RESULTS FROM THE 2014 SPIN-UP SURVEY OF PHYSICS DEPARTMENTS

Prepared by the Statistical Research Center at the American Institute of Physics

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Contents

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Executive Summary

Throughout the report, we offer comparisons of the 2014 data as it compares to the 2002 data. We conducted the appropriate tests for statistical significance where possible. We find that, while some things remain the same, others have changed since the 2002 survey. Below are some of the differences we found.

- We compared recruitment activities reported in 2014 with those reported in 2002. In 2014, more undergraduate departments
    - Targeted recruitment of students likely to major in physics,
    - Targeted recruitment of students who are underrepresented minorities,
    - Hosted individual prospective students & their families in the department,
    - Had faculty or students regularly visit local schools,
    - Offered "introduction to the profession" courses for first-year students,
    - Actively recruited transfer students from two-year colleges, and
    - Grouped potential physics majors in special section of the introductory course.
- A larger proportion of graduate departments hosted individual prospective students and their families in the department.
- There has been a statistically significant shift in advising responsibility in the undergraduate departments: a larger proportion of departments (80%) assigns the advising responsibility to all or several faculty members, while the proportion of departments making one faculty member responsible for all undergraduate advising has decreased (to 6%).
- In comparing student engagement activities in 2014 with those in 2002, we found that a higher proportion of undergraduate departments provided a dedicated undergraduate study room or lounge and conducted exit interviews with graduating seniors.
- Departments have increased their career information dissemination efforts. In 2002, 6% of the departments offered no career information activities; by 2014, that had dropped to less than 3%.

Background

How the survey was conducted

In 2014, the Statistical Research Center at the American Institute of Physics conducted a survey of physics departments to learn about courses and curricula, recruitment activities, interactions between faculty and students, alumni tracking, and curricular reform. The questionnaire was virtually identical to one used in a 2002 survey of physics departments. In this report, we present the results. We will follow the format of the report from the 2002 survey[1] so that one might readily compare. In addition, we have performed the appropriate statistical tests to examine changes and will highlight changes that are statistically significant.

[1] The report from the 2002 survey is available at https://www.aps.org/programs/education/undergrad/faculty/spinup/upload/spinup-survey.pdf.

The original twelve-page questionnaire used in 2002 was developed by Ken Krane and Bob Hilborn. The 2014 questionnaire was virtually identical to the one used in 2002 in order to identify changes in undergraduate physics programs. The department chairs were asked about physics courses and curricula, including the types of courses offered, the number of credits to earn a degree, and the number of students majoring and minoring in physics. Also included were items about recruiting, advising, and keeping track of students and alumni.

The survey was conducted entirely online during the summer of 2014. An email was sent to all 750 chairs of physics departments whose programs included awarding a bachelor's degree in physics. They were asked to visit our web site to complete the questionnaire about their bachelor's programs. The first email was sent on June 24th, a follow-up to non-respondents was emailed on July 7th, and a third request was sent on July 16th. A reminder request was sent July 22nd to respondents who had started the questionnaire but had not completed all of the items. On August 5th we sent a fourth request to those who did not respond, notifying them that the on-line questionnaire would close on August 13th. A final reminder request was sent again to respondents who had started the survey but had not completed all of the items. At the time the survey was closed, 480 contacts in physics departments replied, yielding a 64% response rate.

There appears to be no statistically significant difference in the response rates by highest physics degree offered, by number of physics bachelor's degrees awarded in the previous three years, or by number of full-time equivalent (FTE) faculty members. Therefore, we believe the responses are representative of all physics departments.

Table 1: Response rate by highest physics degree offered in 2014

	Responded		
Highest Physics Degree	**Yes %**	**No %**	**Total Number of Departments**
Bachelor's	65	35	496
Master's	65	35	56
PhD	63	37	191
Overall	64	36	743

Table 2: Response rate by number of physics bachelor's awarded during 2011, 2012, & 2013

Number of Bachelor's 3-year total	Responded Yes %	No %	Number of Departments
New depts.	57	43	7
None	78	22	8
1 to 5	50	50	78
6 to 9	63	37	111
10 to 14	62	38	117
15 to 29	68	32	233
30 to 44	70	30	86
45 or more	67	33	110
Overall	65	35	743*

*The sum (743) does not include the 7 new departments.

