In 1988, a national survey was conducted by the Center for the Study of Community Colleges to assess the needs of two-year colleges for faculty, equipment, and facilities for science, social science, mathematics, engineering, and science-based technology programs, and to identify innovative programs for recruiting students into these programs. Telephone interviews were conducted with a faculty member or administrator from a representative sample of 91 community colleges. Study findings included the following: (1) the colleges had an average of 7 full-time and 12 part-time mathematics faculty members, 5 full-time and 4 part-time physical science faculty members, and 9 full-time and 12 part-time social science faculty members; (2) 40% of the colleges had hired new full-time faculty in math, engineering, and technology within the past 2 years; (3) over 50% of the respondents indicated that compared to part-time faculty, full-time faculty were more experienced in teaching, more committed to the institution, in some cases had stronger credentials, and devoted more time to courses and students; and (4) 30% of the respondents felt that their division had better equipment than other divisions on campus, though small and medium-sized campuses rated their own equipment and facilities more highly than did the large campuses. Based on study findings, it was concluded that if enrollment trends continue and state and local budgets remain at their current level or increase, almost 2,000 additional full-time science, mathematics, and engineering/technology faculty will be employed in the next 5 years. (EJV)
A Pilot Study on Needs in the Sciences in Community Colleges

August 1988

by Debra Banks and Gary Railsback

Center for the Study of Community Colleges

A Non-Profit Corporation

1749 Mandeville Lane, Los Angeles, CA. 90049
(213) 208-6088

Arthur M. Cohen, President
Florence B. Beawer, Research Director
INTRODUCTION

In 1987 the Center for the Study of Community Colleges summarized the major findings of prior research on the status of science education in the community colleges. This summary digest included a list of recommendations in the areas of students, faculty, and curriculum to verify these recommendations and extend them, the Center conducted a pilot study focusing on college needs for faculty staffing, equipment and facilities, and program innovations for recruiting students into science programs.

In May and June 1988 the Center conducted telephone interview surveys with staff in public community colleges across the United States. The interviewees were directed to consider science, social sciences, mathematics, engineering and science-based technologies.

This report includes notes on:
The Sample of Colleges
Faculty
Facilities
Equipment
Student Abilities
Resource Allocations
Conclusions/Recommendations
Response Frequencies

All information was obtained from college staff members in interviews conducted by Debra Banks and Gary Railsback, who also drafted the report. The project was conceived and directed by Arthur M. Cohen and Florence B. Brawer.
THE SAMPLE

A random sample of 91 out of 1134 public community colleges was drawn from the 1987 Community, Junior and Technical College Directory (AACJC, 1987). Participants in the telephone survey consisted of administrators and faculty representatives and were selected by their college presidents upon request by the Center for the Study of Community Colleges. The sample of colleges reflected a normal distribution by enrollment size and a near balanced distribution by region (see tables 1 and 2).

Table 1
National and Sample comparison of Enrollment size

<table>
<thead>
<tr>
<th>Enrollment</th>
<th>Small 1-1499</th>
<th>Medium 1500-7499</th>
<th>Large 7500 plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Colleges</td>
<td>28%</td>
<td>55%</td>
<td>17%</td>
</tr>
<tr>
<td>Sample</td>
<td>19%</td>
<td>62%</td>
<td>20%</td>
</tr>
</tbody>
</table>

¹All college percentages are based on the number of public community colleges.
Table 2  
Comparison of the National and Sample Current Faculty Staffing by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Northeast</th>
<th>Middle States</th>
<th>South</th>
<th>Midwest</th>
<th>Mountain Plains</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Colleges</td>
<td>9</td>
<td>7</td>
<td>32</td>
<td>27</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Sample</td>
<td>11</td>
<td>11</td>
<td>22</td>
<td>28</td>
<td>6</td>
<td>23</td>
</tr>
</tbody>
</table>

¹All college percentages are based on the number of public community colleges.  
THE FACULTY

The average number of full and part-time faculty is shown in Table 3. The smaller colleges had higher percentages of full-time faculty in science, math, engineering and technologies. Medium and large size colleges were about equal in full-time faculty ratios except in the areas of engineering and technology (see chart 1).

