

AC 2007-1894: A SURVEY OF FACULTY DEVELOPMENT ACTIVITIES IN CIVIL ENGINEERING

Wilfrid Nixon, University of Iowa

Wilfrid Nixon is a Professor of Civil and Environmental Engineering at the University of Iowa and a research engineer at IIHR - Hydroscience and Engineering. Dr. Nixon, a Professional Engineer in the State of Iowa, received a B. A. in Engineering from Cambridge University, England in 1981, and a Ph. D. in Engineering from Cambridge University in 1985.

A Survey of Faculty Development Activities in Civil Engineering

Abstract

Recent documents such as the American Society of Civil Engineers (ASCE) “Civil Engineering Body of Knowledge for the 21st Century,”¹ and “Engineering the Future of Civil Engineering,”² together with the National Academy of Engineering (NAE) reports “The Engineer of 2020,”³ and “Educating the Engineer of 2020”⁴ make it clear that the faculty of 2020 will not be cut from the same cloth as the faculty of today. In order to get from here to there, a variety of faculty development programs will be required. This paper reports on a survey of civil engineering department heads, designed to determine the current status of faculty development activities in civil engineering programs in the United States. This survey will serve as the first step in an ongoing process to determine faculty development needs in civil engineering, and ultimately to design programs to meet those needs. The survey was conducted by means of an e-mail sent to the ASCE Department Heads list-serve. Results have been compiled from the responses to this survey, and grouped according to type of development program and perceived unmet faculty development needs.

Introduction

Over the past few years, there have been a number of publications that suggest that the practice of engineering will change significantly in the coming decades. For example, the National Academy of Engineering (NAE) published their report “The Engineer of 2020”³ which described in part how the skill set of the future engineer will be different from the engineer of today and yesterday. Additionally, the American Society of Civil Engineers (ASCE) has published a number of reports on the Body of Knowledge that will be required (in the immediate future) to practice civil engineering^{1, 2}. One key conclusion of the work by ASCE (relating to the ASCE policy 465) is that the engineer of the future will need formal education beyond the Bachelor’s degree. NCEES in essence agreed with this position when they incorporated this requirement into their model law for licensure, which will go into effect in 2015⁵.

A related document by NAE discusses the challenge of teaching the engineer of 2020⁴. Other reports have raised concerns about science and technology education in the United States in general. Given this discussion in the engineering community, it seems appropriate that questions should be asked about the level of preparedness of faculty to teach the engineering curriculum of 2020. In particular, an important question is what is being done to prepare faculty to teach the future engineering curriculum? In other words, what is being done to develop faculty skills to address the changing nature of engineering practice?

This issue was raised in the ASCE Committee on Faculty Development, during the fall of 2006. The committee decided that a first step toward answering this key question would be to determine what faculty development is currently available and being used. This

paper reports on a survey conducted to determine the current level of faculty development in civil engineering in the United States.

Survey Design

The survey asked a series of simple questions, most of which required a yes or no answer. Specifically, questions were asked in five areas: teaching development, research development, mentoring, professional development, and development designed specifically for senior faculty.

In the areas of teaching development and research development, the survey asked whether development activities were mandatory (yes or no answer) and if not mandatory, were development activities offered in that area (yes or no answer). The survey then asked in each of these two areas what form the development activity took: a one to two hour session, a half day to a full day, or longer than a full day.

In the area of mentoring, the survey asked whether a mentoring program existed (yes or no answer), if it existed was it mandatory (yes or no answer), and would it be best described as formal or informal.

In the area of professional development and development activities specifically for senior faculty, the survey asked whether these development activities were offered. In addition, the survey asked for comments or descriptions of any programs for senior faculty. Finally, the survey asked respondents to describe any novel faculty development activities available at their institution. The full text of the survey is given in the appendix to this paper.

The survey was administered by e-mail, using the Department Heads Council list-serve that is maintained and operated by ASCE. Using this, an e-mail containing the survey was sent to all the Civil Engineering department heads who are currently subscribed to the list-serve. The survey was sent on January 8, 2007, and requested a response by January 12, 2007.

Survey Results

The survey went to more than 200 departments of civil engineering (and closely related departments) as determined by the subscribers to the ASCE Department Heads Council list-serve membership. From this mailing, 46 responses were received, a response rate greater than 20%. The schools that responded included all types of institutions, from research intensive through undergraduate only programs. This section presents the results both numerically and graphically of the responses.

Teaching Development

Ten schools indicated that some form of faculty teaching development was mandatory, while 36 schools indicated it was not. Twenty seven schools indicated that some form of

faculty teaching development, while not mandatory, was available, while nine schools indicated that they offered neither mandatory nor voluntary faculty teaching development. These numbers are represented in figures 1 and 2 respectively. The length of teaching development opportunities varied as would be expected. Six schools offered development lasting one to two hours, 13 had offerings lasting half a day to a full day, and 23 schools had offerings lasting more than a day (schools could select more than one response in this category, and four schools did so) as shown in Figure 3. In regard to this latter category, sixteen respondents mentioned the ASCE ExCEED Teaching Workshop, indicating a high degree of awareness among department heads of this important teaching development opportunity offered by ASCE.

