

# APPENDIX D

## **CSU Information Competence Survey Report**

Conducted for:

**The California State University Chancellor's Office**

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## INTRODUCTION

The measurement of student information competence is a challenge to universities confronting the rapid changes in information dissemination and use in society. In order to create strategic plans assuring student success, universities need data on students' current level of information competence as well as areas in which students require further instruction.

Seeking to obtain such information for the CSU system, the CSU Chancellor's Office, working closely with the Council of Library Directors (COLD), contracted with the Social and Behavioral Research Institute (SBRI) at CSU, San Marcos to design and conduct a phone survey. The survey is part of a five year study proposed by SBRI.

The five year plan calls for a comprehensive, multi-method study integrating a variety of qualitative and quantitative research strategies and thus giving greater explanatory power to any resulting claims. It consists of three phases:

Phase I: a phone survey of 3,300 students system-wide to establish a baseline of student competence; the survey identifies the average breadth and depth of students' expertise in accessing, organizing, evaluating and communicating information.

Phase II: an intensive, multi-pronged study of the processes students engage in when completing an information task. The data will tell us how patterns of activities used in

accomplishing tasks are related to technological constraints, access to and familiarity with resources, expertise in using specific resources and other variables. The data expand on the survey findings of baseline competence.

Phase III: a three year longitudinal study of a sample of Freshmen and transfer students, half of whom receive some specific instruction identified as necessary in Phase I and II, and half of whom serve as a control group. The information competence of both groups of students are then assessed and compared. These students will also be interviewed at regular intervals over the three years.

At the end of the five years, we can say with confidence what we know about students' information competence, the specific kinds of difficulties they encounter in accomplishing tasks, the skills the majority of students possess, and how information competence can be improved through instruction. We will also be able to establish the best methods of measuring information competence and the impact of instruction programs.

The first year's survey-assessment incorporated a unique component consisting of hypothetical scenarios that interviewers read to the respondents. Interviewers then asked the students what strategies they would use in completing the hypothetical tasks requiring skill in information praxis. These open-ended questions were designed to assess both the breadth and depth of students' competence in six key areas.

Six core competencies had been identified earlier by the CLRIT Information Competence Work Group and these became the basis of the scenarios. (See Appendix A.) The Work Group

viewed these competencies as crucial to demonstrating proficiency in seeking, evaluating, organizing and communicating information.

In addition, the study gathered data on relevant topics such as student report of their library instruction and services, technology access and use, computer use in course work, and students' routine practices with mass media sources. A broad array of demographic information was also collected.

Below we outline the conceptual considerations of this study, detail the research methods employed in the study, and present the findings of the survey.

### **Conceptual Considerations**

Standards developed to ensure student outcomes present several considerations for assessment. First, standards such as the Core Competencies used in this study are universalistic, decontextualized abstractions of desired student skills. Such abstract statements represent ideals and can serve as resources for determining how to do a task in a naturalistic setting, but they represent disembodied knowledge. Disembodied knowledge is different than knowledge in practice and agents will still need to determine how the ideal can be operationalized given the features of the setting they are in and the requirements of the task.

Second, there are several ways in which competencies could be assessed. Standards or Core Competencies could be tested at the conceptual level, i.e., through asking students to talk or write about them in abstract terms. Yet this would tell us virtually nothing about students' ability to implement these competencies in real world settings.

Another strategy would be to assess the operationalization of competencies through the performance of school-based tasks. Yet this would only tell us how well students have learned to "do school" but not how they might transfer these skills into real life environments upon, or before, graduation.

Assessing performance on tasks found in non-school environments is a third alternative. The tasks would be concrete examples of the Core Competencies. This strategy allows us to see if and how students transfer skills between environments and how ideal standards are operationalized in everyday life situations.

The much-noted disconnect between formal education and the world of work or everyday life occurs because the world outside of classrooms presents people with real contingencies that are unable to be specified beforehand. Educators have struggled continually with the problem of how to make formal education relevant to students' experience away from the university. Thus, in assessing standards, it is preferable to map the standards onto everyday life activities rather than school-based activities. In so doing we can see if students can make the analogy between disembodied knowledge and every day life/workplace tasks or school-based tasks and everyday life/workplace tasks.

Given that we first wanted to assess the performance of a large sample of students (making real-time performance impossible) and given that we wanted to establish how students applied competencies in everyday life, a phone survey containing hypothetical scenarios was the best way of working within these parameters

Third, from a research perspective, assessing knowledge in situ allows for identifying variables to be used in controlled studies and yields an intensive understanding of practical knowledge and the processes of its application in natural environments. Both social psychologists and qualitative researchers in sociology and anthropology advocate studying activities in naturally occurring settings, not as a substitute for controlled experiments or surveys, but to enhance and complement such studies.

Another factor to consider in assessment is that displays of knowledge are context-dependent or situational. As Lave (1988) points out, the same cognitive activity takes different forms across situations and occasions. In problem-solving, agents respond to the resources available, the knowledge they deem to be relevant, the parameters of the particular task, and the environment in which it takes place. Thus, students may perform differently in different contexts.

A final consideration is that while tasks can conceptually be broken into components, in practice they can only be highlighted, not isolated. For example, in learning to play tennis, one may practice serving as an isolated activity but in play one will also have to know what to do when the ball is returned.