Table 3

Averages of Full and Part-time Faculty by Discipline by College Size 1986/87

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Size Colleges</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medium Size Colleges</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Large Size Colleges</td>
<td>13</td>
<td>23</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td>25</td>
<td>15</td>
<td>25</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Average for all colleges</td>
<td>7</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>12</td>
<td>9</td>
<td>11</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

FT= full-time, PT=part-time, Phys= physical sciences, SS= social sciences, ET= engineering and technology, and LS= life sciences.
CHART 1

PERCENTAGE OF FULL-TIME FACULTY BY COLLEGE SIZE

MATH
PHYS. SCI.
SOCIAL SC.
ENG & TECH.
LIFE SCIENCE

<table>
<thead>
<tr>
<th>College Size</th>
<th>MATH</th>
<th>PHYS. SCI</th>
<th>SOCIAL SC</th>
<th>ENG &amp; TECH</th>
<th>LIFE SCIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMALL</td>
<td>49</td>
<td>49</td>
<td>45</td>
<td>69</td>
<td>69</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>37</td>
<td>53</td>
<td>44</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>LARGE</td>
<td>37</td>
<td>42</td>
<td>37</td>
<td>37</td>
<td>62</td>
</tr>
</tbody>
</table>
Changes in Faculty Staffing in the Past Two Years

In answering the question on changes in faculty staffing in the past two years a number of participants gave mixed responses. For example, some stated there were new hires in math disciplines while reducing full-time staff positions in life science at their college. Responses were coded by categories as listed in table 3 and percent frequencies were derived for the categories.

In 40 percent of the cases colleges have hired new full-time faculty in the areas of math, engineering and technology. Full-time replacement hiring has occurred at a 26 percent rate while replacing full-timers with part-timers has only been at a 8 percent level. Reductions in either part-time or full-time faculty pools occurred at a 11 percent rate (see table 4).

Table 4
Percent Changes in Faculty Staffing in the Past Two Years
(1985-86 to 1987-88)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacements for full-time departures</td>
<td></td>
</tr>
<tr>
<td>full-time</td>
<td>26%</td>
</tr>
<tr>
<td>part-time</td>
<td>8%</td>
</tr>
<tr>
<td>Additional hires</td>
<td></td>
</tr>
<tr>
<td>full-time</td>
<td>40%</td>
</tr>
<tr>
<td>part-time</td>
<td>15%</td>
</tr>
<tr>
<td>Reduction of teaching staff</td>
<td>11%</td>
</tr>
<tr>
<td>Total Responses</td>
<td>95</td>
</tr>
</tbody>
</table>

1. Responses were based on hires or reductions in physical and life science and engineering and technology.
By region, new full-time faculty hires have occurred at a greater frequency in the middle Atlantic states (67%) followed by the South (47%) and Midwest (40%) (see Table 5).

Table 5

Percent Changes in Faculty Staffing in the Past Two Years by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast/Middle States</td>
<td>38%</td>
</tr>
<tr>
<td>South</td>
<td>47%</td>
</tr>
<tr>
<td>Midwest</td>
<td>40%</td>
</tr>
<tr>
<td>Mountain Plains</td>
<td>17%</td>
</tr>
<tr>
<td>West</td>
<td>36%</td>
</tr>
</tbody>
</table>

1. The above percentages reflect full-time hires only.
PROJECTED ADDITIONAL FULL-TIME FACULTY HIRES

The largest number of additional full-time faculty hires are expected to occur in math, engineering and technologies (see table 6). Not shown in table 6 is that the expected hirings in technological areas are almost equally split between the disciplines of electronics, computer science and nursing.

