Faculty Technical Currency and Professional Development: 2013 Status Report on a National Survey of Engineering Technology Faculty

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- Nanotechnology: Ethical and Social Implications (2012)
- The Telecommunications Fact Book and Illustrated Dictionary (1992)

Dr. Khan is a senior member of the Institute of Electrical and Electronics Engineering (IEEE), and a member of American Society of Engineering Education (ASEE), and has been listed in Who’s Who among America’s Teachers. Dr. Khan also serves as a program evaluator for the Accreditation Board for Engineering and Technology (ABET).

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Abstract

Faculty professional development activities and technical currency play an important role in promoting student learning and success. Especially for non-research institutions that offer technology driven programs, one of the most important factors determining student success is the technical currency of faculty members. The Accreditation Board for Engineering and Technology (ABET) and regional accreditation bodies place strong emphasis on the technical currency of faculty, and require institutions to provide opportunities for faculty to keep abreast of technological advances.

This paper presents the findings of a faculty survey conducted during December 2013 using the ASEE ETD listserv. ETD has a membership of more than 4000 faculty members and professionals belonging to 1000 institutions from all 50 U.S. states and 57 countries. The intent of the survey was to gauge the status of professional development activities vis-a-vis faculty technical currency at personal, departmental, and institutional levels in the domains of engineering technology. The survey also explores faculty input regarding the importance of technical currency and its relationship to student learning and success. Finally, the paper compares the current status of faculty scholarship vis-à-vis faculty technical currency to the results obtained through earlier studies (2003 & 2007).

I. Introduction

The purpose of project was to explore faculty perceptions of the importance and current status of faculty technical currency for effective teaching. A survey was conducted via the ASEE ETD listserv during December 2013; the listserv has a membership of more than 4000 faculty members and professionals belonging to 1000 institutions. Engineering technology faculty were asked to provide input regarding the status of professional development activities at personal, departmental, and institutional levels. The survey also explored faculty input regarding the importance of technical currency and its relationship to student learning and success. Accreditation agencies and professional organizations consider faculty technical currency a critical factor in promoting effective teaching and learning.

Professional currency or technical currency refers to technical competency and up-to-date technical knowledge of subject matter; computer hardware and software skills; publication of technical papers and textbooks; participation in technical seminars, workshops, and conferences; and professional organization activities. Faculty professional development activities and currency play a critical role in promoting student learning and success. Especially for non-research institutions that offer technology driven programs, one of the most important factors determining student success is the technical currency of faculty members.
Accreditation bodies such as the Accreditation Board for Engineering and Technology (www.abet.org) place high emphasis on the technical competence of faculty. The Engineering Technology Accreditation Commission’s (ETAC) 2013-14 criteria for accrediting programs (2013-14) state: “The competence of faculty members must be demonstrated by such factors as education, professional credentials and certifications, professional experience, ongoing professional development, contributions to the discipline, teaching effectiveness, and communication skills.”

The nature, demands, and vocabulary of scholarship are also evolving. Ernest Boyer, in his 1990 Scholarship Reconsidered: Priorities of the Professoriate, suggested four interrelated dimensions of scholarship: discovery, integration, application, and teaching (see Table 1).²

Table 1. Dimensions of Scholarship according to Ernest Boyer (1990).²

<table>
<thead>
<tr>
<th>Scholarship domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Scholarship of Discovery</td>
<td>- Research as the central ingredient of the intellectual environment</td>
</tr>
<tr>
<td></td>
<td>- The process of discovery</td>
</tr>
<tr>
<td>The Scholarship of Integration</td>
<td>- The process of making connections within and across disciplines</td>
</tr>
<tr>
<td></td>
<td>- The process is related to discovery and convergence of disciplines.</td>
</tr>
<tr>
<td>The Scholarship of Application</td>
<td>- The process of transforming discovered knowledge into specific applications.</td>
</tr>
<tr>
<td></td>
<td>- Application of theory into practice</td>
</tr>
</tbody>
</table>
|                                     | Ernest Boyer: "the application of knowledge moves toward engagement as the scholar asks, 'How can knowledge be responsibly applied to consequential problems? How can it be helpful to individuals as well as institutions?' And further, 'Can social problems themselves define an agenda for scholarly investigation?'"
| The Scholarship of Teaching         | Ernest Boyer: "The work of the professor becomes consequential only as it is understood by others. . . When defined as scholarship, teaching both educates and entices future scholars. Indeed, as Aristotle said, 'Teaching is the highest form of understanding.'" |
In his book *The Digital Economy: Promise and Peril in the Age of Networked Intelligence*, Tapscott proposes a dozen themes for the new economy. The first is knowledge. About the requirements of digital economy and faculty practices, he makes the following observations: “The digital economy requires a far-reaching rethinking of education and, more broadly, learning and the relationship between working, learning, and daily life as a consumer (p.197)….With tenured professors, teachers threatened by technology, less competition, and teaching traditions dating back centuries, many educational institutions have become mired in the past (p.201).”