Serving itself may be broken into its constituent parts: the toss of the ball, the swing of the arm, the contact with the racquet, the movement of the foot and so on, but each part is done in the context of

the others. The player may practice tossing the ball as an isolated exercise, but in doing so, must keep in mind the height of one's racquet when held with an outstretched arm, and the coordination of the toss with the movement of the hand holding the racquet. Thus, the task is highlighted but it is not completely isolated from the other constituent parts of serving.

Likewise, information competency may be broken into its constituent parts, but in practical application, the parts are constitutive of each other. Thus, it is difficult to create scenarios that assess only one of the core competencies; it is possible to highlight a competency but not to isolate it.

## RESEARCH METHODS

### Sample Selection

The 3,309 students surveyed were drawn from a random sample of students from each of 21<sup>1</sup> CSU campuses. The offices of Institutional Research at each campus supplied SBRI with a separate random sample of 2,000 students for the study. From each of these campus samples, a further sample of 150 students were selected based on class level and race/ethnicity criteria. Survey respondents were randomly selected using a computer-assisted-telephone-interviewing (CATI) system. Each campus sample is representative of the class level and race/ethnicity distribution of students at that campus. These campus samples have subsequently been combined to provide a system-wide database of 3,309 interviews. The response rate for the survey was 77.7%, which represents 3,309 completes divided by 4,261 (completes plus refusals).

The average interview was 24.76 minutes in length and covered a range of topics related to the student's academic background, demographics on income and living arrangements, and the use of information resources on campus and at home. In addition, each respondent was asked to consider two scenarios randomly selected from the set of six scenarios.

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<sup>1</sup>Given inadequate populations for sampling, the Maritime Academy and Channel Islands campuses were excluded from the study.

## **Questionnaire Design**

The design of the survey questionnaire required the construction of three major components: 1) questions generated by the identification of domains, or topics, that might be correlated with information skills, 2) demographic data in addition to what was available from student records, and 3) six information scenarios not requiring any special knowledge or expertise. Appendix B contains the questions used in this study.

## **Construction of the Scenarios**

In order to construct scenarios for use in the phone survey, SBRI held meetings of six work groups composed of several members of the Information Competence Assessment Task Force and SBRI staff researchers. Different Task Force members participated in each of the six meetings which were held in January, 2000.

During the day-long meetings, each group generated a scenario that would assess one of the six competencies as well as a list of possible answers that respondents might give. To conclude each scenario, group members drafted two questions: one question to evaluate the students' breadth of current skills and a second question to assess the depth of students' competence. SBRI later made minor modifications in the wording of the scenarios.

The scenarios were pilot tested by 62 students in two sections of an upper division Sociology class which filled a Social Science requirement. These classes reflected the diversity of students found at CSU campuses. The pilot testing suggested some slight changes in wording but showed that students were able to understand and answer the scenario questions.

## RESULTS

### Demographics

This section provides a description of the respondents in terms of their demographic characteristics. The respondents were 57.6% female and 42.4% male.<sup>2</sup> As illustrated in Table 1, about half (47.9%) the sample was white, a quarter (24.6%) were Hispanic/Latino, Asians constituted 19.1% of the respondents, and African Americans were 8.4% of the sample.

**Table 1: Race/Ethnicity of Respondent.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 White	1583	47.8	47.8	47.8
	2 Hispanic/Latino	812	24.5	24.5	72.4
	3 Asian	633	19.1	19.1	91.5
	4 African American	281	8.5	8.5	100.0
	Total	3309	100.0	100.0	

Table 2 shows that 34.7% of the respondents were lowerclassmen, and 65.3% were upperclassmen. Most (87.6%) of the respondents were full-time students.

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<sup>2</sup>Appendix C provides frequencies or descriptives for all items on the questionnaire or provided with the student database.

**Table 2: Student Level.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Freshman	655	19.8	19.8	19.8
	2 Sophomore	495	15.0	15.0	34.8
	3 Junior	834	25.2	25.2	60.0
	4 Senior	1325	40.0	40.0	100.0
	Total	3309	100.0	100.0	

Additionally, almost two-thirds (64.6%) of the students were employed, working an average of 25.30 hours per week. Table 3 displays the students' personal annual income. A small number (7.3%) of the students had incomes of \$36,000 or more. However, students' annual income was most often

**Table 3: Annual Personal Income Before Taxes.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than \$6,000	1401	42.3	43.9	43.9
	2 From \$6,000 up to \$12,000	792	23.9	24.8	68.7
	3 From \$12,001 up to \$24,000	539	16.3	16.9	85.5
	4 From \$24,001 up to \$36,000	230	7.0	7.2	92.7
	5 From \$36,001 up to \$48,000	101	3.1	3.2	95.9
	6 From \$48,001 up to \$60,000	65	2.0	2.0	97.9
	7 Over \$60,000	66	2.0	2.1	100.0
	Total	3194	96.5	100.0	
Missing	8 Don't Know	40	1.2		
	9 Refused	75	2.3		
	Total	115	3.5		
Total		3309	100.0		

(43.9%) below \$6,000. Two-thirds (68.7%) had annual incomes of \$12,000 or below. Table 4 shows the students' total family annual income. This table reveals that 41.0% have annual family incomes of \$36,000 or below, and 59.0% have incomes over \$36,000. For many students, though, their income was supplemented – 48.8% of the respondents indicated that they receive financial assistance from the university they attend. Additionally, 46.6% of the students said they received some form of financial assistance from friends or family members. Between friends and family and the university, 77.9% of the students report receiving some form of financial assistance.

