

# The Importance of Information Literacy: Insights From the Next Generation of Scholars

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## **Abstract**

A quantitative study of 74 doctoral students' opinions about the importance of seven information literacy competencies was conducted. Descriptive statistics revealed that students rated all but two of the competencies as "important" or "very important" for achieving a successful outcome to a research project or course assignment. Stepwise multiple regression analysis showed that several student demographic characteristics, information-seeking behaviors, and teaching and research experiences predicted their ratings of the competencies. Areas for further research are identified.

## **Introduction**

Information-seeking and use have become complex processes for college and university students due to the proliferation of information technologies and resources in all types and formats. Students at the doctoral level frequently need detailed, comprehensive information—particularly for thesis research—and therefore need strong information-seeking and use skills to ac-

complish their research goals (Barry 1997). Librarians, accreditation agencies, and others in the higher education community have articulated information literacy competencies to assist students in learning to find, use and evaluate information. It is argued that information literacy competencies "provide students with a framework for gaining control over how they interact with information in their environments" (Information literacy competency standards 2000, 6). But what do students themselves think about the importance of information literacy competencies?

This paper reports the results of a quantitative study in which the Association of College and Research Libraries (ACRL) Information Literacy Competency Standards for Higher Education (2000) were used as a framework for determining the extent to which doctoral students think that information literacy competencies are important to their research. Another goal of the study was to determine if student demographic characteristics, teaching and research experiences, and information-seeking behaviors are related to their opinions.

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While previous researchers have explored how library experiences influence educational outcomes, it is also important to understand the “non library-related factors that influence information literacy. . . Many aspects of the college environment help to develop student learning” (Whitmire 2001, 410). Researchers have recommended that even factors such as epistemological development should be taken into account in the development of information literacy instruction (Fields 2001). Few studies have included an examination of the combined effects of library and nonlibrary-related variables on opinions about information literacy, especially among doctoral students. Knowledge about the characteristics and attitudes of “previously underserved or unacknowledged” (Research and Scholarship Committee 2003, 108) groups such as graduate students is especially warranted if they are to value information literacy as learners and as prospective faculty members prepared to collaborate with librarians to integrate information literacy into the curriculum. Information literacy experts argue that successful integration depends on collaboration (Iannuzzi 1998; Raspa and Ward 2000; Rockman 2003). Also, those who are involved in developing information literacy training programs for graduate students (see e.g., Samson and Millet 2003) can integrate knowledge about student perceptions of these skills into their programming.

### **Literature Review**

Researchers have used a variety of methods and definitions of information literacy to investigate undergraduate and graduate student perceptions of information competencies. Seamans (2002), Costantino (2003) and Kurbanoglu (2003) used the ACRL information literacy competencies as a framework for their studies. Seamans conducted e-mail and face-to-face interviews with first-year undergraduates to learn how they acquired and used information for course work and general information needs. She found that when they needed information, the students consulted peers, parents, teachers or experts on the topic they were researching, but none indicated that they consulted library personnel. Many relied on the Internet to find information, and all reported that they evaluate web sites, but the extent of their evaluation varied and depended on how they planned to use the information. Half of the students had given thought to privacy concerns and the legal and economic implications of copying and sharing digital materials.

Kurbanoglu (2003) administered a self-efficacy scale to examine Turkish undergraduates' confidence in their performance in nine major areas of information literacy. Results showed that overall, the students usually felt confident. First and second-year students felt more self-efficacious than third and fourth-year students in the following areas: defining information needs, initiating search strategies, locating and accessing information sources, assessing and comprehending information, and interpreting, synthesizing and using information. Third and fourth-year students were more confident than first and second-year students in the following competency areas: communicating information in a format appropriate for its audience and purpose, evaluating the outcomes and processes of information-seeking, improving self-generated knowledge, and recognizing principles of equitable access to information. In Costantino's (2003) study which was based only on Standard Two of the ACRL competencies, 82 percent of faculty and administrators felt that it is “extremely” or “often important” that students understand information literacy skills, while only 69 percent of undergraduates felt it was “extremely” or “often important.” Faculty perceived that students learn about information literacy from librarians or faculty, but many students perceived that they either did not learn those skills or that they had taught themselves.

