ACS Chemistry for Life™

CPT Committee on Professional Training

Summer 2013

Final Report on the Results of the CPT Survey on the Impact of the 2008 ACS Guidelines

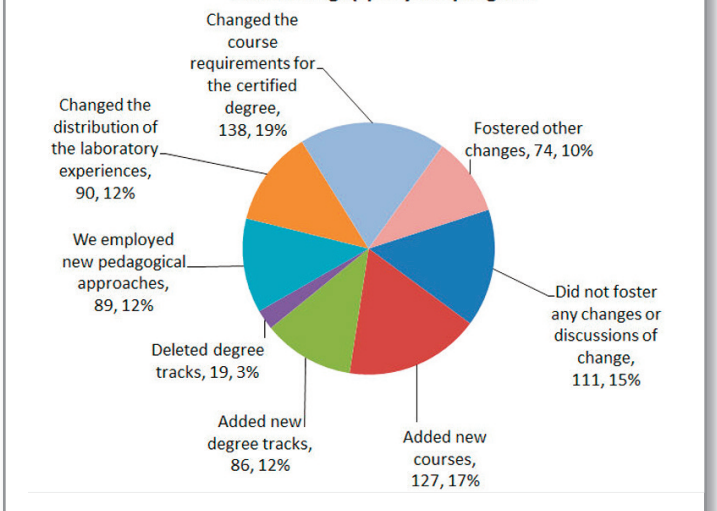
In 2008, the ACS Committee on Professional Training (CPT) released new Guidelines for approval of bachelor's degree programs. In many ways, the 2008 iteration represented a significant departure from previous versions: the Guidelines were simplified; greater responsibility was placed on approved programs for curricular development and oversight; departments were given some flexibility with respect to faculty teaching loads; and greater emphasis was placed on the development of student skills.

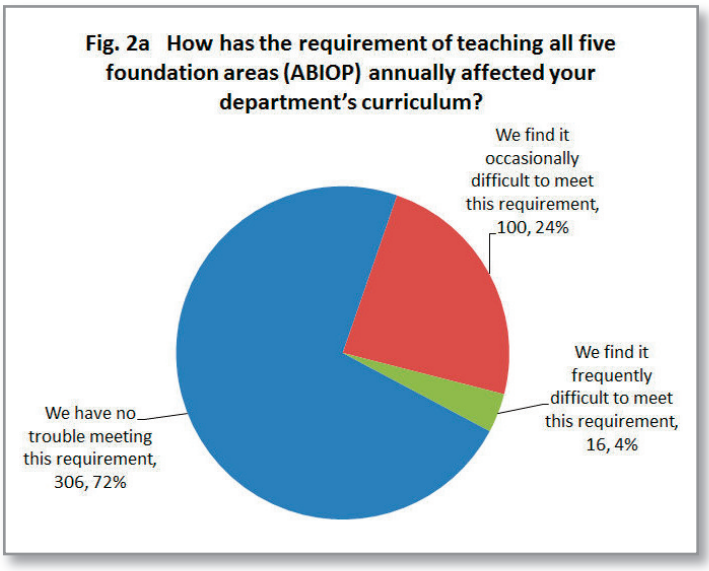
As part of its purview, the CPT is charged with ensuring that the approval process, through the Guidelines, continues to promote program excellence and to provide a pathway for development of competent chemistry professionals. To this end, the CPT regularly gathers feedback from the broad chemistry community on the effectiveness of the Guidelines. This feedback informs Committee deliberations on which aspects of the Guidelines need to be preserved, modified, enhanced, or eliminated. In spring 2012, the CPT conducted such a survey on the impact of the 2008 Guidelines. The survey was administered to all ACS-approved programs; 427 programs participated in the survey (a 64% response rate). Of these, 234 granted a bachelor's as the highest degree in chemistry, 69 were master's, and 124 were PhD-granting. The complete results of the survey will be available at www.acs.org/cpt; below is a short summary of the major findings from the responding programs.

Curricular changes initiated as a result of the 2008 ACS Guidelines.