**Table 4: Annual Family Income Before Taxes.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than \$24,000	648	19.6	22.1	22.1
	2 From \$24,001 up to \$36,000	553	16.7	18.9	41.0
	3 From \$36,001 up to \$48,000	429	13.0	14.6	55.7
	4 From \$48,001 up to \$60,000	419	12.7	14.3	70.0
	5 From \$60,001 up to \$72,000	258	7.8	8.8	78.8
	6 Over \$72,000	622	18.8	21.2	100.0
	Total	2929	88.5	100.0	
Missing	8 Don't Know	260	7.9		
	9 Refused	120	3.6		
	Total	380	11.5		
	Total	3309	100.0		

The living arrangements for students are summarized in Table 5. The most common living arrangement for CSU students was living at home with parents – 39.7% of the respondents indicated that this was their living arrangement. About one in five (20.4%) students were living with their spouse or partner, and approximately the same number (20.0%) were living with roommates, while 7.5% lived on campus. The respondents had an average of .30 children living with them in their household, and 18.7% of the respondents had children in the household.

**Table 5: Current Living Arrangements.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 On-campus	247	7.5	7.5	7.5
	2 Off-campus With Parents	1310	39.6	39.7	47.2
	3 Off-campus With Spouse or Partner	674	20.4	20.4	67.6
	4 Off-campus in Fraternity or Sorority	15	.5	.5	68.1
	5 Off-campus With Roommates	660	19.9	20.0	88.1
	6 Off-campus by Yourself	334	10.1	10.1	98.2
	7 Off-campus With Relatives	49	1.5	1.5	99.7
	8 Part-time at Two Places	9	.3	.3	100.0
	Total	3298	99.7	100.0	
Missing	98 Don't Know	2	.1		
	99 Refused	6	.2		
	System	3	.1		
	Total	11	.3		
<b>Total</b>		<b>3309</b>	<b>100.0</b>		

Table 6 shows the level of education of the mothers and fathers of the respondents. Both parents are likely to have at least a high school level of education. In fact, most are likely to have at least some college – 55.4% of mothers and 58.7% of fathers have at least some college. The largest disparity between mothers’ and fathers’ level of education is at the post graduate level. That is, 8.6% of mothers have some post graduate work, compared to 13.4% for fathers.

**Table 6: Parent's Level of Education.**

	Mother's Level of Education		Father's Level of Education	
	Count	%	Count	%
1 Less than High School	458	14.2%	423	13.4%
2 Some High School	210	6.5%	182	5.8%
3 High School Graduate	770	23.9%	698	22.1%
4 Some College or Technical School	636	19.7%	561	17.8%
5 Two-Year College Graduate	285	8.8%	231	7.3%
6 Four-Year College Graduate	590	18.3%	638	20.2%
7 Postgraduate	276	8.6%	423	13.4%

### **Information Competence Scenarios**

The responses to the scenarios were quantified in two ways. First, the *breadth* of responses was measured. This refers to the number of different types of responses to a given scenario by an individual. That is, when a respondent was presented with a scenario, he or she might have offered

anywhere from zero to a dozen discrete ideas in their response to the scenario. If, for example, the person said three things that could be classified discretely into different answer categories, that person would have a breadth score of three. Second, responses were quantified in terms of *depth*, that is, the extent to which respondents were able to elaborate the specifics of their initial (breadth) responses to the scenarios. For each discrete idea offered in response to the scenarios, the respondents were probed with respect to how they would use the information derived from their initial ideas. The follow-up probes are also in Appendix B. The depth score was the number of discrete ideas offered in response to the follow-up probes.

#### Breadth

The average breadth score for each scenario is displayed in Table 7. Each scenario was presented to over 1,000 respondents. The average breadth ranged from a high of 2.45 for Scenario 2 to 1.46 for Scenario 4. The standard deviation presented in Table 7 indicates the degree of variability in the breadth scores for each scenario. The more variable the number of types of responses, the higher the standard deviation. Thus, the variability ranged from a high of 1.33 for Scenario 1 to a low of .86 for Scenario 6.

**Table 7: Average Breadth by Scenario.**

	N	Minimum	Maximum	Mean	Std. Deviation
SCEN1B Scenario 1 - Breadth	1113	.00	12.00	2.2435	1.3300
SCEN2B Scenario 2 - Breadth	1101	.00	10.00	2.4496	1.2779
SCEN3B Scenario 3 - Breadth	1095	.00	8.00	2.4009	1.0770
SCEN4B Scenario 4 - Breadth	1118	.00	11.00	1.4651	1.1719
SCEN5B Scenario 5 - Breadth	1083	.00	7.00	1.9409	1.1553
SCEN6B Scenario 6 - Breadth	1058	.00	6.00	1.4783	.8645
Valid N (listwise)	0				

The breadth scores on each of the scenarios are related to the breadth scores on each of the other scenarios. That is, a person scoring high on one scenario is likely to score high on the other scenario received, while a person with a low breadth score on one scenario is likely to have a low breadth score on their other scenario. This suggests that breadth scores for the various scenarios are tapping some common dimension.