Morrison (1997), Hartmann (2001), Brown (1999) and Macauley (2001) used the definition of information literacy articulated by the American Library Association Presidential Committee on Information Literacy (1989) in their studies. The committee defined an information literate person as one who recognizes a need for information, locates the information, and evaluates and uses it effectively. Both Morrison and Hartmann used focus groups with undergraduates as their methodology. Students in both studies ranked the ability to evaluate information as the most important information literacy skill. Hartmann and Morrison also found that students were not certain that the ability to recognize a need for information actually constitutes a skill. There was agreement among students in both studies that information literacy is valuable and that librarians can help students develop these skills; however, Hartmann concluded that students perceive the skills are valuable

“only in so far as they need these skills to produce what lecturers want” (117).

In a study of doctoral and master's students in the physical sciences and mathematics at the University of Oklahoma, Brown (1999) explored physical and psychological factors that affected how they found, evaluated and used information. The students reported being engaged in information-seeking on a daily, weekly or monthly basis. They recognized situations in which a gap in their knowledge required that they seek out information, and they were able to articulate in detail how they searched for, used, analyzed, and evaluated information, and how they felt during the search process. Brown concluded that despite poor attendance levels at the university library's workshops for physical science students, and based on the ALA's definition of information literacy, these students were an “information-literate microcosm” of the university student body.

Macauley's (2001) study was designed to determine the extent to which doctoral students and their supervisors at four Australian universities thought that information literacy skills are important. He also sought students' opinions about whether librarians should play a more substantial role in the doctoral research process. Almost 98 percent of the doctoral students and 93 percent of supervisors thought that information literacy skills are an important part of doctoral studies; however, 45 percent of the students and 43.5 percent of the supervisors admitted that they were lacking in information literacy skills. Over half of the women students reported that they were deficient in information literacy skills. Macauley also found that “being younger, enrolled on-campus and more specifically, in Science, increased the chances of receiving information literacy skills training and decreased the perceptions of having information literacy deficiencies” (52). Some of the science students believed that librarians lack the subject expertise to assist them with finding literature relevant to their specific research topic, and therefore should not play a significant role in doctoral studies. In general, however, students in the sample agreed that involving librarians more directly in the dissertation research process is an effective way to help students develop information literacy skills.

Each of the studies described above were conducted with primary data. Whitmire (2001) and Kuh and Gonyea (2003) used multiple regression in secondary data

analyses to predict student characteristics and college experiences that influence perceptions of information literacy. In Whitmire's study, information literacy was defined as students' perceived progress in using the library and other information resources. With data from the University of Wisconsin-Madison Undergraduate Student Satisfaction Survey, she found that the most statistically significant predictor of students' satisfaction with their information literacy skills was their rating of the university's library facilities. Higher ratings of the facilities were associated with greater satisfaction. Race was also a predictor; students of color were more likely than White students to be satisfied with their skills. Students' assessment of their faculty was the least important statistically significant predictor. Kuh and Gonyea's multiple regression analysis of data from the College Student Experiences Questionnaire (CSEQ) showed that library experiences did not contribute to self-reported gains in information literacy, which was defined by six areas which approximated ACRL information literacy competencies. First-year and transfer students reported the least gains in information literacy. Students who were majoring in math and science reported greater gains than those majoring in preprofessional areas. Students who attended doctoral research-extensive institutions reported greater gains than students from institutions in other Carnegie institutional classifications. Those who perceived that their institution emphasized information literacy reported higher gains than those who did not have that perception.

Multiple regression analysis was also used by Neely (2002) in development of a model of the interactions between sociological and psychological aspects of information literacy, which included undergraduate and graduate students' attitudes towards Doyle's (1992) ten information literacy skills, student-faculty interaction, student performance on information evaluation skills, prior exposure to library instruction, and experience in using information literacy skills. Attitude was measured by students' comfort level and agreement with Doyle's skills. Regression analysis revealed that experience in using information literacy skills was the only significant predictor of attitudes toward information literacy. T-test results revealed no significant differences between undergraduate and graduate students, or between men and women on attitudes toward information literacy. It should be noted

that there were only three doctoral students in Neely's sample, so the extent to which the study results apply to this student group is limited.

Review of the literature on attitudes and perceptions of information literacy reveals that overall, students perceive that these skills are valuable, and their perceptions are influenced by a variety of factors. Different definitions of information literacy have been used in the research, as well as a variety of qualitative and quantitative methodologies. More studies are available on undergraduates than on graduate students. The present study is an attempt to add to the knowledge base about graduate students by exploring the combined effects of factors that influence their perceptions of information literacy.