Table 6
Projected Percentage of Additional Full-time Hires for the next five years by Discipline

<table>
<thead>
<tr>
<th>Math</th>
<th>Physical Sciences</th>
<th>Social Sciences</th>
<th>Eng. &amp; Tech Sciences</th>
<th>Life Sciences</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>35</td>
<td>14</td>
<td>9</td>
<td>29</td>
<td>13</td>
</tr>
<tr>
<td>Total Number</td>
<td>58</td>
<td>24</td>
<td>15</td>
<td>49</td>
<td>21</td>
</tr>
</tbody>
</table>

Extrapolating the above number of hires by discipline, approximately 2,082 new full-time positions will be created in science, math, engineering and technology. Positions as broken down by discipline will be 723 math, 299 physical science, 611 engineering and technology, 262 life science and 187 social science.
Hiring patterns by discipline by region (see Table 7) demonstrate that the greatest number of public community college math faculty hires will occur in the West (31%) and South (29%), physical science hires in the Midwest (38%) and West (25%), engineering and technologies in the South (29%) and Northeast (27%), and life science in the Midwest (33%) and West (24%) and South (24%) (see Table 7).

Table 7
Projected Percentage of Additional Full-time Faculty Hires for the Next Five Years by Discipline by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Math</th>
<th>Physical Sciences</th>
<th>Social Sciences</th>
<th>Eng. &amp; Tech</th>
<th>Life Sciences</th>
<th>% of Total Hires by Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle States</td>
<td>7</td>
<td>13</td>
<td>13</td>
<td>16</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Mountain States</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Midwest</td>
<td>22</td>
<td>38</td>
<td>47</td>
<td>6</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>Northeast</td>
<td>9</td>
<td>8</td>
<td>13</td>
<td>27</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>South</td>
<td>29</td>
<td>17</td>
<td>0</td>
<td>29</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>West</td>
<td>31</td>
<td>25</td>
<td>27</td>
<td>18</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td><strong>100%</strong></td>
<td><strong>101%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

1Percent by region excludes Social Sciences.
Obstacles for Additional Hires

Although the number of new hires is fairly optimistic, participants felt that certain conditions or events could prevent these hires. The greatest frequency of concerns cited were state budgeting and subsequent monies available for additional salaries (see table 8).

Table 8

Obstacles for New Full-time Faculty Hires: Frequency of Responses
(N = 107)

<table>
<thead>
<tr>
<th>Category of Response</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monies for salaries</td>
<td>30%</td>
</tr>
<tr>
<td>State budget</td>
<td>25%</td>
</tr>
<tr>
<td>Qualifications and credentialing</td>
<td>15%</td>
</tr>
<tr>
<td>Location</td>
<td>7%</td>
</tr>
<tr>
<td>Facilities space</td>
<td>4%</td>
</tr>
<tr>
<td>Affirmative action</td>
<td>3%</td>
</tr>
<tr>
<td>Other 1</td>
<td>7%</td>
</tr>
<tr>
<td>None</td>
<td>10%</td>
</tr>
</tbody>
</table>

1 Other category included: collective bargaining contracts, enrollments, administration approval, state statutes, and residency requirements.
Qualitative Differences Between Full and Part-time Faculty

Since 1970 the ratio of part-time faculty nationwide has increased steadily; in 1986 it was 60%. Participants in this study were asked if they found any qualitative differences between full-time and part-time faculty. Over 50 percent of the respondents state that full-time faculty were more experienced in teaching, more committed to the institution, in some cases had stronger credentials, and devoted more time to courses and students. On the other hand, part-time faculty had a better perspective of skills students would need for particular job fields and were up to date knowledge in technical areas.