#### Depth

The average depth score for each scenario is displayed in Table 8. Scenarios 1 and 2 had depth scores of over 2.50. By contrast, scenarios 4 and 6 had average depth scores below 2.00. The variability of the scenarios with respect to depth ranged from a high standard deviation of 2.10 for Scenario 1 to a low of 1.26 for Scenario 5.

**Table 8: Average Depth by Scenario.**

	N	Minimum	Maximum	Mean	Std. Deviation
SCEN1D Scenario 1 - Depth	1060	0	21	2.73	2.10
SCEN2D Scenario 2 - Depth	1072	0	15	2.63	1.68
SCEN3D Scenario 3 - Depth	1084	0	10	2.48	1.34
SCEN4D Scenario 4 - Depth	934	0	12	1.84	1.40
SCEN5D Scenario 5 - Depth	992	0	10	2.11	1.26
SCEN6D Scenario 6 - Depth	954	0	15	1.93	1.34
Valid N (listwise)	0				

There is also consistency in the depth scores – the depth scores on each of the scenarios are related to the depth scores on each of the other scenarios. That is, a person with a high depth score on one scenario is likely to score high on the other scenario he or she responded to, and those scoring with a low on one scenario are likely to score low on their other scenario. Again, this implies that the depth scores are indicators of a characteristic being tapped consistently across all the scenarios. Additionally, depth is related to breadth. The depth of the responses to the scenarios are correlated ( $r=.72$ ) with the breadth of the scenario responses. That is, people with higher breadth scores also had higher depth scores.

#### Scenarios

Scenario 1 addresses core competency one: "Formulate and state a research question, problem or issue not only within the conceptual framework of a discipline, but also in a manner in which others

can readily understand and cooperatively engage in the search." Respondents to Scenario 1 offered an average of 2.24 types of answers, and offered 2.73 responses to the follow-up depth question.

Scenario 2 addresses core competency two: "Determine the information requirements for a research question, problem or issue in order to formulate a search strategy that will use a variety of resources." The students offered an average of 2.45 different answers to Scenario 2, and 2.63 answers to the depth question.

Scenario 3 addresses core competency three: "Locate and retrieve relevant information, in all its various formats, using, when appropriate, technological tools." This scenario elicited an average of 2.40 answers with respect to breadth, and 2.48 answers with respect to depth.

Scenario 4 addresses core competency four: "Organize information in a manner that permits analysis, evaluation, synthesis, and understanding." Respondents to Scenario 4, on average, provided 1.46 different types of answers, and 1.84 responses to the follow-up depth question.

Scenario 5 addresses core competency five: "Create and communicate information effectively using various media. Students offered an average of 1.94 types of responses to Scenario 5 , and gave 2.11 depth responses.

Scenario 6 addresses core competency six: "Understand the ethical, legal and socio-political issues surrounding information." Scenario 6 was met with an average of 1.48 types of answers, and 1.93 responses to the depth question.

### **Collateral Aspects of Information Competence**

Assessments of a number of other aspects of information competence were obtained. Specifically, the areas of achievement and aptitude, library use, library problems, computer literacy, media exposure, research process skills, and the presence of home reference materials were addressed. These were included in order to provide insight into how information competence as assessed here relates to other ways of getting at information competence. The pattern of relationships between the present measures of information competence and collateral aspects of information competence can help clarify the significance of the information competence scores.

The following section gives attention to the relationships between these collateral aspects of information competence and the breadth and depth measures of information competence. For these analyses a breadth score and a depth score was computed for each individual. The breadth scores for the two scenarios responded to by an individual were standardized and combined to provide for a breadth score for that individual. The same was done for the depth scores. Thus, each individual has a standardized breadth score and a standardized depth score. The breadth and depth scores were then converted to percentiles. These scores are assessed in terms of their relation to the collateral information competence aspects.

Tables 9 and 10 may be useful in clarifying the meaning of the percentile scores. These tables present unstandardized breadth and depth scores, grouped by quartile. For the breadth scores, Table 9 shows that people in the lowest quartile averaged breadth scores of .92. That is, they offered, on average, just under one type of answer in response to the scenarios. This can be compared to an average of 3.21 for those in the highest quartile.

**Table 9: Breadth Scores by Quartile.**

UBREADTH Unstandardized Breadth Score for Responder			
QBREADTH Breadth Quartile	Mean	N	Std. Deviation
1 First Quartile	.9206	831	.3846
2 Second Quartile	1.6265	833	.2941
3 Third Quartile	2.2420	814	.3667
4 Fourth Quartile	3.2112	831	.7924
Total	1.9986	3309	.9799

Similarly, Table 10 shows the variability in depth. The students who fell in the lowest quartile could provide only one discrete idea when presented with the follow-up probes – they averaged depth scores of .98. On the other hand, those in the highest quartile provided 3.97 ideas in the follow-up.