The vast majority, 85%, of responding programs reported making some changes as a result of the 2008 Guidelines. Between 10% and 20% of them indicated that they had made at least one of the following

Fig. 1 How have the 2008 ACS Guidelines fostered guideline-related curricular change(s) or discussion of such change(s) in your program





curricular adjustments: introduction of new pedagogies, new degree tracks, and/or courses, or changed the course requirements for certification. Of the responding programs, only 5% changed the distribution of laboratory courses; in most (83%) of these, integrated labs were added. Of the 2% of respondents who dropped a traditional laboratory area, 57% dropped biochemistry.

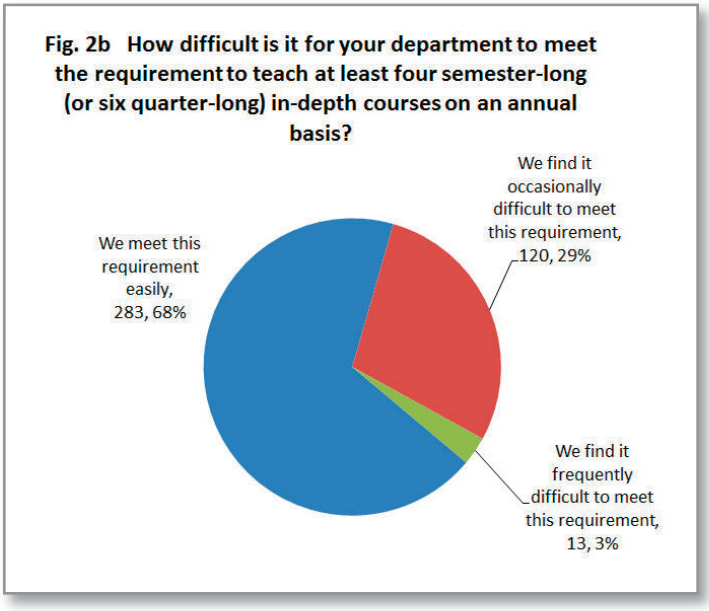
Interestingly, only 4% of responding programs indicated that they had replaced the traditional two-semester organic sequence with a one-semester comprehensive foundation course for at least one degree track leading to certification. Roughly a quarter of that number had done the same for the physical chemistry sequence. Of reporting schools, 1-3% are considering making these changes. Sixty-three percent of reporting schools have not developed any non-traditional in-depth courses, and 32% have done so but with no changes in the foundation courses. Of the 5% that developed non-traditional courses requiring changes in the foundation courses, they responded almost equally by increasing or decreasing the content in foundation course(s), and adding a foundation course. The foundation area most affected by these changes was inorganic chemistry (29%). The other areas were roughly equally affected (16 - 21%).

Annual teaching of foundation and in-depth courses.

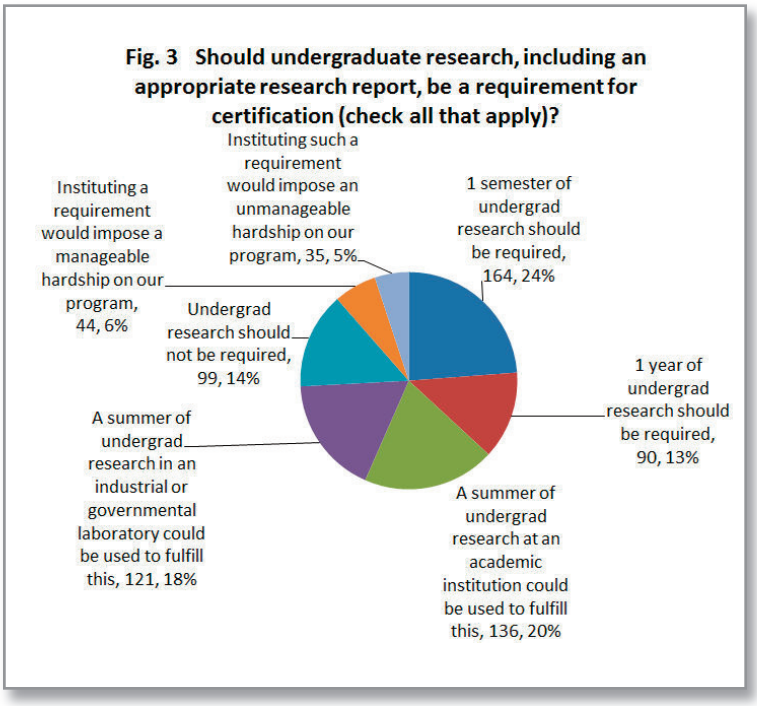
72% of reporting schools have no difficulty teaching the foundation courses (ABIOP: analytical, biochemistry, inorganic, organic, physical) annually, 24% find it occasionally difficult, and only 4% of reporting schools struggle frequently with this requirement. Only 9% of reporting schools made significant curricular changes to meet this requirement and, of these, only 14% considered the changes a negative. The majority (78%) considered the changes a positive. The impact of teaching the required four semester-long (or six quarter-long) in-depth courses annually mirrors that of the foundation courses: 68% of reporting schools meet it without difficulty; 29% find it occasionally difficult; and as with the ABIOP foundation courses, only 3% of reporting schools struggle frequently with this requirement. Only 6% of reporting schools made significant curricular changes to meet this requirement, and of these, only 12% considered the changes a negative. The majority (64%) considered the changes a positive.