Table 3: Response rate by number of physics faculty members (FTE) in 2013

Number of Faculty (FTE)	Responded Yes %	No %	Number of Departments
2 or less	58	42	69
2.1 to 3	61	39	76
3.1 to 4	70	30	54
4.1 to 6	66	34	128
6.1 to 9	62	38	117
9.1 to 15	67	33	112
15.1 to 25	70	30	66
25.1 to 39.9	67	33	72
40 or more	60	40	42
Overall	65	35	736

Courses and Curricula

The first section of the survey dealt with courses and curricula. The next set of tables describes the findings. Between 2002 and 2014, there were no statistically significant changes in the academic calendars. About one department in eight (12%) is on a campus that awards one credit per course, and about one in twenty (5%) operates on a quarter system. The majority of departments (83%) use a semester system. Physics courses comprise 25% - 46% of the total credits required for the "standard" physics degree[2]. This is summarized in Table 4. (There was no significant difference in the academic calendar by highest physics degree awarded.)

Table 4: Total and % physics credits required for "standard" physics degree, 2014

Academic calendar	Total credits for bachelor's degree Low N	 High N	Physics credits for "standard" degree Low %	 High %	Number of respondents
One credit per course	32	36	25	36	57
Semester	120	128	26	41	389
Quarters	180	205	28	46	22

There were no statistically significant changes in the variation in academic calendars nor in the distribution of "standard" physics bachelor's degree programs between 2002 and 2014. Over three-fourths (77%) of the departments awarded a B.S. in physics as the "standard" physics degree, and about one department in six (17%) awarded a B.A. in physics as the "standard" physics degree.

We also asked about physics, math, and chemistry credits required in the "standard" degree. These are shown in Table 5; there has been no statistically significant change from 2002.

Table 5: Physics, math & chemistry requirements in "standard" degree programs, 2014

	Physics credits required Low %	 High %	Math credits required Low %	 High %	Chemistry credits required Low %	 High %	Number of respondents
B.S. in physics	27	44	10	18	3	8	348
B.A. in physics	24	36	6	15	3	7	70
Other bachelor's	23	48	8	16	3	9	18

[2] The "standard" physics degree was defined in the questionnaire as: "your 'most rigorous' physics program. This is usually the undergraduate curriculum that requires the largest number of physics credits and is often designed for students preparing for graduate study in physics."

Table 6 details alternative degree tracks offered. There is no statistically significant change in these data from 2002.

Table 6: Alternative physics degree tracks offered by "standard" program, 2014

Alternative degree track	"Standard" physics degree program B.S. in Physics %	B.A. in physics %	Other bachelor's %	Overall %
B.A.	39	NA	20	32
Physics degree for teachers	28	4	25	24
Specialized degree (e.g. geophysics)	20	20	10	20
Applied physics	14	5	10	13
Engineering physics	17	9	15	16
Combined degree (e.g. physics + math)	7	10	10	8
Astronomy degree	10	13	5	10
Other	14	14	25	15
No alternative track	13	40	30	18
Number of responding departments	355	77	20	452

There was an open-ended question about plans to add any alternative degree tracks in the near future. In reading through those responses, we find that engineering physics was the most commonly mentioned program; other programs that were mentioned frequently include applied physics, astronomy/astrophysics, biophysics and physics education. Some programs discussed adding BS or BA options; others mentioned a dual bachelors/master's program. Departments that offer only a bachelor's degree seemed to consider a broader diversity of options including geophysics, meteorology, and nano-engineering than graduate physics departments.