**Table 10: Depth Scores by Quartile.**

UDEPTH Unstandardized Depth Score for Respondent			
QDEPTH Depth Quartile	Mean	N	Std. Deviation
1 First Quartile	.9822	815	.3343
2 Second Quartile	1.7334	817	.2543
3 Third Quartile	2.4418	808	.3516
4 Fourth Quartile	3.9699	813	1.3112
Total	2.2801	3253	1.3122

## Achievement and Aptitude

An achievement and aptitude scale was constructed with a number of standardized achievement and aptitude tests as well as GPA for the university. Appendix D contains the items. The achievement and aptitude scale, which had an alpha reliability of .74, was constructed only for those students with this data in their student records. This excludes many transfer students. Consequently, about a third of the respondents do not have achievement and aptitude scores. As indicated in Table 11, there is a slight, positive relationship between the achievement and aptitude scale and the breadth score of information competence. There is no evidence for a relationship between the achievement and aptitude scale and the depth score.

**Table 11: Correlations between Breadth and Depth, and Other Aspects of Information Competence.**

		BREADTH Combined Breadth Score for Respondent	DEPTH Combined Depth Score for Respondent
ACHAPT Achievement/Aptitude	Pearson Correlation	.054*	.012
	Sig. (2-tailed)	.017	.609
	N	1918	1892
LIBUSE Usage of Library Resources	Pearson Correlation	.047**	.055**
	Sig. (2-tailed)	.007	.002
	N	3309	3253
LIBPROB Library Problems	Pearson Correlation	-.071**	-.072**
	Sig. (2-tailed)	.000	.000
	N	3307	3251
COMPLIT Computer Literacy	Pearson Correlation	.050**	.038*
	Sig. (2-tailed)	.004	.029
	N	3307	3251
MEDIAEX Media Exposure	Pearson Correlation	.007	.018
	Sig. (2-tailed)	.683	.295
	N	3307	3251
RPSKILL Research Process Skills	Pearson Correlation	.134**	.119**
	Sig. (2-tailed)	.000	.000
	N	3307	3251
HOMREF Home Reference Materials	Pearson Correlation	.081**	.053**
	Sig. (2-tailed)	.000	.002
	N	3307	3251

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

## Library Use

The library usage scale reflects the frequency of access and use of the library, as well as various purposes for which the students use the library. The reliability for the library use scale was .62. The correlations between library use and the breadth and depth measures of information competence are also in Table 11. There is a small, though statistically significant relationship between usage of library resources and the information competence scales. The greater the usage of the library resources, the greater the breadth and depth of the students' responses to the scenarios.

## Library Problems

The library problems scale reflects the extent to which the students have difficulty using and manipulating information from the library or other information sources. The library problems scale had a reliability score of .66. As might be expected, library problems were negatively correlated with the breadth and depth scores. Respondents who reported having difficulty with library information tended to have lower breadth and depth scores. This is indicated by the negative correlations between library problems and the breadth and depth scores in Table 11.

## Computer Literacy

The extent to which the student has experience with computing technology is captured in the computer literacy scale. The reliability of this scale was .70. There is a slight, positive relationship between computer literacy and the breadth and depth measures of information competence. That is,

the greater the computer literacy of the student, the greater the breadth of their responses to the scenarios as well as the depth of the responses.

#### Media Exposure

The media exposure measure indicates the frequency and extensity with which the student makes use of various information sources. The reliability of this scale was .55. The data provide no evidence for a relationship between media exposure and the breadth and depth scores of information competence.

#### Research Process Skills

The research process skills of each student was assessed. Research process skills refers to the extent to which the student rated himself or herself favorably with respect to such skills as reading comprehension and writing skills. The combination of these skills is expressed with the research process skills scale, which had a reliability of .78. This research skills measure had a meaningful relationship to the breadth and depth dimensions of information competence. This is seen in Table 11. The greater the research process skills, the greater the breadth and depth of responses to the scenarios.

## Home Reference

The amount of reference material the student had in the home while growing up, as well as currently, was assessed. The relationships between home reference material and the breadth and depth measures are also indicated in Table 11. The presence of home reference materials was positively related to the breadth and depth of the students' responses. That is, the more reference material to which the student has been exposed, the greater the breadth and depth of the student's response to the scenarios.

## Students with Relatively Low and High Levels of Information Competence

*Breadth.* These relationships may be further clarified by considering how those with lower information competence scores compare to those with higher information competence scores with respect to these collateral aspects of information competence. Table 12 compares those scoring in the lowest quartile on the breadth measure to those scoring in the highest quartile of breadth measure on the collateral information competence measures. Students in the lowest quartile had an average achievement/aptitude score of .10, while those in the highest quartile scored an average score of .60 on the achievement/aptitude scale. Those in the fourth quartile of the breadth measure scored higher (.08) than those in the first quartile (-.02) on library use. Students in the fourth quartile of the breadth measure also reported having fewer library problems (2.08) than those in the first quartile (2.19). Students in the fourth quartile also had higher self-ratings of their research skills (7.96) than those in the first quartile (7.51), and reported having more home reference material (3.40) than those in the first

quartile (3.15) of the breadth measure. Students in the first and fourth quartiles did not differ in terms of reported media exposure.