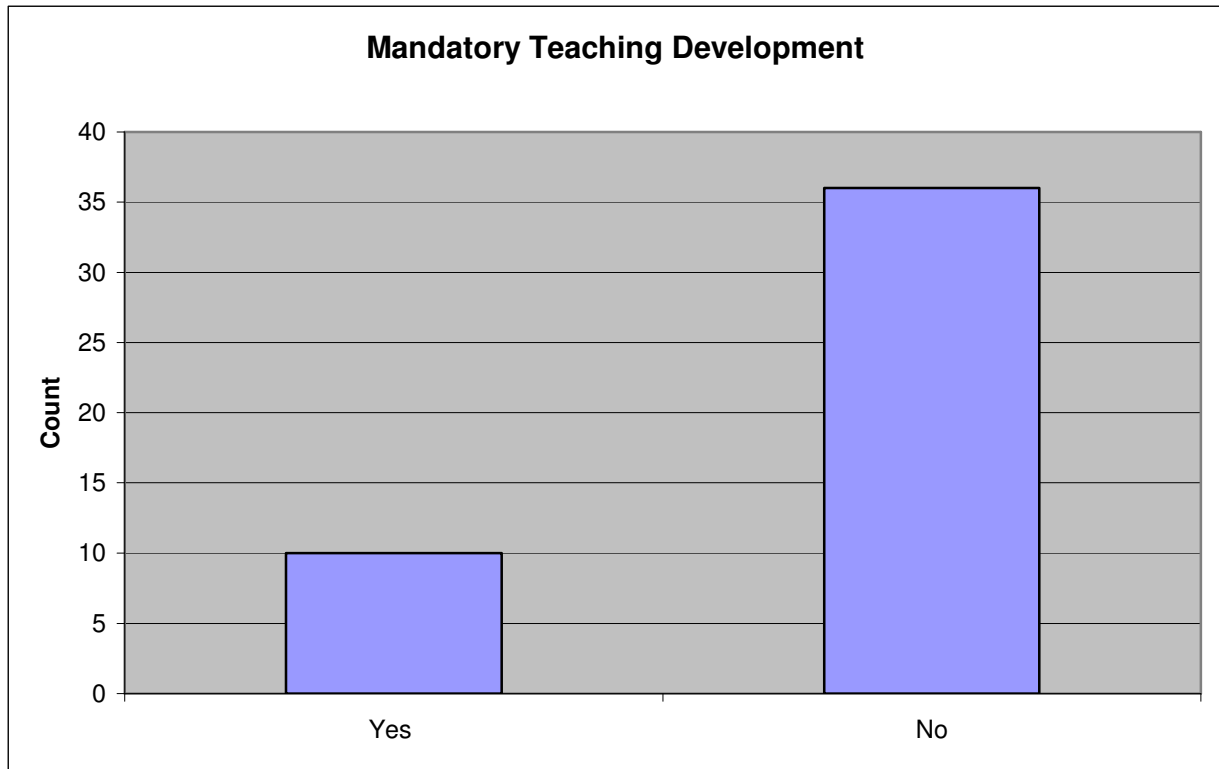


Figure 1: Schools with Mandatory Faculty Teaching Development

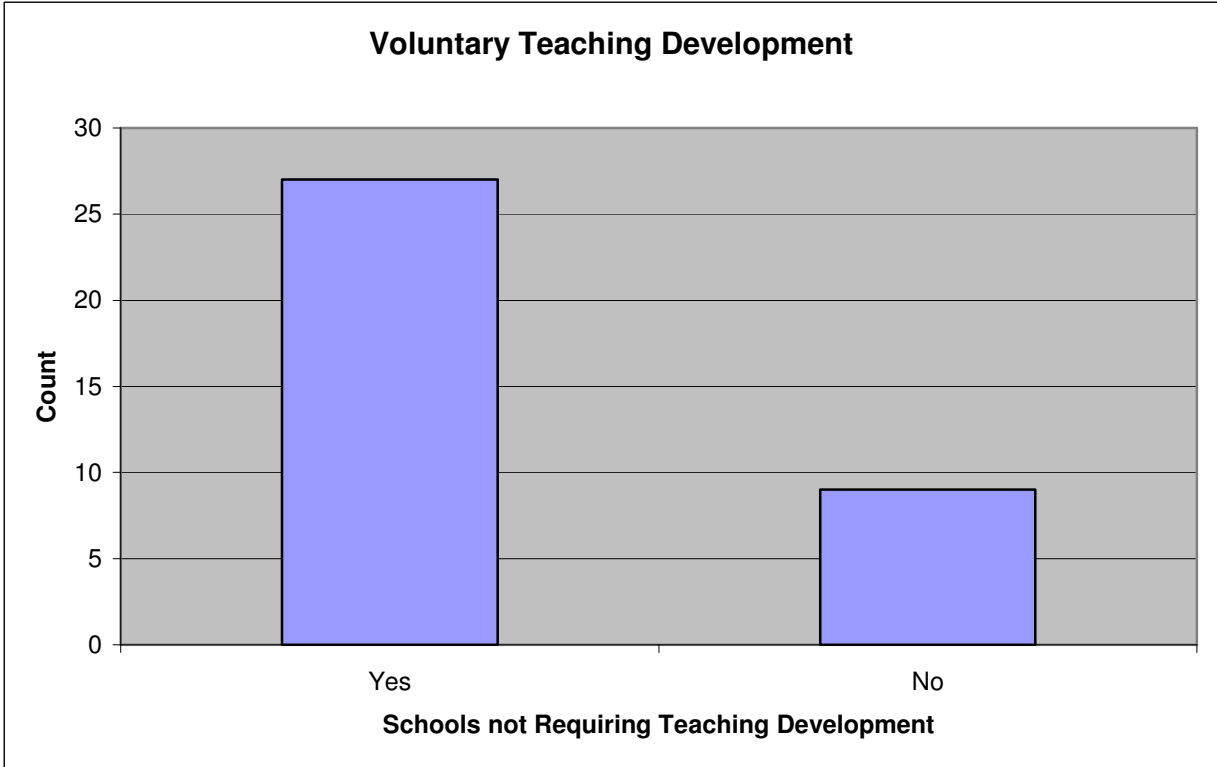


Figure 2: Of the Schools not Requiring Teaching Development, the Number Offering Voluntary Teaching Development

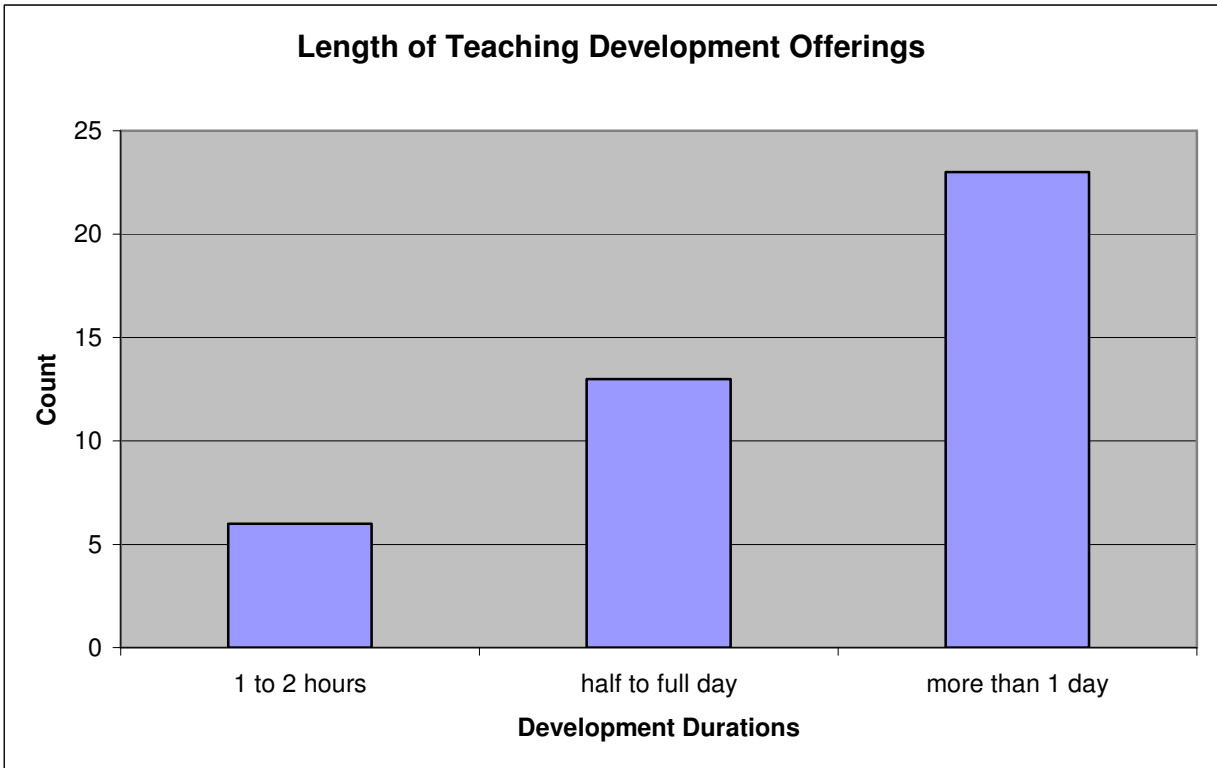


Figure 3: Duration of Teaching Development Opportunities

Research Development

Six schools indicated that some form of research development training was required for faculty, with forty schools indicating that it was not required (see figure 4). Of those forty, twenty indicated that voluntary research development training was offered, while the other twenty indicated such training was not available at their institution (see figure 5). Eight schools offered training lasting one to two hours, 21 schools offered half to full day training, and two schools offered training longer than one day (see figure 6). Four schools offered training durations of more than one category.