Science and Technology Faculty Preparation

When community college representatives were asked to compare the faculty preparation in the Science and Technology area with other divisions or departments at their campus, 38% responded that their division was better prepared than other divisions. However when the size of the campus was considered, the small and medium size were closer to this average of 38% than was the larger campuses with over 7,500 students where 61% of the respondents rated their faculty better than other divisions.

Chart 2

Science & Technology Faculty Preparation
Rating compared with other departments on the same campus

<table>
<thead>
<tr>
<th>Size</th>
<th>Better</th>
<th>Same</th>
<th>Worse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>32</td>
<td>63</td>
<td>5</td>
</tr>
<tr>
<td>Medium</td>
<td>33</td>
<td>65</td>
<td>2</td>
</tr>
<tr>
<td>Large</td>
<td>61</td>
<td>39</td>
<td>0</td>
</tr>
</tbody>
</table>
When the region of the country is considered (see chart 3), the percentage responding that their division faculty were better than other divisions was the lowest on those campuses in the Midwest (24%) and Northeast (33%) regions and highest in Campuses in the Mid Atlantic (50%) and Western (48%) regions.

Chart 3

Science & Technology Faculty Preparation Rating compared with other divisions by Region
EQUIPMENT

When asked to compare their equipment with other divisions on the same campus, 30% responded that their division had better facilities. Yet when size of campus is considered, the small campuses had the highest percentage responding that their division had the better equipment (37%) than either the medium size campus (33%) or the large campus (17%). This was similar to what was found in the facilities comparison, that the large campus have a higher rating for faculty but lower in facilities and equipment.

Chart 5

Science & Technology Equipment Rating compared with other divisions at the same college by College Size

The Equipment rating results were similar in that the Mid-Atlantic region had the highest percentage (50%) responding that their equipment was better than other divisions on the same campus and the West had the lowest percentage (10%). Colleges in the Midwest had the highest percentage responding that their equipment was worse than other division (32%) with the Mid-Atlantic and Mountain Plains both having 20% and the West with only 14%.

When the the representatives were asked specifically what equipment they needed to replace, the responses were tallied by the five different departments, with no responses for social sciences. The response with the highest percentage in each of the five areas was that the equipment they already had was obsolete. In Table 6 below are recorded the percentages for each of the divisions.
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In addition to having a considerable amount of equipment that is obsolete, these representatives when given the opportunity to prioritize funds to upgrade their science and technology program decided that their first and second highest priorities were to purchase new equipment.

Chart 7 gives the percentages of responses for the first, second and third priorities.
Chart 7
FIRST, SECOND AND THIRD PRIORITY FOR UPGRADING SCIENCE AND TECHNOLOGY PROGRAMS

- NEW EQUIP. 38 19
- CURRICULUM 29 11
- STAFF TRAIN 30 9
- REPAIR FAC 22 16 21 8 10 14

KEY:
- FIRST
- SECOND
- THIRD
STUDENT ABILITY

The majority of respondents evaluated their student's ability in the Science and Technology divisions as being the same as students in other divisions (58%), with 33% responding that their students were better prepared and only 9% evaluating their students as being below other divisions in preparation. When campus size was considered the small campuses had the highest percentage responding that their students were better (42%), and the medium (63%) and large (61%) campuses had a majority respond that their students had the same abilities as other divisions. While the smaller campuses had the highest percentage responding their students were better prepared they also had the highest percentage (16%) responding that their students were not as prepared as students in other divisions of the same campus.

Chart 8

Science & Technology Students Ability compared with students in other divisions of the same campus by Size

![Chart showing student ability by campus size](chart.png)
While the Mid Atlantic region had been rated strong in the areas of Faculty Preparation, Facilities, Equipment, it slipped to fourth place when student ability was considered by region. While the Western region had been consistently low in all previous areas except faculty, it rose slightly to 29% responding their students were better prepared than other divisions.