The concepts of faculty development deal with helping faculty members improve their competence as teachers and scholars. Furthermore, improving faculty competence is a part of improving overall instructional quality. The efforts to increase instructional quality depend on faculty development (focus on faculty), instructional development (focus on student, course and curriculum), and organizational development (focus on structure and process).

Faculty in purely teaching institutions (non-research environments), especially those teaching in technology-based and career-oriented programs, generally lag behind the pace of technological change in terms of their professional development activities due to their non-association with research activities. They face two major challenges: how to incorporate and teach new applications of new technologies in the curriculums they teach and how to maintain their professional currency.

Therefore, in summary, the rapid pace of technological change mandates that faculty remain current in their technical areas of specialization as technology leapfrogs and new domains of technology evolve, and thus they need to become reflective practitioners.

For the current study, it was the intent of the authors to survey faculty teaching in the engineering technology domain to determine the state of professional development and processes that are used to maintain technical currency and compare the results with the studies conducted earlier in 2003 and 2007.

### II. Data Collection Procedure

To gauge the status of professional development activities, the faculty survey was conducted through the ETD listserv (http://etidweb.tamu.edu/listserv.php). The participants were asked to submit their responses anonymously. Appendix A exhibits the survey instrument used for data collection.
### III. Results/Findings

Table 2 summarizes the frequency and percentage of responses (2013, 2007 & 2003) indicating faculty perceptions about the various aspects of technical currency, its relationship to student learning/success, and the impact of ABET accreditation criteria on the revision of institutional policies to promote faculty development activities and on allocation of financial resources for faculty developmental activities.