## Methods

### *Participants.*

In spring 2003, via message to a student e-mail listserv for doctoral students in a school of education at a private, doctoral research-intensive university in southern California, Ph.D. students were asked if they would be willing to complete a questionnaire on information use. Eighty-nine students responded that they were willing to complete it. The questionnaire, a cover letter and a postage-paid return envelope were mailed to each student. Seventy-four questionnaires were completed and returned, yielding a response rate of 83 percent.

Forty-five (60.8%) of the respondents were white; 29 (39.2%) were students of color. Fifty-seven (77%) were women; 75 percent were between the ages of 29 and 50. Just under 65 percent had been in their doctoral program 1 to 3 years, and 23 percent had been in the program 4 to 6 years. The majority (74.6%) were either in the course work or qualifying exam stage. Twenty percent were writing their dissertation or proposal, and 5.3 percent expected to complete their dissertation in spring 2003. Fifty-four percent of the students reported that they had taught one or more courses in a 2- or 4-year college/university; that same amount had also taught one or more subjects in an elementary or high school. Nineteen percent had experience as an undergraduate teaching or research assistant, and 35 percent had experience as a graduate teaching or research assistant. Twenty-seven students (36.5%) reported that they spent 5 or fewer hours per week looking for information for research and/or course assignments; 39.2 percent spent 6 to 10 hours; 12.2

percent spent 11 to 15 hours, and 10.8 percent spent 16 to 20 hours. One student reported spending more than 20 hours per week. Fifty-nine (79.7%) students indicated that they planned to teach in a 2 or 4-year college/university within 1 to 5 years after receiving their doctorate.

### *Survey instrument.*

A questionnaire on doctoral student information use was designed to collect data for this study. Information was defined as facts, prior research, or other knowledge that helps a student to understand a topic or issue in order to complete a seminar paper, dissertation or other research project. The questionnaire consisted of 21 Likert-type, dichotomous and opened questions. In addition to demographic questions, students were asked if they had had experience as a teaching and/or research assistant, and if they planned to teach in a higher education institution after receiving their doctorate. They were also asked about aspects of their information-seeking behavior.

To measure their opinions about the importance of information literacy competencies, students were asked to rate on a scale from 1 (not important) to 4 (very important) the extent to which each of the following competencies are important for achieving a successful outcome (defined as students' satisfaction with their work) to a research project or course assignment: (1) being able to accurately define information needs, (2) to critically evaluate information and its sources, (3) to understand economic issues surrounding the use of information, (4) to understand legal issues surrounding the use of information, (5) to understand ethical issues surrounding the use of information, (6) to select appropriate investigative methods for a research problem, and (7) to reconcile personal values and knowledge with new information. The competencies were derived from the Information Literacy Competency Standards for Higher Education (2000).

### *Data analysis.*

Statistics were computed using version 11.5 of the Statistical Package for the Social Sciences (SPSS). Frequencies, percentages, means, and standard deviations were calculated for each information literacy competency. Stepwise multiple regression with mean substitution for missing values was used to predict ratings of the importance of each competency. Predictor

variables were entered in seven separate regressions using each competency as the dependent variable. The variables tested in the regression model were:

1. Demographic characteristics: gender, race/ethnicity, age, stage in doctoral program, number of years in doctoral program

2. Information-seeking behaviors: sources consulted for information (librarian, peers at school or work, World Wide Web search engines, course instructor or advisor), number of hours spent per week looking for information for research or course needs, degree of confidence in the ability to find information for research or course needs, prior attendance in a workshop or course as an undergraduate or graduate student to learn how to find information for research or course needs

3. Teaching and research experiences: college or K-12 teaching experience, experience as an undergraduate or graduate teaching or research assistant, plans to teach in a college or university after receiving the doctorate

## Results

On average, students rated all but two of the information literacy competencies as important for achieving a successful outcome to a research project or course assignment (table 1). Being able to understand economic issues surrounding the use of information, and

being able to understand legal issues surrounding the use of information were the competencies with the lowest average ratings at 2.14 and 2.72, respectively. Mean ratings for the five other competencies ranged from 3.14 to 3.86.

Results of the regression analysis are displayed in table 2. Given that information literacy is a complex set of skills, it is not surprising that different variables emerged as predictors of opinions about different competencies. None of the independent variables predicted ratings of the importance of being able to reconcile personal values and knowledge with new information.

Race emerged as the only statistically significant predictor of students' opinion of the importance of being able to accurately define information needs. Students of color were more likely than White students to rate this competency as important. Students who reported that they plan to teach in a college or university after completing their doctorate were the group most likely to rate the ability to critically evaluate information as important. The number of hours per week that students were engaged in the information search process was the most statistically significant predictor of ratings of the importance of being able to understand the economics of information use. The more frequently they searched, the more likely they were to perceive this competency as important.