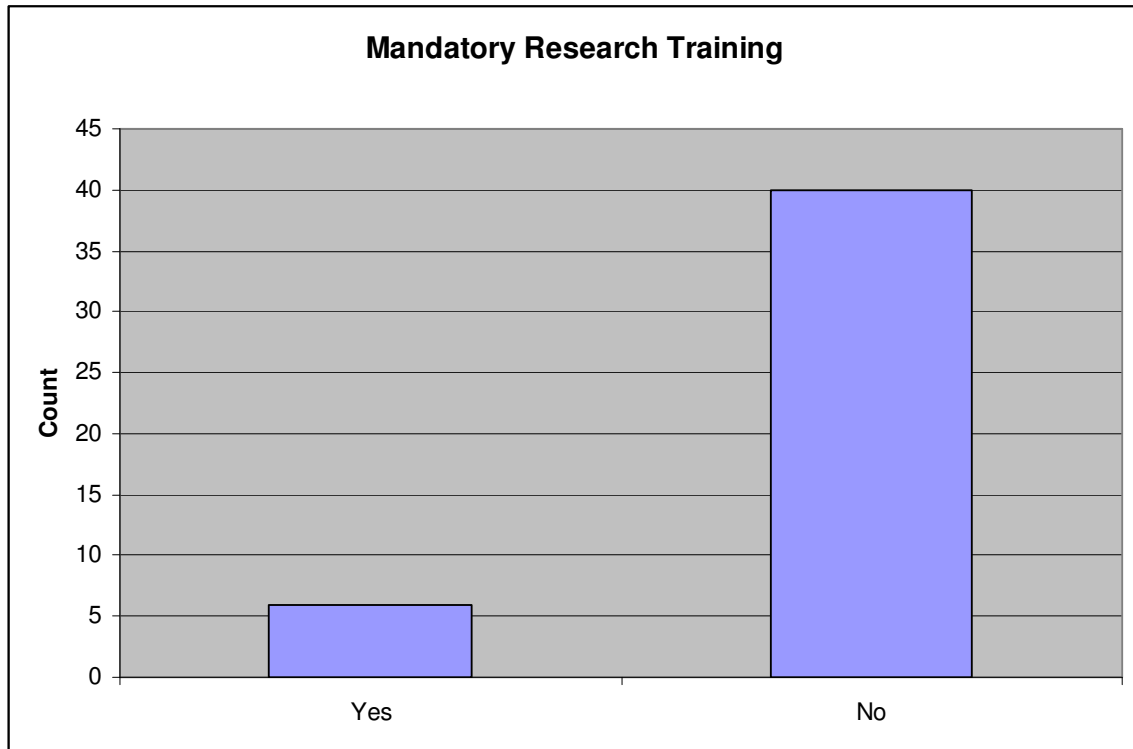


Figure 4: Schools Requiring Research Training for Faculty

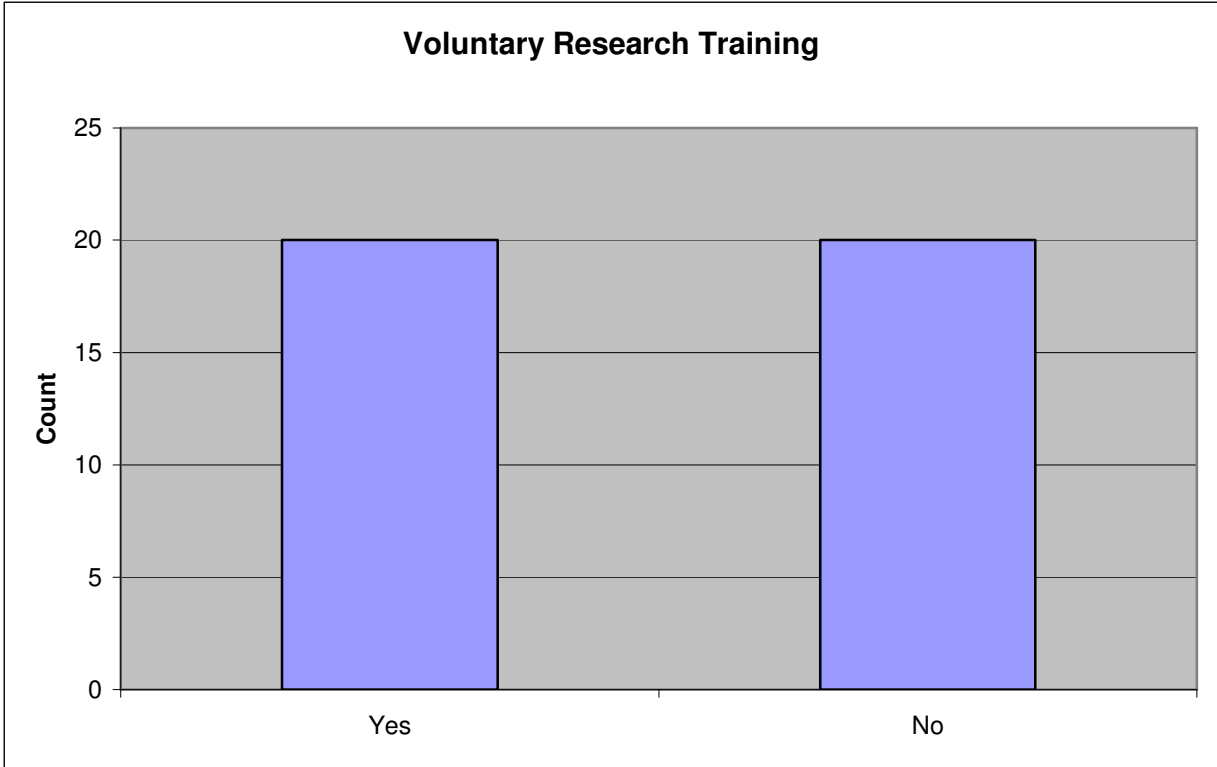


Figure 5: Of the Schools that do not require Research Training, the number that offer such training on a voluntary basis

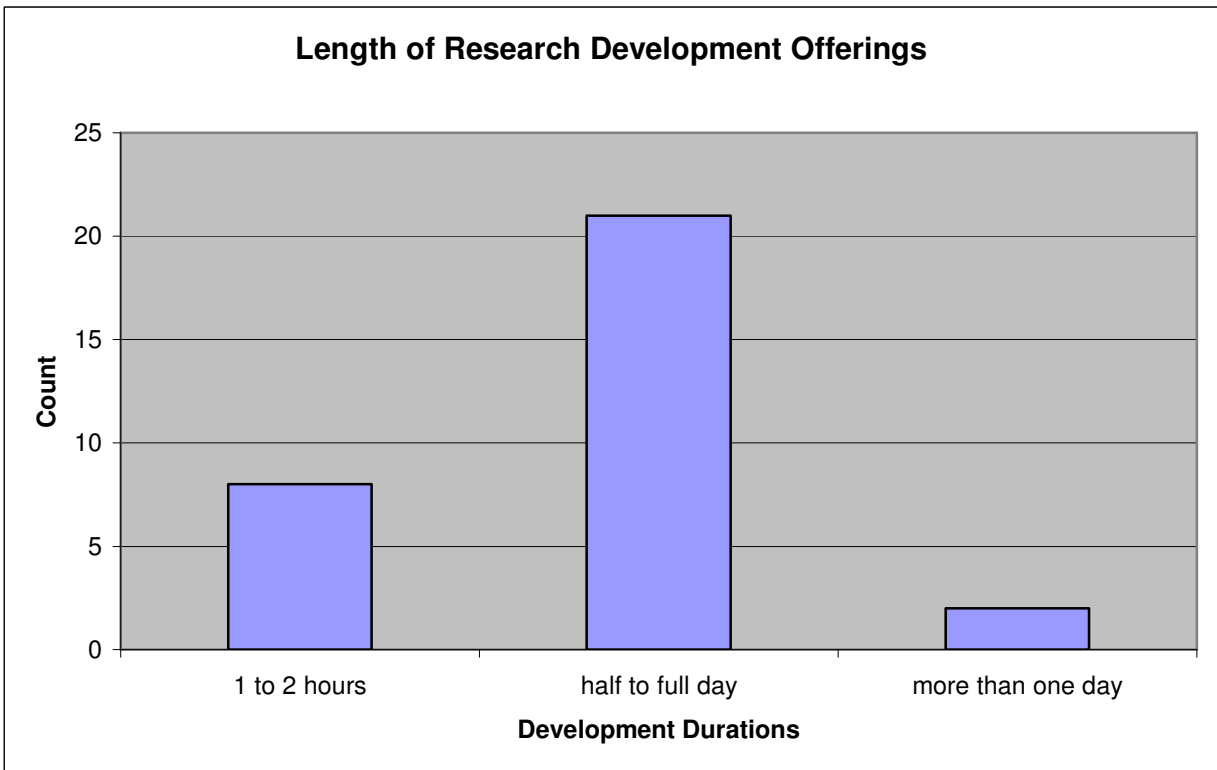


Figure 6: Duration of Research Development Opportunities

Mentoring

Three questions investigated (at a very simple level) the role of mentoring in faculty development. Forty schools offered mentoring for faculty, while six did not have a mentoring program. Of the forty schools, the mentoring program was mandatory in 19 and voluntary in 21. Again, of the forty schools offering or requiring mentoring, ten described their programs as formal, while 30 indicated their programs were informal. These results are shown in figures 7, 8, and 9 respectively.