Chart 9

Science & Technology Student Ability compared with students in other divisions at the same college by Region
RESOURCE ALLOCATION

The large campus divisions were rated the highest for their faculty preparation being better than other divisions (61%) and their resource allocation (44%) and yet were lower in the areas of facilities, equipment, and student ability. Though their resources are better than other divisions they do not rate what they can actually spend money on as being higher. If these colleges were not limited to a uniform salary range for all faculty it would appear that they are spending their large portion of resources on faculty salaries.

Chart 10
Science & Technology Resource Allocation compared with other divisions on the same campus by Size

![Bar Chart]

The highest response to the question of resource allocation was 40% stating their division was better than other divisions. Yet the Mid Atlantic region responded that 80% were better than other divisions, far ahead of the Northeast region which was 56% and the West with 43%. The other three regions were all in the range of 20% with the South at 28.6%; the Midwest at 28% and the Mountain Plains at only 20%.
Chart 11
Science & Technology Resource Allocation compared with other divisions on the same campus by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Better</th>
<th>Same</th>
<th>Worse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Atlantic</td>
<td>10</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mtn Plains</td>
<td>10</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Midwest</td>
<td>28</td>
<td>33</td>
<td>11</td>
</tr>
<tr>
<td>Northeast</td>
<td>29</td>
<td>57</td>
<td>14</td>
</tr>
<tr>
<td>South</td>
<td>43</td>
<td>48</td>
<td>10</td>
</tr>
<tr>
<td>West</td>
<td>48</td>
<td>48</td>
<td>10</td>
</tr>
</tbody>
</table>
CONCLUSION:

Science, mathematics, and engineering and technology full-time faculty staffing percentages in the public community colleges are the best in small size colleges with enrollments under 1500. In addition, the small size colleges were second highest in rating their facilities good, highest in rating their equipment good and highest in rating their students better prepared.

Although enrollments in two-year colleges have plateaued since 1982 (U.S. Department of Education, 1988), science, mathematics, and engineering and technology full-time faculty employment has increased particularly in the Mid-Atlantic and southern states. If enrollment trends continue and state and local budgets remain at their current level or increase, almost 2000 additional full-time faculty will be employed science, mathematics, and engineering and technology in the next five years.

RECOMMENDATIONS FOR FURTHER STUDY

Based on the study's findings summarized above, the following recommendations are made to better understand and improve science education in two-year colleges:

Faculty:

1. A comprehensive nationwide study of science, mathematics, and engineering and technology full and part-time faculty is needed to ascertain faculty characteristics by sex, race/ethnicity, degree holding, and the labor markets from which these faculty are being hired.
2. A trend analysis of science, mathematics, and engineering and technology full-time women and minority faculty employment since 1980 is needed and should be coupled with a trend analysis of science, mathematics, and engineering and technology student enrollment by sex and race/ethnicity.
3. Additional analyses should be done on science, mathematics, and engineering and technology full-time faculty regarding: the professional organizations they belong to, professional conferences they attend, their research and publications, and the salaries.
4. An analysis of the extent science, mathematics, and engineering and technology full-time faculty act as advisors/counselors and are involved in student activity and recruitment programs should be made.
5. Finally, science, mathematics, and engineering and technology full-time faculty should be assessed and compared with other community college faculty for job satisfaction and burn-out.

Facilities/Equipment/Resource Allocation:

1. A comprehensive nationwide analysis of science, mathematics, and engineering and technology community college facilities is needed. Such analysis should identify utilization of both classroom and laboratory space dedicated to science, mathematics, and engineering and technology programs.
2. A comprehensive nationwide analysis of science, mathematics, and engineering and technology equipment usage and needs should be done. In particular, an assessment is needed on the kinds of teaching equipment constantly used in the classroom and laboratory.
3. Last, a comprehensive nationwide analysis of science, mathematics, and engineering and technology equipment and facilities budgets should be done.