Recruitment Activities

We asked the same questions about recruitment activities in 2014 that we had asked in 2002, and we used a paired-difference test to examine changes between 2002 and 2014. This test uses data only from departments that responded both years to insure that the changes exhibited were not the result of a different sample of departments. We also divided the departments into two groups: those awarding only a bachelor's degree in physics (undergraduate departments) and those awarding a graduate degree in addition to the bachelor's degree (graduate departments). The undergraduate departments seem to have become more engaged in recruitment activities, while there was little change in the graduate departments.

A larger proportion of undergraduate departments participated in recruitment activities in 2014 than did in 2002. More undergraduate departments

- Targeted recruitment of students likely to major in physics,
- Targeted recruitment of students who are underrepresented minorities,
- Hosted individual prospective students & their families in the department,
- Had faculty or students regularly visit local schools,
- Offered "introduction to the profession" courses for first-year students,
- Actively recruited transfer students from two-year colleges, and
- Grouped potential physics majors in special section of the introductory course.

There was no change in the proportion of undergraduate departments holding annual (or more often) departmental open houses for students & parents, holding summer workshops for high school students, and identifying and recruiting talented students in service courses.

A larger proportion of graduate departments hosted individual prospective students and their families in the department. While the proportion of graduate departments conducting the various recruitment activities was typically higher than or roughly equivalent to the proportion in undergraduate departments in 2014, there were no other changes in the proportion of departments participating in the recruitment activities we asked about.

It should be noted that 22% of the undergraduate departments reported targeted recruitment of students who are underrepresented minorities; only 12% of graduate departments did so. The graduate departments are typically larger with respect to the number of physics majors. We did test to see whether or not there was a statistically significant difference in the average number of bachelor's degrees awarded over the last three years for departments that participated in more recruitment activities in 2014; we found no difference. Perhaps the changes in recruiting activities will affect the number of bachelor's degrees awarded in future years.

All of these data are detailed in Tables 7 and 8.

There was an open-ended question asking departments their perception of which recruiting activities they considered to be most effective. In examining the responses to this question, we find that hosting students and/or their families in the department and holding open houses in the department were most often mentioned as the most effective recruitment activities. In addition, respondents mentioned contacting interested students, visiting nearby high school classrooms, and using the introductory course to target potential majors.

Table 7: Recruitment activities in undergraduate departments, 2002 & 2014

	2014 Estimate	2002 Estimate	Change*	Level of Significance**
Number of graduates in the past three years	13.1	8.1	+4.9	Very High
Recruiting of High School Students: % of Departments that …				
Target recruitment of students likely to major in physics	41%	28%	+13%	Very High
Target recruitment of students who are underrepresented minorities	22%	7%	+15%	Very High
Host individual prospective students & their families in the department	68%	57%	+11%	High
Have faculty or students regularly visit local schools	26%	17%	+9%	Marginal
Hold annual (or more often) departmental open house for students & parents	47%		—	—
Hold summer workshops for high school students	10%		—	—
Recruiting of Enrolled College Students: % of Departments that …				
Offer "introduction to the profession" courses for first-year students	24%	7%	+17%	Very High
Actively recruit transfer students from two-year colleges	17%	6%	+10%	Very High
Group potential physics majors in special section of the introductory course	24%	15%	+9%	High
Identify and recruit talented students in service courses	60%		—	—

* The value in the "Change" column will not necessarily equal the difference between the 2002 value and the 2014 value due to rounding.

** The "Level of Significance" refers to statistical significance based on the *p*-value from the paired-difference test. The *p*-value is the probability of obtaining a results equal to or "more extreme" than what was actually observed assuming there is no difference between 2002 and 2014. The levels of significance are defined as:

Very High: p-value < 0.01 High: 0.01 < p-value < 0.05 Marginal: 0.05 < p-value < 0.10