In order to meet the requirement of teaching the in-depth courses as prescribed, programs reported five common strategies:

- courses were combined
- courses (typically in biochemistry or physical chemistry) were added or modified
- the foreign language requirement was eliminated
- lab hours were reduced
- lecture components (particularly inorganic and analytical) were added to labs (especially Instrumental)



The lone problem encountered with this requirement is a lack of administrative support for low-enrollment course offerings. Some reporting schools indicated that the lack



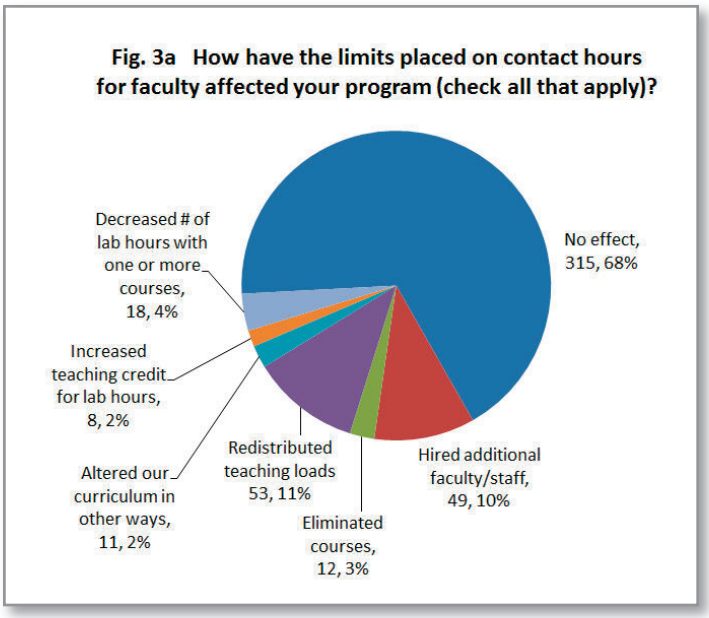
Online access and virtual courses.

Eighty-eight percent of reporting programs indicated that it is important for their undergraduates to be able to perform online structure searches. Having faculty access to online structure searches is important to 95% of the programs. Five percent of programs reported that they offer lab courses that are largely or exclusively virtual; of these programs, 80% offer virtual labs at the introductory level and 10% each do so at the foundation and in-depth levels. Thirty-eight percent of programs responded that they offer courses that are largely or exclusively online, 11% offer them at the introductory level, 2% at the foundation level, and 1% at the in-depth level. As many as 11% of responding programs were unaware if transfer students have virtual lab experiences upon matriculation; 2% are mandated to accept the credits for virtual labs, and 5% have discretion to accept such courses.