Curriculum:

1. Science, mathematics, and engineering and technologies curricular studies are needed to show similarities and differences in course content and delivery between community college courses and similar courses in high schools and four-year colleges and universities.
2. Comparison studies are needed of associate degree curricular requirements in science, mathematics, and engineering and technologies.
3. A database of all innovative science, mathematics, and engineering and technology curricula should be constructed.
4. An assessment study should be made of science, mathematics, and engineering and technology course completion requirements.
5. An assessment study of science, mathematics, and engineering and technology curricular trends (e.g., implementation of critical thinking and writing across the curriculum) relative to student outcomes should be made.

Students:

1. Study of the community college contribution to student flow toward science-based professions should be made so that the colleges' efforts and outcomes may be placed in the overall higher education context.
QUESTIONS FOR DEPARTMENT/DIVISION CHAIR OR DEAN OF TECHNOLOGY

1. How many faculty teach (responses are the average number for all colleges)

<table>
<thead>
<tr>
<th></th>
<th>Full Time</th>
<th>Part Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Engineering/Technology</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

(See also Table 3 and Chart 1)

2. What changes in staffing have you made in the past two years?

- Replace full-time departures with full-time: 26%
- Replace full-time departures with part-time: 8%
- Additional full-time hires: 40%
- Additional part-time hires: 15%
- Reducing of teaching staff: 11%

(See also Tables 4 and 5)

3. Do you anticipate needing additional staff in the next five years?

- Yes: 78%
- No: 22%

If Yes, please indicate number and fields.

Faculty:

<table>
<thead>
<tr>
<th>Teaching field</th>
<th>No, Full-time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>58</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>24</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>15</td>
</tr>
<tr>
<td>Engineering &amp; Technology</td>
<td>49</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>21</td>
</tr>
</tbody>
</table>

(See also Tables 6 and 7)

4. If you foresee any obstacles in employing these people, please indicate what they might be.

- Monies for Salaries: 30%
- State Budget: 25%
- Qualifications and credentialing: 15%
- Location: 7%
Facilities and space 4%
Affirmative action 3%
Other 7%
None 10%

(See Table 9)

5. Are there qualitative differences between full-time and part-time faculty?

- Full-time are more experienced in teaching 41%
- Full-time are more committed to the institution 23%
- Full-time have stronger credentials 13%
- Full-time devote more time to courses and students 10%
- Part-time have a better perspective of the skills students would need for particular job fields 3%
- Part-time have more up to date knowledge in technical areas 10%

6. How would you rate the facilities and equipment in your division?

<table>
<thead>
<tr>
<th>Rating</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>5%</td>
</tr>
<tr>
<td>Fair</td>
<td>25%</td>
</tr>
<tr>
<td>Good</td>
<td>49%</td>
</tr>
<tr>
<td>Excellent</td>
<td>21%</td>
</tr>
</tbody>
</table>
7. How would you compare the science and technology programs with other programs at your college?

<table>
<thead>
<tr>
<th>Faculty preparation</th>
<th>Better</th>
<th>Worse</th>
<th>Same</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities</td>
<td>38%</td>
<td>2%</td>
<td>59%</td>
</tr>
<tr>
<td>Equipment</td>
<td>30%</td>
<td>9%</td>
<td>60%</td>
</tr>
<tr>
<td>Student ability/preparation</td>
<td>30%</td>
<td>15%</td>
<td>53%</td>
</tr>
<tr>
<td>Resource Allocation</td>
<td>33%</td>
<td>9%</td>
<td>58%</td>
</tr>
</tbody>
</table>

8. Using these categories, how would you compare your science and technology programs with those in:

<table>
<thead>
<tr>
<th>Category</th>
<th>Better</th>
<th>Worse</th>
<th>Same</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local high schools</td>
<td>91%</td>
<td>0%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Other community colleges in your area</td>
<td>47%</td>
<td>11%</td>
<td>39%</td>
<td>3%</td>
</tr>
<tr>
<td>Four-year colleges and universities</td>
<td>25%</td>
<td>28%</td>
<td>41%</td>
<td>5%</td>
</tr>
</tbody>
</table>

9. If you were given funds to use for upgrading your science and technology program, toward which of the following could the funds best be applied?

