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Do Students Understand Liberal Arts Disciplines?

WHAT IS THE EDUCATIONAL PURPOSE of the curricular breadth encouraged at liberal arts institutions? Presumably we want students to acquire a variety of skills and knowledge, but we often claim that most skills are taught "across the curriculum," and liberal arts colleges tend to downplay disciplinary information when listing their educational goals. In this article, we argue that one important educational outcome should be for students to develop accurate perceptions of the disciplines they study.

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The research described here originated when Elmore and Prentice were seniors at Grinnell College. Both were pursuing double majors across academic divisions (chemistry/English and biology/sociology). Both regularly noticed—and were disturbed by—negative and inaccurate impressions of their major fields held by students studying other disciplines. They became interested in C. P. Snow's concept of "two cultures" (1988, 3), which suggests that "the intellectual life of the whole of western society is increasingly being split" into sciences and humanities. Therefore, we designed a study that would measure students' perceptions of the various

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liberal arts disciplines and see whether they changed during the four years of college.

Methods

The research was conducted during spring semester of 1998 at Grinnell College. Grinnell is a small, highly selective, liberal arts college in Iowa. It has no distribution requirements, but student majors are distributed fairly evenly across the three divisions of humanities, natural sciences, and social sciences, and about 85 percent of graduates take at least three courses in each division.

First, twenty seniors representing various majors and seven first-year students were interviewed and asked to sort Grinnell's academic departments into piles of subjects with similar characteristics. These students were also asked to explain their clusters and to describe the characteristics of each. Six groups of departments were consistently described as similar and treated as clusters in the later survey research:

- biology/chemistry/physics (natural sciences)
- math/computer science (math/CS)
- music/art/theater (fine arts)
- Russian/Chinese/Spanish/French/German (languages)
- sociology/anthropology/American studies (soc/anthro)
- religious studies/philosophy (rel/philo)

The remaining departments were treated separately because they were not consistently grouped with any other fields: classics, economics, English, history, political science, and psychology.

Next, 108 seniors and 102 first-years responded to a survey, using a seven-point scale to rate each discipline or cluster according to the following parameters:

- helps with understanding people
- deals with feelings and emotions
- involves creativity
- deals with developing theories
- requires a special talent
- is inherently challenging
- deals with concrete facts
- develops communication skills
- makes an important contribution to society
- is applicable outside academia
- is important for an individual's education (regardless of major)

The students surveyed were representative of their classes in terms of gender and (in the case of seniors) major field.

If one of the goals of a broad liberal arts curriculum is to ensure that graduates understand the various fields of study, then a survey such as ours becomes an outcomes assessment instrument. Since not every student experiences every discipline, or even every cluster of disciplines, to use this study for assessment purposes we needed to know the course-taking history of each individual respondent. Trosset (then Grinnell's director of institutional research) linked seniors' survey responses to their transcript data. She then calculated each student's total credits in each disciplinary cluster and their average grade in each area studied. Seniors were divided into two groups for analysis—those with zero credits in that area, and those with twelve or more credits (at least three courses). Seniors with between one and eleven credits in an area were eliminated from that analysis. We also collected survey responses from a small number of faculty members on their own disciplines. Our assumption is that the more students study a particular subject, the more closely their perceptions of it should resemble those of its practitioners.

Results

Using consensus analysis (a statistical technique that measures levels of agreement within populations), we found that, despite some individual variation, Grinnell students could be considered a single culture with respect to their perceptions of various disciplines. There was general agreement across academic divisions and between the two class years. Thus, though differences were perceived between disciplines, it was not the case that natural science, social science, and humanities students had different overall perceptions.

How, then, does this culture perceive the various disciplines? With respect to each attribute, there were statistically significant differences between some disciplines (here we used ANOVAs and paired t-tests). The table below shows an overall summary of the data. Numbers in parentheses are average scores, with seven at the affirmative end of the scale.