#### Table 2. Results for Survey Questions 1-10 (Technical Currency Issues)

<table>
<thead>
<tr>
<th>Question</th>
<th>2013 (N = 123)</th>
<th>2007 (N= 127)</th>
<th>2003 (N = 226)</th>
<th>SD</th>
<th>D</th>
<th>MD</th>
<th>N</th>
<th>MA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Because of the application orientation of engineering technology programs, technical currency of faculty is essential to make student learning more relevant.</td>
<td>8 (6.3)</td>
<td>2 (1.6)</td>
<td>4 (3.1)</td>
<td>5</td>
<td>32</td>
<td>78</td>
<td>5</td>
<td>32</td>
<td>78</td>
<td>137</td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>2 (1.57)</td>
<td>3 (2.36)</td>
<td>5</td>
<td>29</td>
<td>88</td>
<td>5</td>
<td>29</td>
<td>88</td>
<td>137</td>
</tr>
<tr>
<td>2003</td>
<td>1 (0.4)</td>
<td>3 (1.3)</td>
<td>1 (0.4)</td>
<td>0</td>
<td>6</td>
<td>78</td>
<td>1 (0.4)</td>
<td>78</td>
<td>137</td>
<td>60.6</td>
</tr>
<tr>
<td>2. I believe that there is a strong relationship between the technical currency of the faculty member and student learning/success.</td>
<td>8 (6.3)</td>
<td>2 (1.6)</td>
<td>4 (3.1)</td>
<td>5</td>
<td>26</td>
<td>47</td>
<td>32</td>
<td>47</td>
<td>32</td>
<td>78</td>
</tr>
<tr>
<td>2007</td>
<td>2 (1.57)</td>
<td>3 (2.4)</td>
<td>3 (2.4)</td>
<td>4</td>
<td>30</td>
<td>81</td>
<td>32</td>
<td>81</td>
<td>63</td>
<td>133</td>
</tr>
<tr>
<td>2003</td>
<td>3 (1.3)</td>
<td>5 (2.2)</td>
<td>10 (4.4)</td>
<td>9</td>
<td>34</td>
<td>76</td>
<td>13.6</td>
<td>34</td>
<td>76</td>
<td>63.6</td>
</tr>
<tr>
<td>3. My institution supports and encourages faculty members to maintain technical currency.</td>
<td>12 (9.4)</td>
<td>7(5.5)</td>
<td>18 (14.1)</td>
<td>15</td>
<td>19</td>
<td>39</td>
<td>16.8</td>
<td>39</td>
<td>16.8</td>
<td>80</td>
</tr>
<tr>
<td>2007</td>
<td>7 (5.1)</td>
<td>12(9.4)</td>
<td>20(15.7)</td>
<td>27</td>
<td>25</td>
<td>22</td>
<td>14.1</td>
<td>22</td>
<td>14.1</td>
<td>11</td>
</tr>
<tr>
<td>2003</td>
<td>6 (2.7)</td>
<td>17 (7.5)</td>
<td>14 (6.2)</td>
<td>20</td>
<td>63</td>
<td>76</td>
<td>33.6</td>
<td>76</td>
<td>33.6</td>
<td>30.3</td>
</tr>
<tr>
<td>4. My chairperson supports and helps me plan professional development activities to maintain technical currency.</td>
<td>12 (9.4%)</td>
<td>12(9.4%)</td>
<td>13(10.2%)</td>
<td>22</td>
<td>21</td>
<td>36</td>
<td>28.1</td>
<td>36</td>
<td>28.1</td>
<td>12.6</td>
</tr>
<tr>
<td>2007</td>
<td>20(15.7)</td>
<td>5(19.7)</td>
<td>12(9.4)</td>
<td>16</td>
<td>15</td>
<td>18</td>
<td>14.1</td>
<td>18</td>
<td>14.1</td>
<td>16</td>
</tr>
<tr>
<td>2003</td>
<td>14 (6.2)</td>
<td>21 (9.3)</td>
<td>18(8.0)</td>
<td>38</td>
<td>40</td>
<td>63</td>
<td>27.9</td>
<td>63</td>
<td>27.9</td>
<td>32</td>
</tr>
<tr>
<td>Question</td>
<td>2013</td>
<td>2007</td>
<td>2003</td>
<td></td>
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<tr>
<td>5. I believe that I have maintained technical currency during the past 5 years, enabling me to teach courses effectively.</td>
<td>5(3.9) 3(2.3) 10(7.8) 6(4.7) 27(21.1) 44(34.4) 33(25.8)</td>
<td>1(0.7) 3(2.4) 17(13.4) 12(9.4) 11(8.7) 35(27.5) 48(37.7)</td>
<td>4(1.8) 8(3.5) 8(3.5) 8(3.5) 53(33.3) 81(33.8) 64(28.3)</td>
<td></td>
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<tr>
<td>6. My institution has allocated sufficient funds for the professional development activities of faculty during the past 5 years.</td>
<td>32(25) 18(14.1) 14(10.9) 15(11.7) 18(14.5) 24(18.8) 7(5.5)</td>
<td>36(28.2) 27(21.2) 21(16.5) 11(8.7) 11(8.7) 10(7.8) 11(8.7)</td>
<td>43(19.0) 25(11.1) 29(12.8) 30(13.3) 52(23.0) 34(15.0) 13(5.8)</td>
<td></td>
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<tr>
<td>7. There is an urgent need in my department/program to improve existing policies in order to allow faculty to enhance their technical currency.</td>
<td>6(4.7) 16(12.5) 5(3.9) 15(11.7) 22(17.2) 32(25) 32(25)</td>
<td>4(3.1) 11(8.7) 20(15.8) 16(12.5) 25(19.6) 23(18.1) 28(22)</td>
<td>7(3.1) 34(15.0) 16(7.1) 37(16.4) 47(20.8) 45(19.9) 40(17.7)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. There is an urgent need in my department/program to increase funding for faculty development activities.</td>
<td>7(5.5) 5(3.9) 7(5.5) 13(10.2) 24(18.8) 31(24.4) 41(32)</td>
<td>7(5.1) 8(6.3) 7(5.1) 16(12.6) 17(13.4) 48(37.8) 24(18.9)</td>
<td>3(1.3) 22(9.7) 17(7.5) 29(12.8) 38(16.8) 60(26.5) 57(25.2)</td>
<td></td>
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</tr>
<tr>
<td>9. ABET’s new TC2K accreditation criteria will encourage my institution to revise policies in order to promote faculty development activities in order to keep faculty technically current.</td>
<td>15(11.7) 6(4.7) 13(10.2) 49(38.3) 22(17.2) 12(9.4) 11(8.6)</td>
<td>18(14.2) 12(9.4) 10(7.8) 49(38.6) 14(11) 15(11.8) 9(7.1)</td>
<td>21(9.3) 22(9.7) 14(6.2) 77(34.1) 41(18.1) 46(20.4) 5(2.2)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
1. **Technical currency of faculty is essential to make student learning more relevant:**
Out of 123 respondents, 25% said they agree (A) while 69.9% said that they strongly agree (SA) with the notion that because of the applications orientation of engineering technology programs, technical currency of faculty is essential to make student learning more relevant, whereas 3.9% moderately disagree (MD). The level of agreement (94.0%) results for 2013 results are similar to 2007 (97.8%) and 2003 ((96.2%) results.