**What would be your first priority? (N=63)**

- New Equipment: 38%
- Curriculum Development: 7%
- Staff Training: 2%
- Repair/Rebuild Facilities: 8%
- Additional Labs: 5%
- Research on Teaching/Learning: 2%
- Conference Travel: 2%

**What would be your second priority? (N=63)**

- New Equipment: 29%
- Staff training: 22%
- Additional Labs: 13%
- Curriculum Development: 11%
- Repair/Rebuild Facilities: 10%
- Research on Student Outcomes: 10%
- Research on Teaching/Learning: 5%
- Conference Travel: 2%

**What would be your third priority? (N=57)**

- Staff training: 21%
- New equipment: 19%
- Repair/Rebuild facilities: 14%
- Additional Labs: 11%
- Conference travel: 11%
- Curriculum Development: 9%
Research on Student Outcomes 7%
Counselor Information 5%
Research on Teaching/Learning 4%

The frequency for all 92 cases regardless of priority for each category are as follows:
New equipment 82%
Staff training 53%
Curriculum development 50%
Additional laboratory stations 36%
Repair or rebuild facilities 28%
Research on student outcomes 22%
Conference travel 14%
Research on teaching, learning 13%
Other 9%
Counselor information 7%

10. What specific deficiencies in facilities or equipment do you have now or foresee as imminent?

Classrooms 28%
Laboratories 37%
Storage space 22%
Rent facilities in area 3%
New buildings or now constructing 10%
Need faculty offices/furniture 17%
Renovate old buildings 10%
Computer Equipment needed:
None listed 46%
Software 1%
Both software & hardware 15%
Computer lab 17%
Computer Integrated Manufacturing 1%
Just replaced equipment 2%
Equipment is Obsolete 16%
Repair current equipment 1%

Chemistry Equipment needed:
None listed 50%
Balances 1%
All equipment needed 2%
Computer lab 13%
Just replaced equipment 2%
Lab 9%
Obsolete equipment 21%
Repair current equipment 2%

Biology Equipment needed:
None listed 44%
Microbalances/sterilizers 4%
Microscopes 3%
Computer lab 10%
Microbalances, Microscopes/Computer lab 2%
Just replaced equipment 2%
Laboratory 12%
Obsolete equipment 21%
Repair current equipment 2%

Physics Equipment needed:
None listed 44%
Laser/Fiber optic 1%
All equipment needed 5%
Computer lab 10%
Just replaced equipment 2%
Laboratory 11%
Obsolete equipment 25%
Repair current equipment 2%

Engineering Equipment needed:
None listed 48%
CAD/CAM 7%
Graphic Reproduction 1%
AV/Robotics 1%
Computer Lab 12%
Firearms 1%
Just replaced equipment 3%
Lab 1%
11. How could more students be encouraged to enroll in science, mathematics and engineering technology programs?

- Obsolete equipment: 24%
- Repair current equipment: 2%

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulation programs with High Schools</td>
<td>52%</td>
</tr>
<tr>
<td>Junior High Articulation programs</td>
<td>25%</td>
</tr>
<tr>
<td>Advertisement/Publicity</td>
<td>17%</td>
</tr>
<tr>
<td>Elementary School Programs</td>
<td>15%</td>
</tr>
<tr>
<td>Provide more vocational counseling</td>
<td>14%</td>
</tr>
<tr>
<td>On Campus events for High School students</td>
<td>11%</td>
</tr>
<tr>
<td>Internships/Work Experience</td>
<td>11%</td>
</tr>
<tr>
<td>Marketing Study</td>
<td>10%</td>
</tr>
<tr>
<td>Transfer programs with four year colleges</td>
<td>8%</td>
</tr>
<tr>
<td>Scholarships</td>
<td>8%</td>
</tr>
<tr>
<td>Career Fairs with Industry</td>
<td>7%</td>
</tr>
<tr>
<td>Develop &quot;Tech Prep&quot; curriculum with high schools</td>
<td>5%</td>
</tr>
<tr>
<td>Bring High School Faculty on Campus</td>
<td>4%</td>
</tr>
<tr>
<td>Offer Developmental courses</td>
<td>4%</td>
</tr>
</tbody>
</table>