There are several things we should notice about these results. Some of these perceptions are perfectly accurate. Sociology and anthropology *are* about understanding people, and math is *not* about emotions. Likewise, some of these perceptions are false. Perhaps

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most glaringly, math and computer science largely do not deal with facts, but rather with theories and/or processes. It may be that students are confusing the existence of right and wrong answers with a focus on facts and information.

In the following sections, we focus on a few particularly intriguing aspects of students' perceptions.

The "humanness" of disciplines. An interesting pattern was revealed by a factor analysis, a statistical technique that identifies clusters of questions that tend to be answered in similar ways. We found a very strong association among five of the questions: contribution to society, fostering communication skills, helping to understand people, involving feelings and emotions, and involving creativity. The association among these questions suggests that they were all measuring something the students saw as related. Our interpretation is that these questions all relate (positively or negatively) to how much the students saw the various disciplines as being concerned with "the human condition." It appears that Grinnell students tend to apply some category of "humanness" when they perceive and assign value to academic disciplines.

Taking more credits in some disciplines was associated with an increase in their perceived "humanness" (especially history, sociology/anthropology, and psychology). This was not true of others; in fact, math/CS and religious studies/philosophy were actually seen as less "human-related" by seniors who had taken more courses than by those who had taken none. (Grades did not particularly correlate with any aspect of students' perceptions.)

Table 1 **Data Summary**

Helps understand people	Involves emotion	Involves creativity	Develops theories
Soc/anthro (6.2)	Fine arts (6.6)	Fine arts (6.9)	Natural sciences (6.2)
Psychology (6.1)	Psychology (5.9)	English (5.8)	Psychology (5.9)
Rel/philo (5.8)	Rel/philo (5.6)	Rel/philo (4.7)	Math/CS (5.7)
History (5.7)	English (5.1)	Math/CS (4.5)	Soc/anthro (5.7)
Fine arts (5.6)	Soc/anthro (5.1)	Soc/anthro (4.4)	Economics (5.6)
Languages (5.3)	History (4.2)	Natural sciences (4.3)	Political science (5.5)
English (5.0)	Classics (4.0)	Psychology (4.2)	Rel/philo (5.2)
Political science (4.7)	Languages (3.9)	Classics (4.0)	History (4.8)
Classics (4.2)	Political science (3.5)	Languages (3.8)	Fine arts (3.9)
Economics (3.9)	Economics (2.4)	Political science (3.8)	English (3.7)
Natural sciences (3.7)	Natural sciences (2.1)	History (3.7)	Classics (3.0)
Math/CS (2.4)	Math/CS (1.7)	Economics (3.3)	Languages (2.8)

Requires a special talent	Inherently challenging	Involves facts	Develops communication skills
Fine arts (6.2)	Math/CS (6.2)	Natural sciences (6.3)	Languages (6.6)
Math/CS (5.0)	Natural sciences (6.2)	Math/CS (6.3)	English (6.1)
Languages (4.9)	Languages (5.4)	History (5.3)	Fine arts (5.9)
Natural sciences (4.5)	Fine arts (5.3)	Economics (5.1)	Soc/anthro (5.4)
English (4.4)	English (5.0)	Languages (4.9)	Rel/philo (5.2)
Economics (3.9)	Economics (5.0)	Psychology (4.1)	Psychology (5.2)
Classics (3.9)	Classics (4.9)	Political science (4.1)	Political science (4.8)
History (3.6)	History (4.7)	Classics (3.8)	History (4.5)
Political science (3.5)	Political science (4.7)	English (3.7)	Classics (4.4)
Rel/philo (3.4)	Rel/philo (4.7)	Soc/anthro (3.6)	Economics (3.7)
Psychology (3.4)	Psychology (4.6)	Fine arts (3.1)	Natural sciences (3.4)
Soc/anthro (3.1)	Soc/anthro (4.1)	Rel/philo (2.6)	Math/CS (3.1)

Students believe some fields are more essential for everyone's education. Students see some disciplines as more worthwhile than others. In general, the fields seen as more important for everyone to study are those widely taught in high schools—English, history, sciences, math—and disciplines often encountered for the first time at the college level are seen as less important, such as psychology and political science. The fact that seniors as well as first-year students held these views suggests that perceptions that students brought to college were largely unaltered by their experiences on campus.