**Table 1. Frequencies for importance ratings of information literacy competencies**

Competency	Not important	Somewhat important	Important	Very important	Total	Mean	SD
Accurately define information needs	...	...	10 (13.7)	63 (86.3)	73a (100)	3.86	.346
Critically evaluate information	...	3 (4.1)	15 (20.3)	56 (75.6)	74 (100)	3.72	.537
Understand economic issues	22 (30.1)	25 (34.2)	20 (27.4)	6 (8.2)	73a (99.9)	2.14	.947
Understand legal issues	11 (14.9)	19 (25.7)	24 (32.4)	20 (27.0)	74 (100)	2.72	1.027
Understand ethical issues	4 (5.4)	12 (16.2)	28 (37.8)	30 (40.5)	74 (99.9)	3.14	.881
Select appropriate investigative methods	...	...	16 (21.9)	57 (78.1)	73a (100)	3.78	.417
Reconcile personal values and knowledge with new information	1 (1.4)	9 (12.3)	23 (31.5)	40 (54.8)	73a (100)	3.39	.759

*Note:* Percentages are given in parentheses and may not total to 100 due to rounding.  
Scale: 1 = Not important; 2 = Somewhat important; 3 = Important; 4 = Very important  
<sup>a</sup>Missing response.

Table 2. Predictors of importance ratings for information literacy competencies							
Predictor variables	Standardized beta	t	Sig. t	R	R2	F	Sig. F
Accurately define information needs							
Race/ethnicity	-.241	-2.107	.039	.241	.058	4.438	.039
Critically evaluate information							
Plans to teach in a college or university	-.299	-2.659	.010	.299	.089	7.070	.010
Understand economic issues							
Hours per week spent searching for information	.379	3.474	.001	.379	.144	12.068	.001
Understand legal issues							
Age	.249	2.180	.033	.249	.062	4.751	.033
Understand ethical issues							
Plans to teach in a college or university	-.283	-2.642	.010	...	...	...	...
Age	.273	2.548	.013	...	...	...	...
Consults WWW	-.214	-2.018	.047	.461	.213	6.310	.001
Note: Values reflect final step in the stepwise regression model.							
Select appropriate investigative methods							
Age	.360	3.299	.002	...	...	...	...
Writing qualifying exams	.232	2.127	.037	.407	.165	7.038	.002
Note: Values reflect final step in the stepwise regression model.							

Age was the only statistically significant predictor of students' ratings of the importance of being able to understand the legal issues surrounding the use of information. The older they were, the more likely they were to rate this competency as important. Age was also the most significant predictor of ratings of being able to select appropriate investigative methods for a research problem. Again, the older they were, the more likely students were to rate the competency as important. Stage in the doctoral program also emerged as a predictor. Students who were in the qualifying exam stage were more likely to give lower ratings on the importance of being able to select appropriate investigative methods for a research problem.

Three variables predicted ratings of the importance of understanding the ethics of information use. Of the three, students' plans to teach in college or university after receiving the doctorate was the most statistically significant. Students who planned to teach were more likely to rate this competency as important than students who did not plan to teach. The other predictors

of this competency were age and use of the World Wide Web as an information source. The older students were, the more likely they were to give higher ratings of this competency. Students who used the Web as an information source were also more likely to give higher ratings of this competency.

**Discussion**

The mean importance ratings for the competencies revealed that in general students thought they were important; however, two competencies, being able to understand the economic and legal issues surrounding the use of information, were rated on average, no higher than "somewhat important." The students apparently had reservations about whether mastering these skills is necessary for completing their work. More research is needed to determine how doctoral students' understanding of legal and economic aspects of information use influences their work. An interesting finding in Brown's study (1999) may provide a useful starting point. Four doctoral students in her study reported that

they terminated their search for a particular information source if they found that it could not be downloaded for free from the Web. Clearly economics plays a role in how students interact with information.

The regression results suggest that there are temporal and developmental influences on perceptions of information literacy competencies. The number of hours that students spent per week engaged in information-seeking emerged as a significant predictor of ratings of being able to understand the economics of information use. This could mean that spending more time looking for information increases awareness of the costs of acquiring or producing it. Kuh and Gonyea (2003) pointed out that "the more time and energy students invest in activities that are related to desired outcomes of college, the more likely they are to benefit in those areas" (258). More research is needed to determine how the amounts of time and effort dedicated to information-seeking affect doctoral students' perceptions of the economics of information use.