2. **Strong relationship between technical currency and student learning:** 32.8% of respondents strongly agree (SA), 36.7% agree (A), 1.6% moderately agree (MA), 6.3% strongly disagree (SD), and 1.6% disagree (D) with the concept that there is a strong relationship between the technical currency of the faculty member and student learning/success. The levels of agreement (90%) for 2013 results are similar to 2007 (90.6%) and 2003 (88%) results.

3. **Institutional support/encouragement for faculty to maintain technical currency:**
14.1% of respondents strongly agree (SA), 30.5% agree (A), 14.8% moderately agree that they have institutional support/encouragement to maintain technical currency, while 9.4% strongly disagree (SD), 5.5% disagree (D), 14.1% moderately disagree (MD), and 11.7% expressed no opinion (N). The results reveal that the level of agreement for 2013 (59.14%) increased compared to 2007 (47.9%) results but decreased compared to 2003 (74.8%) results.

4. **Chairperson’s support for faculty professional development activities/maintenance of technical currency:** 9.4% of respondents strongly agree (SA), 28.1% agree (A), 16.4% moderately agree (MA), 9.4% strongly disagree (SD), 9.4% disagree (D), and 10.2% moderately disagree (MD) that their chairperson helps and supports them to plan their professional development activities to maintain technical currency, and 17.2% expressed no opinion (N). The results for 2013 indicate that that the level of disagreement is 29% compared to 23.5% in 2003 and 44.8% in 2007.

5. **Faculty maintained technical currency during past 5 years to teach effectively:**
25.8% of participants strongly agree (SA), 34.4% agree (A), 21.1% moderately agree
with the idea that they have maintained technical currency during the past 5 years to teach courses effectively, while 3.9% strongly disagree (SD), 2.3% disagree (D), 7.8% moderately disagree (MD), and 4.7% expressed no opinion (N). The results reveal that the level of agreement for 2013 (81.3%) is similar to results for 2003 (87.6%) and 2007 (73.9%).

6. **Institution has allocated sufficient funds for professional development during the past 5 years**: Only 5.5% of respondents strongly agree (SA), 18.8% agree (A), and 14.1% moderately agree that the institution has allocated sufficient funds for the professional development activities of faculty during the past 5 years, while 25% strongly disagree (SD), 13.1% disagree (D), and 10.9% moderately disagree, and 11.7% expressed no opinion (N). The results indicate that that for 2013 the level of disagreement (50%) decreased compared to 2007(65.9%) and increased compared to 2003 (42.7%).

7. **Urgent need to improve existing departmental polices to allow faculty to enhance their technical currency**: 25% of the faculty members strongly agree (SA), 25% agree (A), 17.2% moderately agree (MA) that there is an urgent need at the department/program level to improve existing policies in order to allow faculty members to enhance their technical currency, while 4.7% strongly disagree (SD), 12.5% disagree (D), 3.9% moderately disagree (MD), and 11.7% expressed no opinion (N). The results show that for 2013 the level of agreement (67.2%) increased from the 2003 (58.4%) and 2007 (59.2%) survey results.

8. **Urgent need to increase department/program funding for faculty development activities**: 32% of respondents strongly agree (SA), 24.4% agree (A), and 18.8% moderately agree with the statement that there is an urgent need to increase funding at the department/program level for faculty development activities, while 5.5% strongly disagree (SD), 3.9% disagree (D), and 5.5% moderately disagree (MD), and 10.2% expressed no opinion (N). The results reveal that for 2013 the level of agreement (74%) increased compared to 2003 (68.5%) and 2007 (70.1%) survey results.

