design of effective learning environments and experiences within schools

and can offer all students, not just the academically talented, the opportunity to learn how to learn.

Bland (1995) employed the case study method to observe and document 45 junior English students and their use of CD-ROM formatted materials to search for and retrieve information. Lacking instruction in the process approach to library research, these students tended to not gain a focus and allowed the basic requirement of the assignment, to locate five resources, to drive their activity. Greater cooperative planning between the teacher and the library media specialist was identified as a factor that would improve the assignment and the student performance if that planning process involved application of a model similar to Kuhlthau's.

### SIMILAR METHODS IN THE UNDERGRADUATE SETTING

Up to this point the examples used to demonstrate the evolution from survey to citation analysis to case study approach for descriptive studies of student search and use of information have been limited to the school library media field. A similar evolution can be identified in the academic library area, specifically to undergraduate bibliographic instruction. Most of the research in the academic library area has been conducted by practicing reference librarians and college library directors, and not by doctoral students.

Kirk (1975), several years prior to increased application of the case study method to undergraduate bibliographic instruction, categorized the methods related to the questions for such evaluation and research:

- The Content of Instruction (was the content presented learned?) as measured by test scores;
- The Process of Bibliographic Search (what steps are taken to search for and select information for the paper?) as measured by logs or librarian observation; and
- The Product of the Search (what appears in the bibliography?) as measured by the quality and/or quantity of references or the grade given on the final paper.

A similar review of the research on library-user education by Arthur Young (1974), appearing one year prior to Kirk's, illustrates the emphasis on studies which investigated instructional methods and student performance based on measuring test results as opposed to in-depth examination of student application of a research strategy or reflection on the final product. Young concluded, "One could speculate that many user education presentations often fail to reflect the findings of information-seeking. ... There is little empirical evidence about the relative emphasis that should be accorded to knowledge of the search process" (p. 10).

### **Measuring the Product: Citation Analysis**

Gratch proposed a methodology for evaluating student research paper bibliographies in 1985. The idea was to have instructors and librarians make a co-evaluation of the quality of the resources used by the student in an attempt to demonstrate if bibliographic instruction leads to a use of a greater variety of materials and better materials. Ackerson and Young (1994) applied a variation of the Gratch model during a three-year study of term papers written by engineering students at the University of Alabama. These studies indicated that instructors and librarians came closer, over time, in agreeing on judgments as to defining "quality materials," but it was doubtful that just a better bibliography would lead to any increase in the grade or overall higher evaluation of the term paper. Those who taught bibliographic instruction could get some idea, after in depth analysis of the bibliographies, if the instructional message was getting through concerning how, where, and why to locate a wide variety of journals and other materials. But citation analysis did little to indicate if the student's final product improved because of a greater, more relevant, or more selective use of resources.

As in the school library media studies described earlier, citation analysis gave some useful feedback for revision of bibliographic instruction in order to make students aware of a greater variety of resources, but the method does not lead to insight as to the students' information selection and evidence use patterns.

### **Measuring the Process: Case Studies**

Over the past decade, methods to measure the indicators of quality information selection have led to more attention given to how students construct linkages through their search for information, and if such linkages impact their decision as to the focus of the paper. As in the school library media research, the undergraduate library user's behavior was best documented through qualitative case study methods.

Mellon (1986) found the same high anxiety among college students as did Kuhlthau among high school students when the students were first introduced to the research paper assignment. Mellon's application of the qualitative case study approach demonstrated how a focus on viewing experiences from the perspective of the students involved can provide an opportunity to understand why students placed in a demanding library use situation react as they do. The case study approach, based on observations and interviews designed to include the holistic environment, lead to description of the student's view rather than control of the variables that the instructor or librarian consider to be most important. Application of qualitative approach has led to new and more important questions which must be considered by those who construct library use assignments and who teach bibliographic instruction. A new set of interventions and counseling strategies become apparent and are critical to the instructional process, more so than teaching resource location and reference source selection (Kuhlthau, 1993).



A clear application of the qualitative approach is the study Barbara Fister (1992) conducted based on extensive interviews of 14 undergraduates who had completed successful research projects. Among her conclusions are:

- Finding a focus is a critical phase, but it comes after extensive background reading, not after simply looking in the *LC Subject Headings*;
- Extensive consultation with the instructor may be the key first step before investing much time with general reference materials;
- Students find much of their material through the citation network and through serendipitous browsing of the shelves; and
- Getting ideas, gathering information, and writing are parts of an integrated process, one feeds the other in a continuing cycle.

## CONCLUSION

The recent increasing frequency in the use of quantitative case study methodology has provided new insight concerning the behavior of the students who are placed in situations in which they are expected to use multiple information resources. The new direction of evaluation and research related to bibliographic instruction is toward student learning processes and away from teaching only basic skills of resource location and use of search tools. Understanding of student behavior gained from these more recent studies may lead to increased efforts to expand instruction beyond the one-time lesson to introduce students to the library. Even though integrated with subject content, such limited introductions are often made without understanding the need for resource counseling roles which need to be played by both the classroom instructor and the librarian. Counseling and guidance from the background reading phase through the topic focus phase as well as in the evaluation of the product phase are areas that are in need of more attention by those who apply the qualitative case study approach to future research.