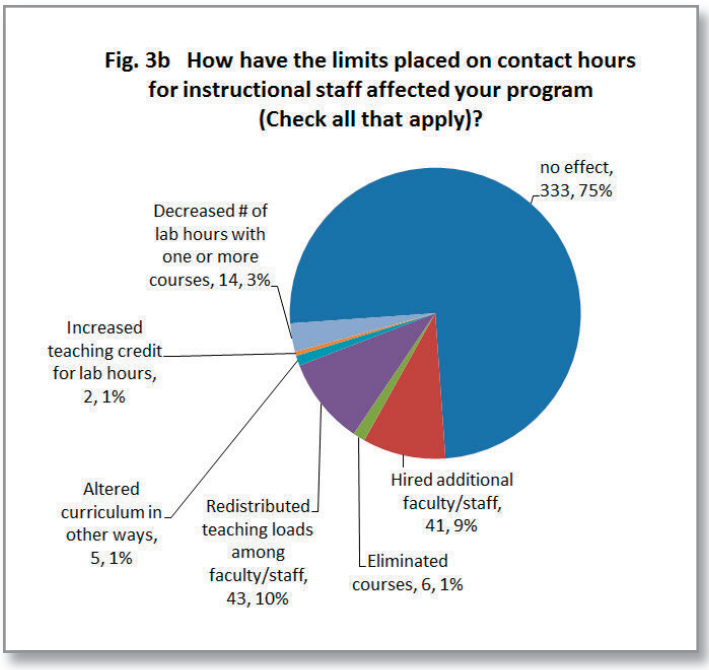
of explicit statements in the Guidelines allowing schools the flexibility to cycle courses (even though students can still complete the curriculum in four years) jeopardizes their ability to maintain approval.

Undergraduate research.

Of reporting programs, 33% require research in at least one degree track, and 35% require it for certification. Of those that do not require research for certification, 20% allow it to be used for lab hours, while 12% allow it to be used for in-depth hours. Only 2% of reporting programs considered as a negative the option of counting as many as 180 hours of research toward the requisite 400 lab hours beyond general chemistry. Fifty-four percent of reporting programs said this requirement had no impact on their course offerings. In 17% of reporting schools, the research component has been increased significantly. Seventy-five percent of respondents expressed the belief that undergraduate research should be required for certification; 24% indicated that at least one semester should be required, while 13% indicated that one year should be required. Fourteen percent of programs reported that they do not believe that undergraduate research should be required for a certified degree. If undergraduate research were required, 6% would find it a manageable hardship, but 5% would find it an unmanageable one.



When asked what role virtual labs should play in the undergraduate curriculum, 43% felt it should play no role, and 53% suggested they play a limited supplementary role to existing laboratory instruction. While 3% and 1% of respondents saw virtual labs as sufficient replacements for introductory and foundation labs, respectively, essentially none felt that they were appropriate replacements for in-depth labs. With respect to online chemistry lecture courses, 62% of respondents



do not offer such courses, and 57% consider them as inappropriate at any level. Of those that do, 11%, 2% and 1% offer online courses at the introductory, foundation and in-depth levels, respectively. As many as 25% of responding programs considered online courses as appropriate if limited to introductory courses, and 9% were in favor of them for introductory and foundation courses only. Just 7% believed they were appropriate throughout the undergraduate curriculum. Interestingly, roughly 84% of respondents felt that the Guidelines should contain a clear statement on the use of virtual labs and online lectures.

Program excellence, rigor, and flexibility.

Of responding programs, only 3% felt that the 2008 Guidelines precipitated a decrease in program excellence, and 4% believed that rigor suffered as a result of the changes. Interestingly, 8% felt that program flexibility fell. 16%, 20% and 39%, respectively of respondents thought that program excellence, rigor, and flexibility increased as a result of the 2008 Guidelines.

Faculty contact hours.

The option of allowing up to two faculty or instructional staff to carry as many as 17 contact hours in a given term with averaging to 15 hours for each individual for the academic year was viewed as a negative by 5% of respondents; 45% considered it as positive. Of responding programs, 36% have or may take advantage of the flexibility. However, for 9% of programs, the limits are still difficult to meet even with the added flexibility. The most common (~10%) program strategies to accommodating the limits on faculty and instructional staff are the redistribution of teaching loads among faculty/instructional staff and the hiring of additional personnel. Less common strategies include:

- decreasing the number of lab hours associated with at least one course (3%)
- increasing the teaching credit for lab hours (1%)
- course elimination (1%)

The CPT wishes to express its sincere gratitude to responding programs for their thoughtful and timely feedback. Because of these results, as well as input from across academia, industry, and within the ACS, we are in the process of once again revising the Guidelines (see the CPT white paper at www.acs.org/cpt). These revisions, slated for release in 2014, are expected to be adjustments rather than dramatic departures from the 2008 Guidelines. For an update on the status of the revision process, please see the article on page 1 in the Summer 2013 issue of the CPT Newsletter. Readers are encouraged to voice comments on the proposed revisions to cpt@acs.org. ■