Table 8: Recruitment activities in graduate departments, 2002 & 2014

	2014 Estimate	2002 Estimate	Change*	Level of Significance**
Number of graduates in the past three years	19.5	10.6	+8.9	Very High
Recruiting of High School Students: % of Departments that …				
Host individual prospective students & their families in the department	80%	67%	+12%	Marginal
Hold annual (or more often) departmental open house for students & parents	53%		—	—
Have faculty or students regularly visit local schools	42%		—	—
Target recruitment of students likely to major in physics	41%		—	—
Hold summer workshops for high school students	19%		—	—
Target recruitment of students who are underrepresented minorities	12%		—	—
Recruiting of Enrolled College Students: % of Departments that …				
Identify and recruit talented students in service courses	61%		—	—
Group potential physics majors in special section of the introductory course	32%		—	—
Offer "introduction to the profession" courses for first-year students	27%		—	—
Actively recruit transfer students from two-year colleges	13%		—	—

* The value in the "Change" column will not necessarily equal the difference between the 2002 value and the 2014 value due to rounding.

** The "Level of Significance" refers to statistical significance based on the *p*-value from the paired-difference test. The *p*-value is the probability of obtaining a results equal to or "more extreme" than what was actually observed assuming there is no difference between 2002 and 2014. The levels of significance are defined as:

Very High: p-value < 0.01 High: 0.01 < p-value < 0.05 Marginal: 0.05 < p-value < 0.10

Interactions between Faculty and Students

In terms of student engagement, the person or persons responsible for advising undergraduate majors in graduate departments has not changed significantly. In 58% of the graduate departments, several or all faculty members are responsible for advising; in 29%, one faculty member has this responsibility. In the remaining graduate departments, advising is handled by the chair (2%), departmental staff (6%), a university advisor (2%) or in some other way (2%).

There has been a statistically significant shift in advising responsibility in the undergraduate departments. A larger proportion of departments (80%) assigns the advising responsibility to all or several faculty members, while the proportion of departments making one faculty member responsible for all undergraduate advising has decreased (to 6%). There has been little change in the proportion of departments in which the chair does the advising (12%) or in which the advising is handled in some other way (2%).

Student-advisor interactions occur more frequently than they did in 2002; the change is seen in advisors seeing students several times per term. (See Table 9.)

Table 9: Frequency of student-advisor interaction, 2002 & 2014

	Type of Department			2014	2002
	Bachelor's %	**Master's %**	**PhD %**	**Overall %**	**Overall %**
Once a year or less	3	12	12	6	5
Once per term	35	58	61	42✦	33
Several times per term	62	30	27	52✦	62
Number of Responding Departments	293	33	95	421	556

✦ The difference is seen in the increased number of times students and advisors have interactions.

The questionnaire asked about a series of activities which department might use to engage students. In most cases, a higher proportion of the graduate departments had offered the activity in 2002 than undergraduate departments at that time. We found no statistically significant changes in activities offered in graduate departments. Among undergraduate departments, a higher proportion provided a dedicated undergraduate study room or lounge and conducted exit interviews with graduating seniors. The results for undergraduate departments are in Table 10; the graduate department results are in Table 11.

We did test for statistically significant difference in the number of bachelor's degrees awarded by the number of student engagement activities. (We simply summed up the number of student engagement activities from Table 10 or 11 in which each department participated.) We found highly significant differences for undergraduate departments (p-value = 0.030); that is, departments which offered a higher number of student engagement activities awarded more bachelor's degrees. We did not find any statistically significant differences for graduate departments.

Table 10: Student engagement activities in undergraduate departments, 2002 & 2014

	2014 Estimate	2002 Estimate	Change*	Level of Significance**
Number of graduates in the past three years	13.1	8.1	+4.9	Very High
% of Departments that …				
Provide a dedicated undergraduate study room or lounge	86%	74%	+12%	Very High
Conduct exit interviews with graduating seniors	45%	35%	+10%	High
Have an active physics club or SPS chapter	73%		—	—
Provide building keys to undergraduate physics majors	54%		—	—
Assign a faculty mentor to each student	52%		—	—
Assign a peer mentor to each student	2%		—	—

* The value in the "Change" column will not necessarily equal the difference between the 2002 value and the 2014 value due to rounding.