9. **Impact of ABET’s accreditation criteria on revision of institutional policies for promoting faculty developmental activities to keep faculty technically current**: Only 8.6% of respondents strongly agree (SA), 9.4% agree (A), and 17.2% moderately agree (MA) that ABET’s accreditation criteria will encourage their institutions to revise policies for promoting faculty development activities in order to keep faculty technically current, while 11.7% strongly disagree (SD), 4.7% disagree (D), and 10.2% moderately disagree (MD), and 38.3% expressed no opinion (N). The results indicate that for 2013 the level of disagreement (26.6%) is similar to 2003 (25.2%) and 2007 (31.4%) survey results.

10. **Impact of ABET’s accreditation criteria on allocation of adequate financial resources for faculty development activities**: Only 7% participants strongly agree (SA), 10.2% agree (A), and 18.8% moderately agree (MA) that ABET’s accreditation criteria will encourage their institutions to allocate adequate financial resources for faculty development activities, while 10.9% strongly disagree (SD), 9.4% disagree (D), 7.8%
moderately disagree (MD), and 35.9% expressed no opinion (N). The results reveal that for 2013 the level of disagreement (28.1%) is similar to 2003 (30.6%) and 2007 (37.3%) survey results.

11. Modes for maintaining technical currency: Figure 1 shows the frequency distribution of various modes used by respondents to maintain their technical currency. Reading books, magazines and journals; attending conferences/technical workshops/seminars; and keeping up-to-date via the Internet are the most widely used modes for faculty to maintain their technical currency, whereas working as consultants and knowledge/skills transfer from senior faculty/colleges are the least practiced modes.

The results for 2013 are similar to the 2007 & 2003 survey results; participation in professional organizations, attending conferences/workshops/seminars and reading books and journals, are the most frequent modes used to maintain technical currency.

12. Institutional Affiliation: Figure 2 shows the frequency distribution of respondents’ institutional affiliations.
13. **Departmental Affiliation**: Figure 3 shows the frequency distribution of respondents’ professional areas.

![Figure 3. Respondents' Departmental Affiliation](image)

14. **Respondents’ Affiliation with ETAC of ABET Accredited Programs**: Figure 4 shows the frequency distribution of respondents’ affiliations with ABET accredited programs.

![Figure 4. Respondents’ Affiliation with ETAC/ABET Accredited Programs](image)

15. **Respondents’ Computer Competency/Information Technology (IT) and hardware skills (PC & Networking)**: Figure 5 illustrates the respondents’ self-reported computer/IT/networking hardware skills. The 2013 results reveal that 52.8% respondents claim to have a medium level of computer hardware skills compared to 2003 (54%) and 2007 (45%) results. The computer skill level results for 2003, 2007, and 2013 have similar trends; the majority of responders claim a medium level of computer hardware skills.
16. **Computer Competency/Information Technology (IT) Software skills (PC & Networking):** Figure 6 illustrates respondents’ claimed computer competency/IT/networking software skills. As in 2003 and 2007, the survey results for 2013 also reveal that the majority of respondents report a medium level of computer software (PC & Networking) skills[2013 (39%), 2007 (55%) and 2003 (49%)].

17. **Department funds provided for professional development activities:** Figure 7 shows the participants’ reports of departmental funds for professional development on an annual basis for years the 2013, 2007, and 2003. In 2013, 16.5% respondents received no financial support for professional development activities[2007 (16.5%), 2003 17.6%]; 9.1% received $1-$200 [2007 (9.4%), 2003 (20.3%)]; 15.7% received $201-$500 [2007
(20.4%), 2003 (20.7%); 19% received $501-$1000 [(2007 (22.8%), 2003 (19%)); 19.8% received $1001-$1500 [(2007 (15.7%)), 2003 (16.3%)] and 19.8% received more than $1500 [(2007 (14.9%), 2003 (5.7%)].

18. Personal Funds used for professional development activities: Figure 8 illustrates the participants’ use of personal funds for professional development in years 2013, 2007, and 2003. In 2013, 12.2% participants reported that they did not spend any personal funds for professional development [2007(13.3%), 2003(18.1%)], 39% spent $1-$500 [2007(49.6%), 2003(48.2%)], and 48.8% spent $501-$1500 [2007(37%), 2003(33.6%)] of personal funds for professional development.

19. Teaching Experience: Figure 9 illustrates participants’ teaching experience. Survey participants’ reported having teaching experience of 0-5 years; 10.6% claimed 6-10 years teaching experience; 30.1% 1-20 years teaching experience, and 54.5% reported
more than 20 years teaching experience. The 2013 survey results are similar to 2007 and 2003 survey results; the majority of participants reported more than 20 years of teaching experience.