Transcript analyses do reveal an association between students' perceptions of the importance of studying certain disciplines and their enrollment in these fields. First-years and seniors with no credits in a subject rated some academic fields as much more important than others (from English at 6.0 to sociology/anthropology at 4.1). However, seniors with twelve or more credits in various subjects tended to rate those they studied as of very similar importance (mostly in the 5.x range). We cannot, of course, say whether they learned the importance of the fields by studying them, or whether they first decided the fields were important and studied them for that reason. In either case, it appears that a significant subset of students does embrace a model of liberal education during college. Further study of those who do *not* adopt liberal arts ideals might help with understanding what it takes to change their perceptions.

Students believe some fields contribute more to society. Generally, the fields seen as making a contribution to society are those seen as applicable outside academia. These include the natural sciences, math/CS, the fine arts, and economics. In our preliminary interviews, students identified various "good" contributions of the sciences and math, such as medicine and various technologies, but also mentioned "bad" ones like the design of weapons. Economics is presumably seen as related to finance and investment. Some students we interviewed mentioned that the fine arts are important because they make the world more beautiful.

Some disciplines are perceived to be more challenging. Some disciplines are fairly consistently seen as either hard or easy. In particular, math/CS and the natural sciences stand out in students' minds as the most challenging.

Contributes to society	Applicable outside academia	Important part of education
Natural sciences (6.2)	Natural sciences (5.7)	English (5.6)
Math/CS (5.8)	Math/CS (5.7)	History (5.2)
Fine arts (5.7)	Economics (5.7)	Natural sciences (5.1)
Economics (5.6)	Fine arts (5.5)	Fine arts (5.0)
English (5.2)	Languages (5.3)	Math/CS (5.0)
Psychology (5.0)	English (5.2)	Languages (4.8)
History (5.0)	Psychology (5.0)	Economics (4.7)
Political science (5.0)	Political science (4.9)	Soc/anthro (4.5)
Languages (4.9)	Soc/anthro (4.3)	Rel/philo (4.5)
Soc/anthro (4.7)	History (4.3)	Political science (4.2)
Rel/philo (4.5)	Rel/philo (3.0)	Psychology (4.2)
Classics (3.8)	Classics (2.7)	Classics (3.6)

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Interestingly, students often espoused negative views of their *own* fields. For example, social science division majors (as a group) tended to describe those disciplines as the least challenging, whereas science division majors did not think that science was less challenging (which they might have done on the grounds that perhaps it comes easily to them personally). Math is actually seen as slightly more challenging by seniors who avoided it than by those who studied it (6.6 compared to 6.1), and we know from other evidence that some of those who choose to avoid it do so because they find it difficult. In contrast, the fine arts are seen as more challenging by those who did study them (5.7 compared to 4.9), and the same is true of sociology/anthropology (4.6 compared to 3.7).

Comments about special talents tended to reflect the same patterns as those heard anecdotally: "I'm not good at math, or foreign languages" or "She's very musically talented." A recent study at Hamilton College provides a more detailed look at the concept of special talents. In an interview study, Sweet (2004) found that, while students could list the components of "writing skills" and talk about how they had acquired them, they were generally unable to describe "quantitative skills." Even more troubling, both those who excelled at math and those who feared it tended to see it as unlearnable, saying things like "you can either do it or you can't."

Multiple linear regressions showed that the Grinnell students associated challenge with fields they believed to involve either facts or creativity. Fields that help with understanding people, such as sociology/anthropology and psychology, are *not* considered challenging. Interestingly, helping to understand people is *not* seen as correlated with making a contribution to society or with being an important part of everyone's education. Though distressing to Prentice and Trosset as social scientists, this finding is intriguingly consistent with a finding from an unrelated survey Trosset conducted to evaluate the training activities for student residence hall advisers. There was a tendency for these students to feel that a lot of training was unnecessary because just being a good person should be enough to make them effective in their jobs. As one student put it, "We're caring people, so we already know how to talk to someone who's depressed." As mental health professionals know, most people do *not* know how to talk to depressed people, but this student's remark reflects a common perception that these activities are not challenging skills that require training.

Students espouse a narrow definition of creativity. Students seemed to define creativity narrowly as the production of a creative work; the fine arts and English (creative writing) were considered more creative than other fields. The limits of this definition are seen in the fact that fields believed to develop theories were seen as noncreative, although developing theories is a creative activity. Respondents also rarely felt that fields dealing with facts were creative. Overall, students seemed to think that certain fields would deal with facts or theories, and others would deal with emotions or creativity.

One of the few things that differed between first-year and senior responses was that seniors thought natural sciences and math/CS were significantly more creative than first-years did. They also thought that math/CS dealt less with facts. This was true for both seniors who did and did not take courses in these areas. Although we cannot explain this finding, it is possible that this attitude could be learned

from other students who were studying these fields. Conversely, seniors who took courses in sociology or anthropology saw those fields as significantly more creative than those who had not (5.2 compared to 4.3). Faculty members in all disciplines surveyed saw their own disciplines as highly creative, reflecting what happens at the high levels of any academic field.

Implications

Overall, the students' perceptions are not so different from what we might expect to hear from the general public. However, half of our respondents had already received four years of a liberal arts education. Is this what we should expect? Why are these perceptions—and misperceptions—important? How do they affect the quality of the education we provide, and of the society in which our graduates participate?

Students seem to arrive at college already holding some deep-seated views of disciplines. Clearly these views will affect their curricular choices, which will limit their exposure to disciplines they already perceive negatively (and perhaps inaccurately). In interviews with senior humanities majors who had avoided the sciences, Trosset found that many held negative misperceptions of those fields: as uncreative with one right answer and no room for new ideas; as cold, distant, and unconcerned about people; as very specialized and unrelated to their lives; and as pointless for anyone not planning a scientific career. About half said they had actively resisted pressure from their advisers to take more science. We wonder whether higher education's increasing emphasis on interdisciplinary courses will affect student perceptions. These initiatives could provide opportunities for students to see greater similarities between fields—although negative student perceptions could limit their effectiveness.

The nature of faculty advising can also be affected by such perceptions. A 1967 study by Lionel Lewis found that faculty members in the humanities, social sciences, and natural sciences at a large university had different ideas about the purpose of a college education. For example, those in the sciences were more likely than others to believe an education should "provide vocational training and skills related to career," while humanities faculty were more likely to believe an education should "provide deepening and broadening experiences." One thing not often mentioned at liberal arts colleges is that, even at these institutions, not all faculty members are themselves liberally educated, and not all espouse the values of the liberal arts. In the previously mentioned interviews with science-avoidant students, several said their advisers had not pressured them to take any science. In a related study in which faculty members evaluated various student curricula, some individuals indicated that they did not particularly value multidisciplinary breadth. Humanities faculty members were more likely than others to tolerate an absence of natural science courses, while natural science professors were more likely to tolerate an absence of social sciences.

Even more important, every day citizens make decisions that affect how liberal arts disciplines will be taught and used, whether or not they know very much about them. Politicians make decisions about what kinds of research will be funded, and how our society will interact with other cultures. Business executives decide how technologies will be applied and made available. School boards decide what children will study. Professional schools decide what kinds of undergraduate curricula prepare students to enter business, engineering, medicine, and the law. Misperceptions and negative views of disciplines can easily lead to actions and policies that are anathemas to those of us committed to the liberal arts. As educators, we need to be very concerned with students who only ever take one class in a subject area, and what understandings of that subject they achieve. The pervasive student misperceptions of academic disciplines described in this study suggest that this type of assessment is very important for liberal arts institutions. □

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