** The "Level of Significance" refers to statistical significance based on the *p*-value from the paired-difference test. The *p*-value is the probability of obtaining a results equal to or "more extreme" than what was actually observed assuming there is no difference between 2002 and 2014. The levels of significance are defined as:

Very High: p-value < 0.01 High: 0.01 < p-value < 0.05 Marginal: 0.05 < p-value < 0.10

Table 11: Student engagement activities in graduate departments, 2002 & 2014

	2014 Estimate	2002 Estimate	Change*	Level of Significance**
Number of graduates in the past three years	19.5	10.6	+8.9	Very High
% of Departments that …				
Have an active physics club or SPS chapter	91%		—	—
Provide a dedicated undergraduate study room or lounge	80%		—	—
Provide building keys to undergraduate physics majors	64%		—	—
Conduct exit interviews with graduating seniors	54%		—	—
Assign a faculty mentor to each student	39%		—	—
Assign a peer mentor to each student	4%		—	—

* The value in the "Change" column will not necessarily equal the difference between the 2002 value and the 2014 value due to rounding.

** The "Level of Significance" refers to statistical significance based on the *p*-value from the paired-difference test. The *p*-value is the probability of obtaining a results equal to or "more extreme" than what was actually observed assuming there is no difference between 2002 and 2014. The levels of significance are defined as:

Very High: p-value < 0.01 High: 0.01 < p-value < 0.05 Marginal: 0.05 < p-value < 0.10

Departments have increased their career information dissemination efforts. In 2002, 6% of the departments offered no career information activities; by 2014, that had dropped to less than 3%. Looking at undergraduate departments, we find that fewer relied on materials from professional societies, and the proportion relying on the university career services offices was unchanged. The biggest increase was in the proportion of departments having alumni visit. For graduate departments, the proportion taking field trips to local industry declined, while the proportion having alumni visit and the proportion relying on the university career services office increased. These data are detailed in Tables 12 and 13.

Table 12: Career information activities in undergraduate departments, 2002 & 2014

Activity	2014 Estimate	2002 Estimate	Change*	Level of Significance**
Number of graduates in the past three years	13.1	8.1	+4.9	Very High
% of Departments that have used _____ to provide career information …				
Alumni visits to the department	67%	44%	+24%	Very High
Departmental colloquia by physicists in industry	50%	33%	+17%	Very High
Career materials from the professional societies	50%	62%	-11%	High
Field trips to local industries	33%	23%	+10%	High
The university career services office	54%		—	—

* The value in the "Change" column will not necessarily equal the difference between the 2002 value and the 2014 value due to rounding.

** The "Level of Significance" refers to statistical significance based on the *p*-value from the paired-difference test. The *p*-value is the probability of obtaining a results equal to or "more extreme" than what was actually observed assuming there is no difference between 2002 and 2014. The levels of significance are defined as:

Very High: p-value < 0.01 High: 0.01 < p-value < 0.05 Marginal: 0.05 < p-value < 0.10

Table 13: Career information activities in graduate departments, 2002 & 2014

Activity	2014 Estimate	2002 Estimate	Change*	Level of Significance**
Number of graduates in the past three years	19.5	10.6	+8.9	Very High
% of Departments that have used _____ to provide career information …				
Alumni visits to the department	61%	37%	+24%	Very High
Field trips to local industries	20%	39%	-18%	High
The university career services office	59%	37%	+22%	High
Departmental colloquia by physicists in industry	66%		—	—
Career materials from the professional societies	61%		—	—

* The value in the "Change" column will not necessarily equal the difference between the 2002 value and the 2014 value due to rounding.