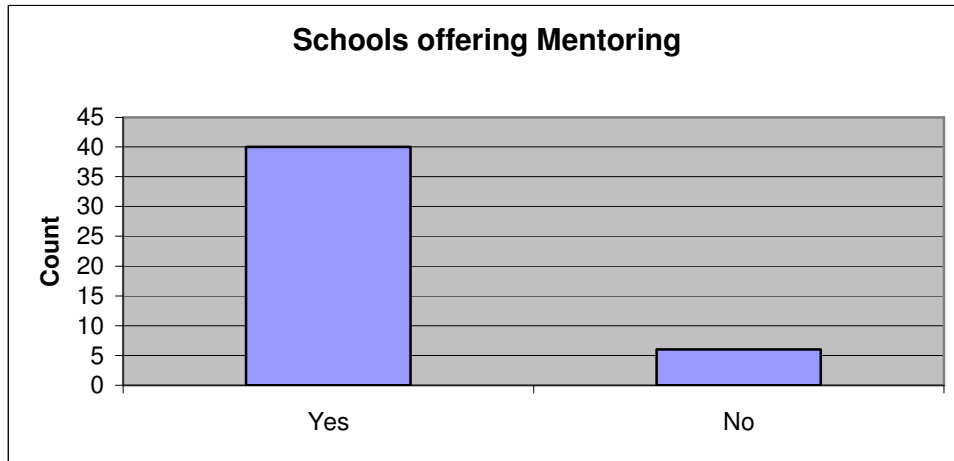


Figure 7: Schools offering mentoring for junior faculty

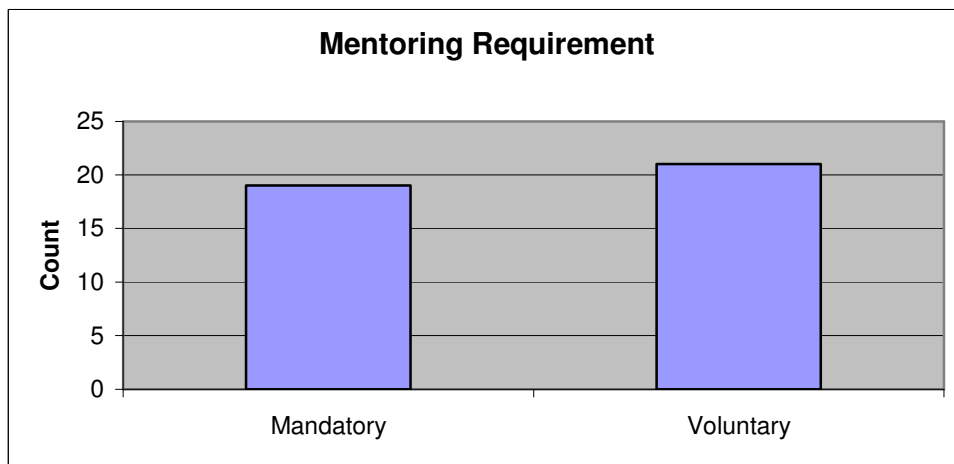


Figure 8: Mentoring as either Mandatory or Voluntary

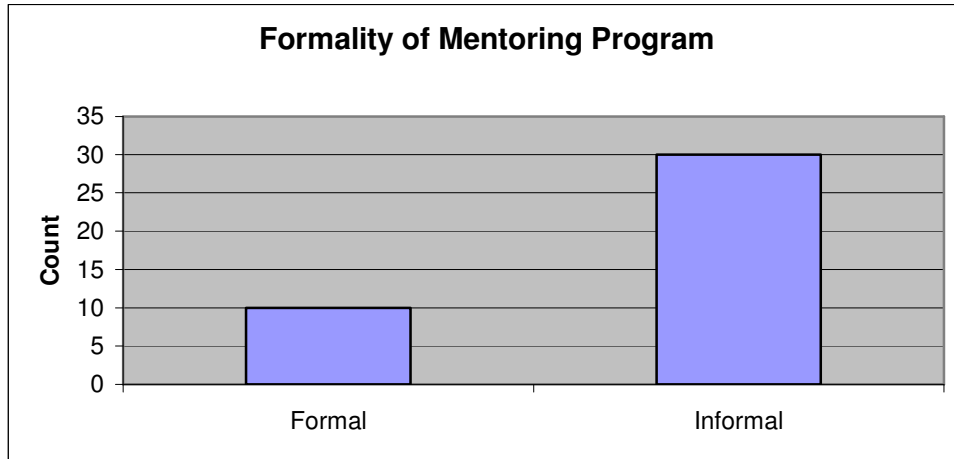


Figure 9: Mentoring as either Formal or Informal

Other Development Activities

Twenty seven schools offered some form of assistance to faculty for professional development, versus nineteen that did not (see figure 10). Eight schools offered some form of development specifically tailored for senior (or tenured) faculty, with 38 schools not noting such programs (see figure 11).