Within the academic bibliographic instruction setting, Harold Tuckett and Carla Stoffle (1984) have described this evolution as moving away from teaching individual reference tools and moving toward introducing theoretical and practical discussion of the use of conceptual frameworks for determining selection and use of information. Such frameworks should be based on how information is organized with a discipline's discourse, and refined on theories of how people learn. Those who engage in library and information use education must have a firm understanding of human cognitive development.

Among the major questions for future research are: Will we move our observations and interviews to settings in which the researcher can truly capture the thoughts and decisions made by those who are successful in manipulating the information use process and find meaning in the information? Can information use instructors along with administrators for information institutions create environments where a wide spectrum of students have access to the guidance needed

across all phases of the research process? Should we be combining writing laboratory, information search and retrieval, and information consultation services organized under seamless access within the same service areas, in both virtual as well as physical facilities? In what collaborative manner should instructor and librarian be planning, teaching, and evaluating student performance in order to help students transform source texts into critical selection of relevant evidence (Higgins, 1993)?

## REFERENCES

- Ackerson, Linda G., & Young, Virginia E. (1994). Evaluating the impact of library instruction methods on the quality of student research. *Research Strategies, 12*, 132–144.
- Bland, Kay P. (1995). *CD-ROM utilization in the high school student research process*. Unpublished doctoral dissertation, University of Memphis, Memphis, TN.
- Callison, Daniel. (1988). Methods for measuring student use of databases and interlibrary loan materials. *School Library Media Quarterly, 16*, 138–144.
- Callison, Daniel. (in press). 75 years of research in the school library media field. In K. Latrobe (Ed.), *A history of school library media*. Littleton, CO: Libraries Unlimited.
- Callison, Daniel, & Daniels, Ann. (1988). Introducing end-user software for enhancing student online searching. *School Library Media Quarterly, 16*, 173–181.
- Craver, Kathleen W. (1987). *The influence of the availability of an academic online catalog on the use of academic libraries by college-bound high school seniors*. Unpublished doctoral dissertation, University of Illinois, Urbana-Champaign.
- Drott, M. Carl, & Mancall, Jacqueline C. (1980). Materials students use: A direct measurement approach. In David V. Loertscher (Ed.), *School library media centers: Research studies and the state-of-the-art* (pp. 21–30). Syracuse, NY: ERIC Clearinghouse on Information Resources.
- Ennis, Phillip H. (1967). Commitment of research. *Wilson Library Bulletin, 41*, 899–901.
- Fister, Barbara. (1992). The research processes of undergraduate students. *Journal of Academic Librarianship, 18*, 163–173.
- Fitzgibbons, Shirley A., & Callison, Daniel. (1991). Research needs and issues in school librarianship. In C.R. McClure & P. Herson (Eds.), *Library and information science research: Perspectives and strategies for improvement* (pp. 296–315). Norwood, NJ: Ablex.
- Friel, Linda D. (1995). *The information research process with low-achieving freshmen using Kuhlthau's six stage model and the interventions that*

- facilitate the process*. Unpublished doctoral dissertation, University of Lowell, MA.
- Gratch, Bonnie. (1985). Toward a methodology for evaluating research paper bibliographies. *Research Strategies*, 3, 170–177.
- Grover, Robert, & Fowler, Susan G. (1993). Recent trends in school library media research. *School Library Media Quarterly*, 21, 241–247.
- Higgins, Lorraine. (1993). Reading to argue: Helping students transform source texts. In Ann M. Penrose & Barbara M. Sitko (Eds.), *Hearing ourselves think: Cognitive research in the college writing classroom* (pp. 70–101). New York: Oxford University Press.
- Kirk, Thomas. (1975). Bibliographic instruction: A review of the research. In R.J. Beeler (Ed.), *Evaluating library use instruction* (pp. 1–29). Ann Arbor, MI: Pierian.
- Kuhlthau, Carol Collier. (1983). *The library research process: Case studies and interventions with high school seniors in advanced placement English classes using Kelly's theory of constructs*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey.
- Kuhlthau, Carol Collier. (1985). *Teaching the library research process*. West Nyack, NY: Center for Applied Research in Education.
- Kuhlthau, Carol Collier. (1993). *Seeking meaning: A process approach to library and information services*. Norwood, NJ: Ablex.
- Mancall, Jacqueline C. (1979). *Resources used by high school students in preparing independent study projects: A bibliometric approach*. Unpublished doctoral dissertation, Drexel University, Philadelphia, PA.
- McGregor, Joy H. (1993). *Cognitive processes and the use of information: A qualitative study of higher order thinking skills used in the research process by students in a gifted program*. Unpublished doctoral dissertation, Florida State University, Tallahassee.
- McGregor, Joy H. (1994). Information seeking and use: Students' thinking and their mental models. *Journal of Youth Services in Libraries*, 8, 69–78.
- Mellon, Constance A. (1986). Library anxiety: A grounded theory and its development. *College & Research Libraries*, 47, 160–166.
- Pitts, Judy M. (1994). *Personal understandings and mental models of information: A qualitative study of factors associated with the information-seeking and use of adolescents*. Unpublished doctoral dissertation, Florida State University, Tallahassee.
- Stroud, Janet. (1982). Research methodology use in school library dissertations. *School Library Media Quarterly*, 10, 124–134.
- Tuckett, Harold W., & Stoffle, Carla J. (1984). Learning theory and the self-reliant library user. *RQ*, 24, 58–66.
- Young, Arthur P. (1974). Research on library-user education: A review essay. In John Lubans, Jr. (Ed.), *Educating the library user* (pp. 1–15). New York: R.R. Bowker.