**Figure 9: Participants' Teaching Experience**

![Teaching Experience Chart]

20. **Recent Industrial/Consulting Experience:** Figure 10 illustrates the participants’ reports of recent industrial or consulting experience for years 2013, 2007, and 2003. In 2013, 43.1% of participants reported having 0-5 years, and 56.9% reported more than 5 years of industrial and consulting experience. The 2013 survey results are similar to 2007 and 2003 survey results; the majority of participants have more than 5 years of industrial or consulting experience.

**Figure 10. Participants' Recent Industrial/Consulting Experience**

![Consulting Experience Chart]

21. **Highest educational degree completed:** Figure 11 shows the claims for the highest degree completed by the survey participants for years 2013, 2007, and 2003. In 2013, 56.9% reported the Ph.D. or other doctorate, 38.2% a masters degree; 2.4% a
baccalaureate degree; and 2.4% reported that they have only industrial experience. The 2013 survey results are similar to 2007 and 2003 survey results; the majority of participants claimed to have a Ph.D. or other doctorate.

22. **Institutional expectations for conducting research/publications:** In 2013, 58.5% respondents reported that they are expected to conduct research, in contrast to 2007 (35%) and 2003 (29%). The results reveal a significant shift in the expectation to conduct research.

23. **Gender:**
In 2013, out of 123 respondents, 91.9% were males and 8.1% females, in contrast to 2007 (males: 82.7% and 2003 (males:86.3%

24. **Professional Membership:** Figure 12 shows the respondents’ reported professional society affiliations. Majority of participants are members of IEEE, ASEE and ASME.

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**Figure 11. Participants' Educational Background**

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2007</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Experience</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>B.S.</td>
<td>19</td>
<td>35</td>
<td>4</td>
</tr>
<tr>
<td>M.S.</td>
<td>49</td>
<td>51</td>
<td>128</td>
</tr>
<tr>
<td>Ph.D. or other doctorate</td>
<td>77</td>
<td>41</td>
<td>70</td>
</tr>
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</table>

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**Figure 12: Participants' Professional Membership**

<table>
<thead>
<tr>
<th>Society</th>
<th>2003</th>
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<th>2013</th>
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</thead>
<tbody>
<tr>
<td>IEEE</td>
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<tr>
<td>ASEE</td>
<td>45</td>
<td>57</td>
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<td>ASME</td>
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<tr>
<td>AICHE</td>
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<td>1</td>
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</tr>
<tr>
<td>Other</td>
<td>83</td>
<td>73</td>
<td>27</td>
</tr>
</tbody>
</table>
25. Training in Pedagogy of teaching and learning: In 2013, 41.5% of respondents reported that they did receive training in the pedagogy of teaching and learning [2007 (46.6%) and 2003 (52.7%)] and 58.5% reported they did not receive any such training [2007(53.4%) and 2003 (47.3%)].

26. Participants’ Feedback/Comments regarding the importance of faculty technical currency and faculty development on student learning/success: Out of 123 respondents, only 5.7% completed the comments section of the survey. The following is a sample of selected comments.

- Faculty technical currency plays a pivotal role in teaching and learning.
- It is critically important. But I also think that in addition to financial support, faculty members need to be given time release and incentives so that they are encouraged to be pro-active in maintaining technical and academic currency. At the back end of this, insufficiently developed faculty will lead to reduced student learning and success and that will make our future graduates more incompetent and less competitive in the global marketplace.
- There is no support from my institution. I am using my personal funds to pursue professional development activities.
- Both, faculty technical currency and pedagogy of teaching and learning are critical to effective teaching.
- I have returned to industry as …an engineer and am better off as I am treated with professional respect and courtesy by my supervisor and my colleagues. Quite frankly I wish I had not earned my doctorate and simply continued to teach at the vocational-technical school where I was treated fairly and had opportunity for professional growth including maintaining my technical skills.
- I consider the biggest obstacle to technical currency at my institution is my salary. I seek overtime assignments to supplement my salary but that leaves little or no time for technical currency.
- Attending an annual convention such as ASEE is unlikely for two reasons. I need to pay the expenses up front and am not likely to be reimbursed unless I am making a presentation.
- A very important survey.

IV. Implications for Practice/Recommendations

Based on the survey results and participants’ feedback, and comments, the following recommendations are made for maintaining and enhancing faculty technical currency and faculty development activities in order to improve the quality of instruction in engineering technology programs.