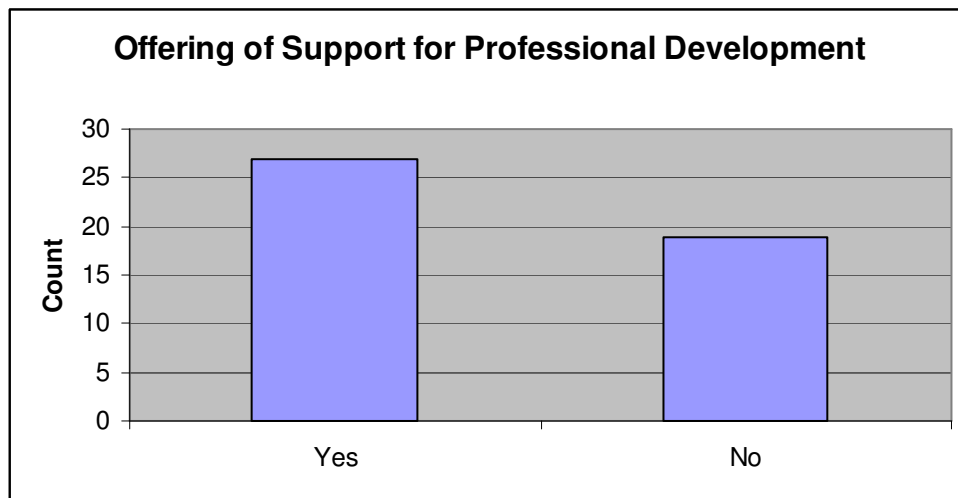


Figure 10: Schools offering support for Professional Development

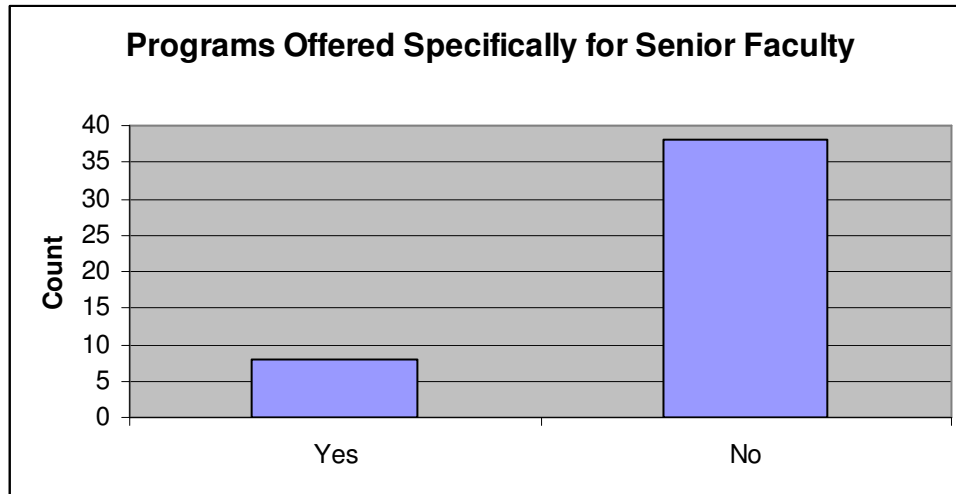


Figure 11: Schools offering programs specifically aimed at senior faculty

Survey Comments

Thirty three of the survey respondents made comments in response to the survey. These included a number indicating either a lack of resources or time. Typical comments in this regard included “We never even get close to dealing with all of the items above,” and “The resources are likely ‘out there’ – getting faculty to take advantage of development opportunities is my present difficulty.” Others indicated that while there is some support for faculty travel to conferences, that support can only cover one conference a year. One respondent pithily noted that an unmet need was “funding, obviously.”

A theme that ran through a number of comments was the need to help faculty be successful. Two pertinent comments in this regard are: “We need a more formalized program where faculty (junior and senior) can be mentored and put on a path to success.” and “Department chair works with each new faculty member to develop a “business plan” for professional development.”

A number of survey respondents mentioned the Center for Teaching (or its equivalent) on their campus as a source of development offerings. One respondent noted their center had offerings specifically for senior faculty. Another noted “I wish more faculty would take advantage of the (center for teaching) offerings and participate. It is difficult to motivate tenured faculty to participate in this process but those that do benefit from the experience.”

In terms of offerings specifically for senior faculty, there were a number of comments. One noted that their university has a “Not so new faculty luncheon” which is targeted specifically at tenured faculty. Another spoke of there being several opportunities for senior faculty development but “none targeted specifically for engineering.” A third comment noted that their department “supports, where appropriate, professional development needed to assist senior faculty making career changes or in need of

additional expertise.” A final, and again somewhat pithy, comment regarding development opportunities for senior faculty simply noted “sabbatical leave.”

Other comments that were particularly enlightening included a number about professional development, which are reflected in one particular comment “We provide funding for study references, examination fees, and license fees thereafter.” Others noted the importance of professional registration, including one school that has a specific salary increment for those who are registered engineers. A very relevant comment concerning mentoring noted “mentoring is formative, not summative – this is important.”

Implications

While the survey results are of interest in their raw form, it may be possible to draw some broader conclusions or findings from them. However, it should be noted that the preliminary nature of this work does not allow truly definitive findings.

It is telling that less than a quarter of the responding schools require that faculty receive some sort of training in how to teach. Equally, it is telling that nearly 20% of the responding institutions do not have any way on campus for a faculty member to obtain such training, even if they wished to do so. If engineering as a discipline is to continue to attract the best and brightest, it would seem that the attitudes encompassed in these numbers will have to change. It is perhaps a hopeful sign in this regard that more than a third of the respondents specifically mentioned the ASCE ExCEED program, without specific prompting in the survey itself.

That twenty schools do not have available any sort of on-campus training in research is perhaps less surprising. Eleven of the twenty schools without such offerings are primarily undergraduate institutions, but that means that nine of the twenty schools expect their new faculty to be able to develop a successful research program with no formal guidance. Of course, many new faculty have done exactly that over the years, but this does suggest a degree of inefficiency.