** The "Level of Significance" refers to statistical significance based on the *p*-value from the paired-difference test. The *p*-value is the probability of obtaining a results equal to or "more extreme" than what was actually observed assuming there is no difference between 2002 and 2014. The levels of significance are defined as:

Very High: p-value < 0.01 High: 0.01 < p-value < 0.05 Marginal: 0.05 < p-value < 0.10

Alumni Tracking

Three-hundred and forty-three departments responded to a question asking about career destinations of graduates of the last three years. Table 14 compares the responses for departments awarding a doctorate, master's, or bachelor's as the highest physics degree. These data have been weighted by number of graduates. Whereas more than one-third of the bachelor's degree recipients from departments with graduate programs in physics go to graduate school in physics, just over one-fourth of those from undergraduate departments do so. In 2014, doctoral-granting departments accounted for 52% of the physics bachelor's degrees awarded, and undergraduate only departments accounted for 42% (Mulvey & Nicholson, 2015). (The remaining were awarded in master's-granting departments.) It must be noted that only respondents who provided data are included in Table 14. It is possible that departments who responded to the questionnaire but did not provide responses to this question do not have this information for their graduates; thus, the proportion of graduates for which information is not known is likely higher than 12%. The decreasing proportions of alumni going to graduate school in physics and continuing in 3/2 engineering programs is statistically significant, as is the increase in the proportion going into nontechnical employment.

Table 14: Reported alumni destinations (as a percent of graduates), 2002 & 2014

	Highest Physics Degree Awarded			**Overall**	**Overall**
Destination	**Bachelor's**	**Master's**	**Doctorate**	**2014**	**2002***
Graduate school in physics	27	35	36	31	35
Other graduate school	19	8	15	16	13
Employment in technical field	20	29	20	21	22
Employment in nontechnical field	6	5	6	6✦	3
High school teaching	7	8	3	5	6
Continued in 3/2 engineering program	6	0	1	3✦	7
Active military	4	0	1	2	1
Other	1	1	5	3	2
Don't know	9	13	14	12	11
Number of responding departments	244	28	71	343	453

✦ These changes are statistically significant; however, it is possible that the difference is a function of differences in departments tracking alumni rather than actual differences in post-baccalaureate plans.

* These data do not match the data in the 2002 report; rather, these are stated as a percentage of graduates to make the comparisons consistent.

Table 15 takes a different look at these data. Instead of looking at the proportion of alumni going on to various destinations, Table 15 looks at the proportion of departments sending at least one bachelor's degree recipient to these same destinations. Almost every department sent at least one alumnus to graduate school in physics, and about half of the departments do not know what at least one student did after graduation. The marked increase in the proportion of departments sending alumni to employment in nontechnical fields is consistent with the increase in the number of graduates accepting employment in these fields. (Again, this difference could be more about changes in tracking alumni than about actual changes in post-baccalaureate plans.)

Table 15: Proportion of departments sending alumni to various destinations, 2002 & 2014

Destination	Highest Physics Degree Awarded: Bachelor's (%)	Master's (%)	Doctorate (%)	Overall 2014 (%)	Overall 2002 (%)
Graduate school in physics	91	100	97	93	91
Other graduate school	80	64	85	80✦	65
Employment in technical field	80	93	85	82	80
Employment in nontechnical field	47	46	51	48✦	28
High school teaching	52	54	61	54	45
Continued in 3/2 engineering program	33	0	13	26	31
Active military	19	7	31	21	17
Other	14	11	31	17	14
Don't know	49	57	61	52✦	38
Number of responding departments	244	28	71	343	453

✦ These changes are statistically significant; however, it is possible that the difference is a function of differences in departments tracking alumni rather than actual differences in post-baccalaureate plans.

We also asked about the types of information departments maintain on their alumni. Table 16 details the proportion of departments using a variety of methods to maintain information on alumni. Many more departments now maintain some form of data than they did in 2002. In 2002, almost one-third of the responding departments (32%) reported maintaining no information on alumni; by 2014, this proportion had dropped to 5%. PhD- and master's-granting departments are more likely than undergraduate departments to maintain a mailing list for a departmental newsletter. Conversely, undergraduate and master's-granting departments are more likely than doctoral-granting departments to receive updates from past students by email or phone.