Age, a developmental characteristic, emerged as a predictor of ratings of the importance of being able to understand legal and ethical aspects of information use, and being able to select appropriate investigative methods for a research problem. Further research is needed to determine how and why various aspects of human development might influence perceptions of these and other information literacy competencies. Fields (2001) offered that women's epistemological development should be considered in the design of information literacy instruction for undergraduates. Perhaps doctoral students' epistemological growth or life experiences are related to their opinions about information literacy.

In the present study, students of color were more likely than White students to rate the ability to accurately define information needs as important. Whitmire (2001) also found that being a student of color was related to perceptions of information literacy. More research is needed to determine the role of race and ethnicity in doctoral students' experiences with information literacy competencies.

Students' desire to teach in a college or university after receiving the doctorate was related to ratings of the importance of understanding ethical issues of information use, and to the importance of being able to critically evaluate information and its sources. Future research should explore whether specific characteristics

of aspiring college teachers influence their beliefs about the significance of information ethics and critical evaluation of information in the research process.

The fact that several independent variables thought to influence perceptions of information literacy did not predict ratings of any of the competencies in this study is an interesting finding. For example, neither previous experience in a course or workshop to learn to find information for research or course needs, nor use of a librarian as an information source were predictors. Kuh and Gonyea (2003) found no relationship between library experiences and perceived gains in information literacy, and Brown (1999) found that students were information literate despite low attendance rates in university library instruction sessions. Neely (2002), however, found that exposure to library instruction was a predictor of performance on information literacy skills, and that experience in using the skills was a predictor of attitude toward information literacy. Given these conflicting results, further research is needed to examine the circumstances under which library and information literacy instruction experiences impact doctoral students' perceptions of information competencies. In the present study, students were not asked to describe the exact nature of the previous instruction they had received, so it is not possible to infer which aspects of their experience made the most difference in their perceptions of information literacy. Also, level of confidence in finding information was not a predictor of ratings of any of the competencies in this study. Future research with other variables, perhaps using the concept of self-efficacy (Kurbanoglu 2003), should be conducted to determine if confidence plays a role in predicting doctoral students' opinions about information literacy.

Another interesting finding of this study is that stage in the doctoral program and the number of hours per week that students spent searching for information predicted opinions about information literacy competencies, but the number of years students had been working towards the doctorate did not play a role in predicting their opinions. This suggests that what students are doing in their doctoral program is more important than how long they have been working toward the degree. Some students progress faster than others in a doctoral program; therefore, stage in program is not necessarily congruent with how long one has been in the program. Perhaps, then, librar-

ians and faculty should target library and information literacy instruction at critical stages in doctoral study, and not base instruction on how long students have been in their program. Future research on the relationship between stages of doctoral student development and opinions about information literacy is needed in order to determine the most opportune times to offer information literacy instruction.

As stated earlier, none of the variables predicted opinions of the importance of being able to reconcile personal values and knowledge with new information. This finding is interesting given that 86.3 percent of the students rated this competency as “important” or “very important.” It is likely that the variables tested in the regression model are not the most important in predicting opinions of this competency. Qualitative data obtained from interviews or focus groups with graduate students may prove useful in identifying factors that affect opinions about this competency. Theories of epistemological development that can help explain the nature of students’ knowledge structures (Fields 2001) would be useful in exploring perceptions of this competency.

## Conclusion

The predictor variables in this study accounted for 5.8 to 21.3 percent of the variance in doctoral students’ ratings of the importance of information literacy competencies. This indicates that there are additional student or institutional characteristics that need to be factored into analyses of perceptions about information literacy. Nevertheless, the findings of this study are a starting point for expanding the knowledge base on doctoral students and information literacy.

There are several limitations of this study. The sample was selected from doctoral students in a single institution in the field of education. Also, the sample was self-selected and relatively small. The findings therefore, cannot be easily generalized to other doctoral student populations. Research with larger samples of doctoral students in different fields of study and in different types of doctoral-granting institutions is needed.

It is important that librarians, students, faculty and administrators understand how doctoral students perceive the importance of information literacy. This knowledge can be incorporated into graduate student and faculty development initiatives such as preparing future faculty programs and faculty learning communities (Richlin and Essington 2004). It might also

increase the likelihood that doctoral students will be more aware of the role of information literacy in their lives as students, and as prospective faculty members who will be working in collaboration with librarians to teach students to find, use and evaluate information resources effectively.

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