**Table 12: Mean Values on Collateral Aspects of Information<sup>a</sup> Competence by First and Fourth Breadth Quartiles.**

	First Quartile	Fourth Quartile
ACHAPT Achievement/Aptitude*	.1031	.5965
LIBUSE Usage of Library Resources*	-.0225	.0803
LIBPROB Library Problems*	2.1948	2.0776
COMPLIT Computer Literacy*	2.8532	3.1023
MEDIAEX Media Exposure	.0095	.0176
RPSKILL Research Process Skills*	7.5109	7.9568
HOMREF Home Reference Materials*	3.1506	3.4031

a. \* indicates a statistically significant difference at .05

*Depth.* Table 13 displays average scores on the collateral aspects of information competence scales for the first and fourth quartiles on the depth measure. There is no significant difference between students in the first and fourth quartiles of the depth measure with respect to achievement/aptitude, library use, or media exposure. However, those with higher depth scores did report having fewer library problems (2.18) compared to those with lower depth scores (2.08). The students with higher breadth scores also had greater computer literacy (3.08) than students with lower depth scores (2.84). Those with higher breadth scores rated themselves more highly with respect to their research skills (7.97) than students with lower depth scores (7.55). Students with higher depth scores also said they had more home reference material (3.39) compared to those with lower depth scores (3.21).

**Table 13: Mean Values on Collateral Aspects of Information Competence by First and Fourth Depth Quartiles.<sup>a</sup>**

	First Quartile	Fourth Quartile
ACHAPT Achievement/Aptitude	.4126	.5268
LIBUSE Usage of Library Resources	-.0084	.0439
LIBPROB Library Problems*	2.1830	2.0760
COMPLIT Computer Literacy*	2.8450	3.0856
MEDIAEX Media Exposure	.0153	.0128
RPSKILL Research Process Skills*	7.5461	7.9677
HOMREF Home Reference Materials*	3.2125	3.3911

a. \* indicates a statistically significant difference at .05.

### **Differences in Breadth and Depth Measures**

In addition to the domains, or other aspects of information competence, that were correlated with breadth and depth scores, a qualitative assessment of a small sample of recorded interviews revealed other possible factors accounting for the variation in scores. These were:

1) Background knowledge, also known as “cultural capital” or “knowledge funds.”

Some students demonstrated little or no knowledge of the problem solving context in each scenario. For example, scenario six required a rudimentary knowledge of newspaper work. However, some students did not have this “knowledge fund” as illustrated by one example: “I

wouldn't ask anything. I'd just print it. It's an editorial. He's the journalist. I'm just the Editor."

2) Differences in cognitive styles in formulating a response.

The additional comments revealed that some students believed they would have answered the scenarios questions more competently if they had been given more time to think about them or if the scenarios had been presented in writing and required a written response. Others gamely took on the challenge while indicating their answers wouldn't necessarily be the best when "off of the top of my head." One student remarked: "I'll just throw things out there until a good idea comes up."

3) Implicit judgments about validity or reliability of information.

There is some evidence that some respondents did not have greater breadth scores because they had implicitly decided some possible answers were not valid. In other words, students had tacit ways of evaluating sources of information or other possible answers which they didn't explicate. For example, some students stated they believed personal experience or experiential learning was the most reliable source of information, omitting mention of printed materials, mass media, or the Internet.

4) Reluctance to reconsider, or enlarge on, what students “already know.” This was especially noticeable for students who claimed some area of expertise related to the scenario, e.g., health science majors who felt they knew a lot about medicine in answering scenario #2 or experienced travelers answering scenario #3. These respondents claimed to already know the best answers.

This analysis is suggestive rather than conclusive. During the 2000-2001 school year, more extensive qualitative research will investigate the factors accounting for variance in student responses. The data collected in the coming year will produce definitive findings. Nevertheless, this preliminary analysis suggests complex reasons for student responses and cautions against making causal or correlational statements relying only on variables used in this study.

### **Information Competence and Demographic Characteristics**

It is useful to consider variations in information competence related to demographic characteristics. This analysis gives attention to the relation between the breadth and depth of the students’ responses and some key features of the student. For this analysis, the breadth and depth percentile scores are used. Percentile scores are a relative score or rank. Thus, some scoring at the 90<sup>th</sup> percentile scored higher than 90% of the cases.

## Student Level

Student level was a significant predictor of the breadth and depth of student responses to the scenarios. Mean breadth and depth percentile scores are presented in Table 14 for students at different levels. Freshmen ranked lower on breadth scores than seniors. Specifically, freshman ranked, on average, at about the 46<sup>th</sup> percentile, while seniors ranked at about the 52<sup>nd</sup> percentile. Additionally, freshmen had lower depth scores than did juniors and seniors. Both depth and breadth of responses vary by student level even when controlling for age.

**Table 14: Breadth and Depth Percentile Scores by Student Level.**

STLEVEL	Student Level		PBREADTH Breadth Percentile Score	PDEPTH Depth Percentile Score
1	Freshman	Mean	46.3234	45.1102
		N	655	647
		Std. Deviation	28.5660	28.7713
2	Sophomore	Mean	49.2406	49.4741
		N	495	487
		Std. Deviation	27.2601	28.3471
3	Junior	Mean	49.7675	50.7403
		N	834	817
		Std. Deviation	29.1818	28.7858
4	Senior	Mean	52.2852	52.2005
		N	1325	1302
		Std. Deviation	29.2290	28.9046
Total		Mean	50.0151	50.0154
		N	3309	3253
		Std. Deviation	28.8712	28.8715

## Gender

Table 15 displays the mean breadth and depth percentile scores for males and females. There were no significant differences in information competence scores by gender.