1. At the personal level:
   Faculty members should do a yearly self-inventory of their technical currency, and should identify areas of improvement and pursue professional development
activities to enhance their technical currency, and do a self-assessment of their skills.

2. At the program/department level:

   a. Administrators/chairpersons need to realize the importance of technical currency. Moreover, they should provide training opportunities for faculty to enhance their technical currency in order to improve student learning/success. In this regard they need to allocate appropriate amounts of funds for faculty professional development activities.
   b. Curriculum development and revision activities should be synchronized with faculty development and training activities vis a vis technical currency in order to optimize teaching/learning using continuous quality improvement.
   c. Faculty should be encouraged to pursue industrial experience via mini-industrial sabbaticals and consulting work.
   d. Administrators/chairpersons need to realize the importance of pedagogy in teaching and learning. And they should provide training opportunities for faculty to strengthen pedagogy in order to improve student learning/success.

3. At the Institutional/Organizational level:

   a. Because of the applications orientation of engineering technology programs, faculty technical currency is essential to make student learning more relevant. Therefore, there is a need to formulate/revise institutional polices to encourage faculty to maintain technical currency.
   b. Institutions need to allocate appropriate funds for faculty developmental activities.
   c. Institutions need to collaborate with industry for creating professional development opportunities for faculty.
   d. Institutions also need to realize the importance of the IT/computer/tablet competency in promoting student learning as faculty and students continuously communicate outside classrooms via digital communications. All faculty members should be provided training opportunities to enhance their computer/IT/networking and hardware/software skills.

V. Conclusion

This paper highlighted the importance of faculty technical currency and professional development. The faculty technical currency survey findings suggest that the majority of the participants believe that:

1. Because of the applications orientation of engineering technology programs, technical currency of faculty is essential to make student learning more relevant (level of agreement: 2013 [94%], 2007 [97.8%], 2003 [96.2%]).
2. There is a strong relationship between faculty technical currency and student learning (level of agreement: 2013 [90%], 2007 [90.6%], 88% [2003]).

3. The use of online and hybrid teaching modes has extended teaching hours beyond the traditional classroom and broadened office hours because of easy access through email, social media and cell phones. Consequently, faculty have less time to conduct research and to pursue professional development activities. Hence, there is an urgent need to revise and strengthen institutional/departmental policies to facilitate faculty pursuit of professional development activities to maintain technical currency (level of agreement: 2013 [67.2%], 2007 [59.2%], 2003 [58.4%]).

4. There is an urgent need to increase the funds for professional development activities for faculty.

The paper explored the state and status of faculty technical currency and professional development in engineering technology programs. It underscored the need for faculty development and training, and recommended ways to improve faculty technical currency.

References


Appendix A

Dear Colleague:

As you know, declining student enrollments and shrinking funds have imposed new challenges for technology faculty who wish to pursue professional development activities to maintain technical currency. The lack of faculty currency in the profession may be hurting student interest and retention. In this regard, we would like to explore the state of faculty technical currency and scholarship. Therefore, we invite you to participate in our survey project. To ensure your confidentiality, you are not required to write your name on the survey questionnaire. Your participation in this project is strictly voluntary, and information gathered for this study will remain confidential. Answering the questionnaire will not take more than five minutes. You can complete this survey online by clicking on the following URL:

http://kwiksurveys.com/s.asp?sid=i415ciemjigyqzr276153

We plan to present the results of this survey at the 2014 ASEE conference. We will also compare the results with the survey conducted earlier in 2004 and 2007. We hope that the results of this study will help to improve the quality of instruction in engineering technology programs and lead to enhancing faculty development activities and scholarship.

Thank you for your willingness to participate in this research study.

Sincerely

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Amin Karim
Visiting Professor
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Downers Grove, IL 60515

E-mail: akarim@devry.edu
Facility Survey on Technical Currency

For Questions 1-10, please use the following scale.

1 = I strongly disagree with this statement (SD)
2 = I disagree with this statement (D)
3 = I moderately disagree with this statement (MD)
4 = I neither agree nor disagree with this statement (N)
5 = I moderately agree with this statement (MA)
6 = I agree with this statement (A)
7 = I strongly agree with this statement (SA)

Please circle the appropriate number.