Mentoring is obviously seen as an effective tool for helping new faculty adjust to their responsibilities, with more than 80% of the respondents having a mentoring program and with more than half of those having that program be mandatory. Informal programs account for three quarters of the mentoring programs recorded. The survey did not define what was meant by formal or informal, so this is clearly an issue that requires some further clarification. However, it is clear that an effective mentoring program can at the very least supplement any formal training in the areas of both teaching and research, and may well serve as an alternative to more formal development offerings in these areas.

Nearly 60% of the respondents provided some form of assistance for the professional development of faculty (indicated in the survey as “e.g. getting their PE or obtaining specialty certification”). This is perhaps one area of major concern. If civil engineering degree programs become too “divorced” from the practice of civil engineering then there is a significant danger of a loss of relevance in the education provided to students. That

more than 40% of respondents do not offer opportunities for professional development may indicate a current weakness in civil engineering education that is deserving of further investigation.

Fewer than 20% of the respondents provide development opportunities tailored to senior faculty, although it should be noted that this may be a significantly undercounted number. As one respondent noted, sabbatical leave is a time honored form of development for senior faculty. This may suggest that the development opportunities inherent in the sabbatical system are less fully employed than they could be. This too suggests an opportunity for further investigation. The area of development for senior faculty may well be extremely critical in facing the challenges of the coming decades for civil engineering education. Senior faculty set the tone for a department and if they are not provided with the tools and the skill sets needed to adjust to the new paradigms of civil engineering education, then that adjustment will be at the least hampered and potentially stopped altogether.

Conclusions

A survey of faculty development activities in civil engineering departments in the United States has been conducted by way of an e-mail sent to the ASCE Department Heads Council list-serve. Forty six schools responded to the survey. The results have been presented and discussed. While the survey is clearly preliminary, the results suggest that there are a number of development opportunities that are currently underutilized. In particular, more offerings in the areas of teaching and conducting research would be helpful. Further, opportunities related to professional development and those specifically aimed at senior faculty are less than they might ideally be. In contrast, mentoring seems to be a tool in great use and with a great deal of potential.

Bibliography

1. American Society of Civil Engineers, 2004. "Civil Engineering Body of Knowledge for the 21st Century," available on the Internet at http://www.asce.org/files/pdf/bok/bok_complete.pdf
2. American Society of Civil Engineers, 2001. "Engineering the Future of Civil Engineering," available on the Internet at <http://www.asce.org/pdf/tcfpd-complete.pdf>
3. National Academy of Engineering, 2004. "The Engineer of 2020: Visions of Engineering in the New Century," The National Academies Press.
4. National Academy of Engineering, 2005. "Educating the Engineer of 2020: Adapting Engineering Education to the New Century," The National Academies Press.
5. NCEES Press Release 9/25/2006. "Council votes to increase amount of education required for engineering licensure," available on the Internet at http://www.ncees.org/news/index.php?release_id=1

Acknowledgements

The author gratefully acknowledges the support of his fellow CFD committee members. Their discussion sparked the idea for this paper. The survey would not have been possible without significant assistance from both Dion Coward and Ping Wei of ASCE. Their active encouragement of this endeavor has made it possible. The response from numerous department heads of civil engineering departments around the country was superb and the author is extremely thankful for their willingness to take some time out of hectic schedules to complete the survey so rapidly. Clearly, without the assistance of all these people, this survey would not have happened, and this paper would not have been written. However, all errors and omissions in the paper are the fault of the author and not of those who assisted him.

Appendix: Text of E-Mail Survey used in this study

Teaching Development

Do you require your new faculty to take any courses to help with their teaching?

Yes _____ No _____

If no, do you make any such courses available to new faculty without requiring that they take the courses?

Yes _____ No _____

How long are the courses on teaching that you make available to your new faculty?

One or two hours in length? _____

A half day to a full day in length? _____

More than a full day in length? _____

Research Development

Do you require your new faculty to take any courses to help with writing research proposals and managing a research program?

Yes _____ No _____

If no, do you make any such courses available to new faculty without requiring that they take the courses?

Yes _____ No _____

How long are the courses on research that you make available to your new faculty?

One or two hours in length? _____

A half day to a full day in length? _____

More than a full day in length? _____

Mentoring

Do you have a mentoring program for new faculty?

Yes _____ No _____

If yes, is this program mandatory or voluntary?

Mandatory _____ Voluntary _____

Would you describe this program as formal or informal?

Formal _____ Informal _____

Professional Development

Do you provide any assistance for your faculty to obtain further credentials that are pertinent to their discipline (e.g. getting their PE or obtaining specialty certification)?

Yes _____ No _____

Senior Faculty

Do you have any faculty development programs targeted specifically at tenured faculty?
If yes, please describe them briefly here:

Other

Are there any special features of the faculty development that you offer that you consider especially noteworthy and would be willing to share here briefly? If yes, please comment here:

Are there any needs in faculty development of which you are aware that are not currently being met? If yes, please comment here: