

Association Report: 2YC₃

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A Snapshot of Chemistry Programs and Faculty at Two-Year Colleges

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The Need for Information

For all the data gathered in recent years on science education, there has never been any systematic or comprehensive effort to map the scope and substance of chemistry instruction at the nation's two-year college campuses. Apart from anecdotal reports, little is known about the demographics, background, current assignments, and viewpoints of the thousands of chemistry faculty who teach there. Equally little is known about the types of chemistry courses taught, instructional practices, faculty perceptions of resources available for instruction or professional development, and characteristics of the students enrolled in chemistry courses. Yet two-year colleges represent approximately 50% of higher education institutions and are particularly important in providing access to many groups that are underrepresented in the science, mathematics, and technology workforce (1).

Partners in Progress, a 1992 report of a National Science Foundation (NSF) workshop on the role of professional societies in science, technology, engineering, and mathematics education in two-year colleges, included a recommendation that the American Chemical Society (ACS) and other professional societies conduct studies to obtain baseline information on science at two-year colleges (2). Members of ACS's Division of Chemical Education and ACS staff concurred that a survey of chemistry in the two-year colleges would provide valuable information. Plans for such a study were put into place, and ACS resources for the first phase of the project became available in 2001 (3). Because the American Institute of Physics (AIP) had completed an extensive study of physics in two-year colleges in 1996 with NSF funding, ACS arranged to collaborate with AIP and draw upon the resources of its Statistical Research Center for this study (4).

Gathering the Data

ACS adapted the model successfully used by AIP for its study of physics. The plan was to first conduct a survey of appropriate department chairs, program heads, or deans at all two-year college campuses that offer chemistry courses. This ACS-funded survey would permit the gathering of some basic data on both faculty and programs. It would also lay the groundwork for a second phase—an in-depth survey of individual faculty—that will require external funding.¹ The faculty survey would ask for detailed information on academic and work experience, instructional practices, resources for instruction and professional development, as well as views on the adequacy of resources and faculty descriptions of their students' characteristics.

Connecting with Departments

During the 2001 fall semester a survey form was sent to department chairs or other appropriate representatives at 1195 two-year college campuses that offer chemistry (out of a total of 1773 two-year college campuses in the nation). The questionnaire was designed to obtain a range of data on faculty and programs.²

The response rate of 77% indicates that the survey data reported here provides a comprehensive view of chemistry in two-year colleges. Web sites were checked for another 208 campuses (17%) that did not respond, and unofficial data obtained from these sites were found to be consistent with the other 77%. Thus there is a strong basis for assuming that the results reflect the situation of at least 94% of the two-year colleges that offer chemistry.

Findings on Faculty

Number of Faculty

The 916 responding departments included a total of 3364 faculty. Adding to this figure the numbers of faculty obtained from Web sites of 208 non-responding departments and generalizing to the 6% of schools for which no data on department size were available, it is estimated that, overall, there were approximately 4300 chemistry faculty in this nation's two-year colleges in fall 2001, 59% (2540) with full-time appointments and 41% (1760) teaching part-time.

Gender

Thirty-two per cent of chemistry faculty members at reporting departments were female. Proportions of full-time and part-time faculty by gender were identical. Forty per cent of the campuses had no women on their chemistry faculty, and 34% had only one. No difference was found in course load or full-time/part-time status by gender. However, a higher percentage of male faculty (55%) had Ph.D.s or Ed.D.s compared with female faculty (40%). There were no significant differences in tenure status (male: 52% tenured, 10% tenure-track, 38% temporary; female, 48%, 14%, 38% respectively).

Course Loads

The survey requested information on faculty course loads excluding standalone laboratory sections. The median number of such courses was 3 for full-time faculty and 1 for part-time faculty. The corresponding means were 2.7 and 1.3. Table 1 gives more detail on the number of chemistry sections

Association Report: 2YC₃**Table 1. Number of Chemistry Sections Taught per Faculty Member, Fall 2001, Excluding Laboratory**

Sections per Faculty Member	Full-time Faculty, Percent (Number ^a)	Part-time Faculty, Percent (Number ^a)
1	16 (406)	76 (1338)
2	30 (762)	21 (370)
3	33 (838)	2 (35)
4	16 (406)	1 ^b (18)
5	4 (102)	
>5	1 (25)	

^a Calculated using the estimate of 4300 chemistry faculty; 59% (2540) full-time, 41% (1760) part-time.

^b One percent of part-time faculty taught four or more courses.

taught per faculty in the fall 2001 semester. Note that many full-time faculty often teach non-chemistry courses, which are not reflected in these data, and fulfill administrative duties in addition to their chemistry course assignment.

Highest Degree by Tenure Status

Ph.D. or Ed.D. degrees were held by 53% of the tenured faculty, 59% of tenure-track faculty, and 43% of temporary faculty.

Other Factors

Table 2 lists data for full- and part-time faculty on highest degree earned, tenure status, and years at current campus.

Findings on Programs

Program Size (Faculty)

In terms of departmental size, 28% of campuses had only one chemistry instructor. On the other end of the distribution, four campuses each had 19 chemistry faculty. Overall, campuses had a median of 3 and a mean of 3.7 chemistry faculty.

Program Size (Course Sections)

The median number of chemistry sections (excluding laboratory sections) taught in a department during the fall 2001 semester was six, and the mean 7.8. Seven percent of campuses offered only one chemistry section; 30% taught three or fewer.

Retirements

Sixteen percent of the campuses had seen retirements among full-time permanent faculty during the past two years; in 88% of the cases only one person retired. On the basis of this, it can be estimated that, among all two-year college chemistry programs, there were about 225 retirements over the past two years.

Table 2. Comparison of Full-time and Part-time Chemistry Faculty, Fall 2001

	Full-time, Percent	Part-time, Percent
Ph.D. or Ed.D.	54	42
Tenured/permanent	78	3
Tenure-track	18	1
Temporary	4	96
Years working at campus (median)	10	4
(mean)	12.6	6.2

Other Turnover

Ten percent of the campuses also had full-time faculty leave prior to retirement. This generalizes to an estimate of 120 faculty leaving, also over a two-year period.

Recruitment

Nine percent of the campuses were currently recruiting new full-time faculty, which translates to a total of 120 positions open, and another 13% say they anticipate recruiting next year, involving an additional 180 positions nationwide. (The small discrepancy between retirement plus other turnover and recruitment might be due to internal filling of some openings, on either a permanent or temporary basis, by current part-time faculty.)

Findings on Courses

Nationwide, there were an estimated 9000 chemistry course sections offered at two-year colleges in the fall of 2001 (computed by multiplying the reported mean of 2.1 chemistry sections per instructor by 4300 instructors). Table 3 indicates the distribution of the various kinds of courses offered.

Further Information

The departmental survey has provided reliable data that were not previously available on two-year college programs and faculty, along with a database of faculty names from which a representative sample can be drawn for the second phase of the project planned for 2003. The full report of data from the departmental survey is available at <http://www.acs.org/education/2year.html> (accessed Nov 2002).

Overall results from the departmental and planned faculty surveys will lead to a better understanding of the status of chemistry in two-year colleges by providing detailed quantitative data about two-year college chemistry programs and faculty. Outcomes will include identification of strengths and

Table 3. Distribution of Types of Chemistry Courses, Fall 2001

Course Name	Campuses Offering Course, Percent	Fraction of All Chemistry Courses Offered, Percent
General Chemistry for Science Majors	93	41
Introductory Chemistry for Allied Health, etc.	73	29
Chemistry in Context, etc.	23	6
Analytical Chemistry	4	1
General Organic Chemistry	59	11
Chemical or Physical Science for Education Majors	5	1
Other Physical Science	6	2
Chemical Technology	3	1
Other ^a	26	8

^a Includes Fundamentals of Chemistry, Preparatory Chemistry, and similar courses of a basic, introductory nature, as well as specialty courses.

areas of need for both professional development and instructional programs, and provision of a baseline for comparison for two-year colleges that are trying new approaches to education and establishing innovative programs.

Notes

1. Funding is currently being sought through the NSF ATE program for the second phase of the project. If funding is obtained, the faculty survey will be conducted in the fall 2003 semester.

2. Only aggregate data from the survey are reported. Data from individual institutions are treated as confidential.

Literature Cited

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