12. Have you done anything special to encourage participation by women and minority students? For example, initial enrollments or retention and program completion?

### Re: Women's Recruitment/Retention
- College has "Women's Program": 49%
- College hasn't developed special Women's program: 37%
- Majority of Students are already women: 5%
- Majority of students are women & have programs: 2%
- Attempting to hire women faculty: 2%
- Advertising: 1%
- Have Women's program and advertising: 1%
- Provide childcare for women students: 1%

### Re: Minority Recruitment/Retention
- Have minority recruitment program: 42%
- Don't have minority program: 42%
- Few minorities in service area: 7%
- Seeking to hire minority faculty as role model: 2%
- Already have proper ratio of minority to area population: 2%
- Faculty involvement in this area: 1%
REFERENCES


DEFINITIONS

Life Sciences: Includes Biology and Nutrition
Physical Sciences: Includes Physics, Chemistry, Earth Science, Geology, and Astronomy.
Technologies: Focused on scientific theory based courses: Electronics, CAD/CAM, Aviation, Nursing, and health related fields.
PARTICIPATING COLLEGES BY STATE BY REGIONS

NORTHEAST

Connecticut
Quinebaug Valley
Waterbury State Tech. College
Massachusetts
Cape Cod
Springfield Technical
New Hampshire
New York
Broome
Genesee
Onondaga
Orange County
Vermont
Vermont Tech. Coll.

MIDWEST

Illinois
Chicago City-Wide
Wilbur Wright
Highland
John Wood
William Rainey Harper
Iowa
North Iowa Area
Southeastern-North & South
Michigan
Kirtland
Monroe County
Muskegon
Oakland-Highland Lakes
Schoolcraft
Minnesota
Minneapolis
Willmar
University of Minnesota Technical
Crookston
Missouri
East Central
Penn Valley
Three Rivers
Trenton
Nebraska
Metropolitan Technical
Mid Plains
Southeast-Beatrice

(Midwest continued on next page)
SOUTH
Arkansas
  Phillips County
  S. Arkansas U.-El Dorado
Florida
  Central Florida
Sheboyan
  Palm Beach
  Polk
  South Florida
Kentucky
  Owensboro
  Somerset
North Carolina
  Anson Tech. Coll.
  Forsyth Tech. Coll.
  Randolph Tech.
  Wilks
South Carolina
  Midlands Tech.
Texas
  Alvin
  Austin
  Cisco
  El Centro
  Franks Phillips
  Odessa
Virginia
  Rappahannock

MIDWEST (Continued)
Ohio
  Youngstown State
Wisconsin
  University of Wisconsin Center-
    Gateway Technical-Racine

MOUNTAIN PLAINS
Kansas
  Independence
Montana
  Flathead Valley
New Mexico
  Eastern New Mexico University-Clovis
  New Mexico Jr. College
Oklahoma
  Rogers State College

WEST
Arizona
  Arizona Western
California
  Cabrillo
  College of the Redwoods
  Long Beach City College
  Fullerton
  College of Alameda
  Riverside
  San Diego Miramar
  City College of San Francisco
  Santa Clarita Community
  Santa Rosa
  Mission-Santa Clara
  Yuba
Nevada
  Clark County
Oregon
  Blue Mountain
  Clatsop
  Portland
  Southwestern Oregon
Washington
  Pierce
  North Seattle
  Whatcom