<table>
<thead>
<tr>
<th>Question</th>
<th>SD</th>
<th>D</th>
<th>MD</th>
<th>N</th>
<th>MA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Because of the application orientation of engineering technology programs, technical currency of faculty is essential to make student learning more relevant.</td>
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<td>2. I believe that there is a strong relationship between the technical currency of the faculty member and student learning/success.</td>
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<td>3. My institution supports and encourages faculty members to maintain technical currency.</td>
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<td>4. My chairperson supports and helps me plan professional development activities to maintain technical currency.</td>
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<td>5. I believe that I have maintained technical currency during the past 5 years, enabling me to teach courses effectively.</td>
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<td>6. My institution has allocated sufficient funds for the professional development activities of faculty during the past 5 years.</td>
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<td>7. There is an urgent need in my department/program to improve existing policies in order to allow faculty to enhance their technical currency.</td>
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<td>8. There is an urgent need in my department/program to increase funding for faculty development activities.</td>
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<td>9. ABET’s accreditation criteria will encourage my institution to revise policies in order to promote faculty development activities in order to keep faculty technically current.</td>
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<td>10. ABET’s accreditation criteria will encourage my institution to allocate adequate financial resources for faculty development activities.</td>
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<td>11. How do you stay current (or maintain technical currency) with the pace of technological change? (Check all that apply)</td>
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<td>□ Active participation in professional organizations</td>
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<td>□ Presenting papers at conferences/writing papers in peer-reviewed publications</td>
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<td>□ Attending conferences/technical workshops/seminars</td>
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<td>□ Reading books, technical magazines, and trade journals</td>
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<td>□ Keeping up-to-date via the Internet</td>
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<td>□ Knowledge/skill transfer from senior faculty/colleagues</td>
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<td>□ Working as a consultant in industry</td>
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</table>
12. I am affiliated with a:
   - □ State supported 4-year university
   - □ State supported 2-year program/community college
   - □ Private non-profit 4-year university
   - □ Private for profit 4-year university

13. My departmental affiliation:
   - □ Electrical and electronics engineering technology
   - □ Computer engineering technology
   - □ Mechanical/Manufacturing engineering technology
   - □ Industrial engineering technology
   - □ Civil engineering technology
   - □ Chemical engineering technology
   - □ Environmental engineering technology
   - □ Other ____________________________

14. Do you teach in a TAC of ABET accredited program?
   - □ Yes
   - □ No
   - □ We are in process of getting the accreditation

15. Indicate your computer competency/Information Technology (IT) hardware skills (PC & Networks):
   - □ Low level (Basic understanding of computer hardware/network systems)
   - □ Medium level (have understanding of computer/network systems)
   - □ High level (can design hardware/network systems)

16. Indicate your computer competency/Information Technology (IT) software skills (PC & Networks):
   - □ Low level (can use application software word, PowerPoint, Internet browsers, etc)
   - □ Medium level (can write simple programs)
   - □ High level (proficient in programming using high-level languages)

17. Indicate the amount of departmental funds provided to you annually for participation in professional development activities (conferences, workshops, seminars, etc).
   - □ None
   - □ $1 - $200
   - □ $201 - $500
   - □ $501 - $1000
   - □ $1001 - $1500
   - □ More than $1500

18. Indicate the amount of personal funds you spent over the last year for participation in professional development activities (conferences, workshops, seminars, etc).
   - □ None
   - □ $1 - $200
   - □ $201 - $500
   - □ $501 - $1000
   - □ $1001 - $1500
   - □ More than $1500
19. Years of teaching experience
   - □ 0-2
   - □ 3-5
   - □ 6-10
   - □ 11-15
   - □ 16-20
   - □ More than 20

20. Number of years of recent industrial experience/consulting
   - □ 0
   - □ 1-2 years
   - □ 2-4 years
   - □ 5+ years

21. Highest educational degree completed
   - □ Industrial experience
   - □ B.S.
   - □ M.S.
   - □ Ph.D. or other doctorate

22. Does your institution expect you to conduct research and do publications?
   - □ Yes
   - □ No

23. Gender
   - □ Male
   - □ Female

24. Professional society membership (check all that apply)
   - □ IEEE
   - □ ASEE
   - □ ASME
   - □ ACS
   - □ ASCE
   - □ ACSM
   - □ AIChE
   - □ Other___________________

25. Did you receive any formal training in the pedagogy of teaching and learning?
   - □ Yes
   - □ No

26. Do you have any comments regarding the importance of faculty technical currency and faculty
devlopment on student learning/success?