**Table 15: Breadth and Depth Percentile Scores by Gender.**

QDEM3G Respondent Gender (Interviewer Observation)		PBREADT H Breadth Percentile Score	PDEPTH Depth Percentile Score
1 Female	Mean	50.4511	50.0041
	N	1904	1877
	Std. Deviation	28.6145	28.6507
2 Male	Mean	49.4242	50.0308
	N	1405	1376
	Std. Deviation	29.2154	29.1804
Total	Mean	50.0151	50.0154
	N	3309	3253
	Std. Deviation	28.8712	28.8715

#### Race/Ethnicity

Race/ethnicity was related to information competence scores. Whites, Hispanic/Latinos, and African Americans all displayed greater breadth in their responses than did Asians. This is displayed in Table 16, which shows Asians at just below the 42<sup>nd</sup> percentile. Whites also had higher breadth scores than Hispanic/Latinos. The pattern was similar for the depth of responses. That is, Asians lagged behind whites, Hispanic/Latinos, and African Americans with respect to depth.

**Table 16: Breadth and Depth Percentile Scores by Race.**

RACE	Race		PBREADT H Breadth Percentile Score	PDEPTH Depth Percentile Score
1	White	Mean	53.0467	52.7422
		N	1583	1570
		Std. Deviation	28.1036	28.7128
2	Hispanic/Latino	Mean	49.1164	49.6126
		N	812	801
		Std. Deviation	28.6956	28.5346
3	Asian	Mean	42.4454	43.0490
		N	633	601
		Std. Deviation	29.6533	28.4177
4	African American	Mean	52.5856	50.8279
		N	281	281
		Std. Deviation	28.7246	29.2864
Total		Mean	50.0151	50.0154
		N	3309	3253
		Std. Deviation	28.8712	28.8715

## Age

Table 17 shows the mean breadth and depth percentile scores by age category. Students were classified in three groups based on age. The youngest group, ages 17 to 21, had significantly lower breadth scores than those in the oldest age category, ages 26 and above, though they did not differ from the middle category, ages 22 to 25. The youngest category also underperformed the two older categories with respect to depth. The youngest category had a mean depth percentile score of 47.69, while the middle and oldest categories scored 50.31 and 52.62 respectively.

**Table 17: Breadth and Depth Percentile Scores by Age Category.**

AGECAT	Age Category		PBREADT H Breadth Percentile Score	PDEPTH Depth Percentile Score
1	17 to 21	Mean	47.6902	46.8749
		N	996	989
		Std. Deviation	27.7381	28.6382
2	22 to 25	Mean	50.3128	51.4718
		N	907	889
		Std. Deviation	28.9074	28.2312
3	26 and Older	Mean	52.6200	53.0295
		N	929	908
		Std. Deviation	29.4744	29.3810
Total		Mean	50.1473	50.3476
		N	2832	2786
		Std. Deviation	28.7534	28.8660

### Living Arrangement

The living arrangement of the student was related to the breadth and depth of the students' responses. Those living off campus with their parents had lower breadth scores than those living on campus, those living off campus with their spouse or partner, and those living off campus with roommates. Table 18 shows those living off campus with their parents ranked just over the 46<sup>th</sup> percentile on the breadth measure, while those living on campus, off campus with their spouse or partner, and off campus with roommates ranked at about the 53<sup>rd</sup>, 56<sup>th</sup>, and 51<sup>st</sup> percentiles respectively. Though those living part-time at two different places appear to have scored very low breadth scores, there are too few cases in that category to draw any conclusions. Similarly, those living

on campus ranked below those living off campus with their spouse or partner and those living off campus with roommates.

**Table 18: Breadth and Depth Percentile Scores by Current Living Arrangements.**

QDEM2 Current Living Arrangements		PBREADT H Breadth Percentile Score	PDEPTH Depth Percentile Score
1 On-campus	Mean	53.0040	52.2375
	N	247	244
	Std. Deviation	28.3345	29.1690
2 Off-campus With Parents	Mean	46.5152	46.3368
	N	1310	1284
	Std. Deviation	28.3370	28.2186
3 Off-campus With Spouse or Partner	Mean	55.5346	55.2416
	N	674	666
	Std. Deviation	28.9727	29.1171
4 Off-campus in Fraternity or Sorority	Mean	50.1914	54.1152
	N	15	15
	Std. Deviation	23.0175	30.3615
5 Off-campus With Roommates	Mean	51.2549	51.0177
	N	660	652
	Std. Deviation	28.6796	28.5605
6 Off-campus by Yourself	Mean	48.3187	49.8475
	N	334	325
	Std. Deviation	30.2150	29.9841
7 Off-campus With Relatives	Mean	50.6473	51.9600
	N	49	48
	Std. Deviation	28.0675	27.3946
8 Part-time at Two Places	Mean	41.7951	55.3508
	N	9	8
	Std. Deviation	23.3320	21.9244
Total	Mean	50.0408	50.0450
	N	3298	3242
	Std. Deviation	28.8836	28.8852

## Other Demographics

A number of other demographic characteristics were assessed with respect to their relationship to the breadth and depth measures of information competence. Specifically, student status (full- or part-time), employment status (employed or not employed), personal or family income, and financial assistance from university (received or not received) were not demonstrated to be related to the breadth and depth measures. Financial assistance from a friend or family member, however, was found to be marginally related to depth. That is, those who indicated that they had received some financial assistance from a friend or family member had lower depth scores than did those who had not received assistance.

## Demographics by Quartiles

To provide a clearer picture of those students falling in different quartiles, Appendix E shows percentages for each demographic category with respect to the breadth and depth quartiles. For example, Table E1 in Appendix E shows the percentage of freshmen in each breadth quartile, as well as sophomores, juniors, and seniors. Table E1 shows the breakdown across breadth quartiles for each demographic factor. Table E2 shows the same type of classifications for the *depth* quartiles. Thus, looking at Table E1, we can see that quartile 1 of the breadth measure comprises 24.4% of the females and 26.1% of the males.

## Additional Comments

Finally, interviewers asked respondents if they had any additional comments. Although many of the 441 comments were too vague or irrelevant to be useful, there were 133 comments regarding the campus libraries, technology on campuses, or technology in the campus library.

The most frequent comment concerned the accessibility of computers and difficulty in connecting with the library and the Internet. Most of the comments dealt with the problem of finding an available computer in campus labs or connecting with the campus from home computers.

Students also cited some discomfort in using technology and a number of requests were made for more detailed library technology courses, instruction on how to access the library from home computers, and information on how to use library databases and WebPAC. Several students suggested more library tours to explain library resources including, but not limited to, online resources.

In regard to technology alone, students wanted more online classes but also more classes in how to use the Internet and develop computer skills. Three students commented that they were discouraged by the rules and procedures they had to go through in order to use a campus computer.

## DISCUSSION

The intent of this study was to establish a baseline of student competence to be used as a comparison in future studies. The study did not attempt to grade students on the quality of their answers but rather to create a measure of students' resourcefulness in thinking of ways to locate, evaluate, organize, and use information in everyday life situations. Competence was measured both by the breadth and depth of answers, and not in relation to a set of ideal answers.

The survey revealed the kinds of information resources that students readily think of using and how well acquainted they are with these resources. The survey also shed light on some factors which may account for different levels of information competence. Of particular interest is the significance of library usage and the students' self-assessment of research process skills such as reading comprehension and writing.

The depth and breadth scores tell us that more students were able to supply a broad range of answers and elaborate on them in response to scenarios 1,2, 3 and 5 than to scenarios 4 and 6. One possible explanation is that students are less skilled in organizing information given to them in various formats as in scenario 4, and in perceiving ethical, legal and political dilemmas embedded in a scenario as in 6 than they are in the other four core competencies. However, another likely explanation is that some facet of the context was unfamiliar to respondents such as not having enough knowledge of the newspaper business; also possible is that in listening to the scenario, respondents attended to certain phrases more than others.

Although the teams creating the scenarios believed they had chosen settings and situations that anyone could easily recognize, this may not have been the case. Some students may not have knowledge of historical preservation or community organizing (scenario 4) or of an editor's job or newspaper work in general. (scenario 6) This may be seen as a challenge to the educational system to assure that all students develop a common fund of knowledge, or it may be an invitation to researchers to learn more about the daily lives of an increasingly diverse student population.

In addition, approximately 20% of respondents whose first language was not English had not passed the English Proficiency test (19.3%) or had not taken the test (.8%) This could have been a contributing factor in Asians' underperformance when compared to other ethnic groups.

Future research can build on these findings in several ways. First, it can shed light on why and in what ways students use different information resources and how these practices differ between groups, for instance between freshmen and seniors or between younger and older students. Second, a follow-up study using qualitative methods could reveal how library usage and other factors impact student information competence.

It is a concern that Asian students' performance lagged behind other ethnic groups. In the coming year, further investigation might help explain this difference, if it continues to be true in a different context. If it does not hold true in a different context, research can explore under what conditions Asians or other ethnic groups perform best on information tasks.

The study suggests that students need instruction on the wide variety of information sources available to them. Increasing their repertoire of ways to access, organize and present information

increases the possibility of successful completion of information tasks in an efficient manner. A follow-up study can uncover more specific instructional needs.

## SUMMARY

This information competence study produced a number of noteworthy results. Some key points are listed below.

- The sample includes 3,309 students from 21 CSU campuses.
- The average breadth score for the scenarios ranged from 1.46 to 2.45, and students in the lowest quartile averaged breadth scores of .92, compared to an average of 3.21 for those in the highest quartile.
- The average depth score for the scenarios ranged from 1.84 to 2.73, and students in the bottom quartile averaged depth scores of .98 while those in the top quartile averaged depth scores of 3.97.
- The depth and breadth scores were correlated ( $r=.72$ ).
- A slight, positive relationship was found between the achievement and aptitude scale and the breadth score, but not for the depth score.
- The greater the usage of the library resources, the greater the breadth and depth of the students' responses to the scenarios.
- The greater the computer literacy of the student, the greater the breadth of their responses to the scenarios.
- The greater the research process skills, the greater the breadth and depth of responses to the scenarios.

- The presence of reference materials in the home was positively associated with the breadth and depth of the students' responses to the scenarios.
- Freshmen had lower breadth and depth scores than seniors.
- Asians lagged behind whites, Hispanic/Latinos, and African Americans with respect to breadth and depth.
- The youngest students underperformed the older students with respect to breadth and depth.