Table 16: Alumni information maintained by departments, 2002 & 2014

Type of Information	Highest Physics Degree Awarded: Bachelor's (%)	Master's (%)	Doctorate (%)	2014 Overall (%)	2002 Overall (%)
Updates from past students by email or phone	60	60	39✦	55	51
Mailing or email addresses for students at the time they graduate	58	69	54	58✦	46
Information on employment or graduate school plans at the time of graduation	59	54	52	57✦	45
Mailing list for departmental newsletter	18	34✦	38✦	25	26
Surveys of alumni	24	26	22	24	24
Other	11	11	8	10✦	4
None of the above	6	3	4	5✦	32

✦ These changes are statistically significant; however, it is possible that the difference is a function of differences in departments tracking alumni rather than actual differences in the type of information maintained.

Curricular Reform

About half of the responding departments reported having made "significant" changes in their curriculum over the preceding several years; this is statistically significant smaller proportion of departments than reported making such changes in the 2002 survey with p-value < 0.01. When changes were made, they were more likely to be made in upper-division courses and the calculus-based introductory course. The details are provided in Table 17. With the exception of upper-division courses, departments were more likely to change the pedagogy or content and pedagogy instead of changing only the content of the course.

Table 17: Curricular reform in various courses, 2014

	Bachelor's (%)	Master's (%)	PhD (%)	Overall (%)
General Education Courses				
Content	9	8	3	7
Pedagogy	24	38	20	24
Both	32	15	34	32
N/A	35	38	43	37
Algebra-based Introductory Course				
Content	7	7	9	7
Pedagogy	30	36	25	30
Both	17	14	16	16
N/A	46	43	50	47
Calculus-based Introductory Course				
Content	7	0	3	5
Pedagogy	41	38	51	43
Both	32	38	29	32
N/A	20	25	17	20
Introductory Course for Majors				
Content	14	13	6	12
Pedagogy	22	13	27	22
Both	24	47	33	28
N/A	40	27	33	37
Upper-division Courses				
Content	30	50	28	31
Pedagogy	14	21	9	14
Both	42	14	31	38
N/A	15	14	31	18

Open-ended responses show that most curricular changes were faculty driven, either by new faculty members with energy and expertise or by motivated faculty members in the department. Respondents explicitly mentioned the dean or chair being involved only a few times, and no respondent indicated the dean was a negative or threatening force. Other drivers included poor student performance, interest in retaining current students or attracting new students, and complaints or negative comments in exit interviews.

The curriculum changes were intended to improve student outcomes or improve preparation for students. Respondents may have taken their responses from the wording of the question itself because there was very little in the open-ended responses that was not included in the wording of the question. The most commonly reported ways to assess student outcomes were performance on standardized assessments (25%) and increases in the number and retention of physics majors (19%). About one program in six (17%) reported having no assessments in place. One in seven (14%) said that it was too early to tell.

We also asked how the costs of the changes were financed. The three most-often reported funding sources were the internal reallocation of resources within the department (76%), university or endowment funds from outside the department (35%), and grants from NSF or another federal agency (16%). About one department in 11 (9%) indicated that there were no costs incurred.

Strengths and Weaknesses

We asked an open-ended question about the undergraduate program's greatest strength. Several themes were prominent throughout the responses: research opportunities for undergraduates, student-faculty interactions, and personal attention for students. One-third or more of the respondents mentioned at least one of these as their greatest strength. This is somewhat different from the 2002 survey; however, we did not do statistical tests on these open-ended responses.

Finally, we asked about the undergraduate program's greatest weakness or challenge. About three respondents in ten (29%) indicated an issue with students: either the inadequate preparation of students or simply the need for more students to form a "critical mass" or to foster a "sense of community." Several respondents also mentioned a lack of diversity among students. Almost as many respondents (27%) mentioned the need for additional faculty members to fill vacancies, to help reduce class sizes, or to enable curricular reform. Space, facilities, and equipment issues were mentioned by 16% of the respondents. Inadequate funds for research or for curricular changes was mentioned by 12% of respondents as was the need to do better in recruiting students.

References

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