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Volume XLIV, Number 1, Spring 2018

Evolving Characteristics of Today's Applied Engineering College-Level Educator: 2013 to 2017

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ABSTRACT

This manuscript was created to document faculty, and academic support, issues from 2013 to 2017. The 2013 manuscript was published by the *Journal of Technology Studies*. This four-years-later study provided greater insight for academics that asked the research question: "What is the latest in our teaching career field?" Issues of concern to faculty included positional status (adjunct, contract, tenure-track, tenure), faculty rank, length of time in current rank, length of time in nonacademic professional work (before or after academic work), primary academic program, total number of students taught per semester, average academic salary, contract length, administrative duties and salary benefits. Other issues included academic professional accreditation, degree levels offered, market pay (competitive) presence, academic freedom, benefits cost of coverage (health insurance, life insurance, etc.), the use of faculty talent, the management of teaching assignments, and the number of credit hours taught per semester. Finally, questions about the percentage of teaching load (face-to-face, hybrid, and online), the ease of resource and support acquisition, expectations for research (scholarship), unique ways that an academic institution compensates beyond the base salary, expectations for promotion and tenure, and additional comments pertinent to an academic's role in academia. In the 2013 study, 244 people (from 39 states) participated (only 212 responses were valid). This number dropped to 103 people from 27 states in 2017 (only 90 responses were valid). Although the survey population was smaller for 2017, the number of respondents was determined to be sufficient for reporting to other academics in a publication. Significant results in the study from 2013 to 2017 included an increase from 63.86 to 74.45 students taught per semester and a faculty salary mean change from $73,567 to $77,306 per year. Other survey indicators presented minimal change from 2013 to 2017.

Keywords: Higher Education, Professional Development

INTRODUCTION

Education is undergoing substantial transformation in order to meet the current (and urgent) low-cost mandate of today's public, postsecondary education institutions, and politicians. The purpose of this article is to compare survey results from the Winter of 2013 study, to the Winter of 2017 study. Results from the Winter of 2013 survey (the article was titled: "Characteristics of Today's Applied Engineering College-Level Educator") were published in Volume XL, Number 1, Spring 2014 of *The Journal of Technology Studies.* In this study, effort was put forth to share a baseline four year later of educator facts in the following areas: salaries, technological advancement, professional experience, course loads, class sizes, globalization, and lack of advancement opportunities. This survey (Winter of 2017) is a duplication of the Winter 2013 survey in order to collect updated information of educators from the postsecondary applied engineering/ technology programs and institutions across the United States of America. The purpose, and justification, for the repeat of this study was to help educators how their career choice of teaching has evolved in only four years. It was also hopeful that meaningful trends could be drawn on issues of most concern to faculty.

Little has changed in the literature review from the Winter of 2013 to the Winter of 2017 relating to the demands placed upon educators. Shortages of well-trained and well-prepared faculty are still a concern as well as are low salaries and salary compression. Although while the Bureau of Labor Statistics (BLS) projected a postsecondary teacher growth at 17% from 2010 to 2020 (in the 2010 citation), the renewed BLS (2016) projection has decreased to 13% growth from 2014 to 2024. In 2010, the BLS reported that a postsecondary teacher earned a median salary of $62,050. The median annual wage increased to $72,470 in May of 2015 (BLS, 2016, December). Considering the 12-month unadjusted Consumer Price Indices (2016), the consumer price index (CPI) rose 1.6% (January of 2011), increased 2.9% (January of 2012), increased 1.6% (January

of 2013), increased 1.6 % (January of 2014), declined -0.1% (January of 2015), and increased 0.0% in May of 2015, the unadjusted wage in May of 2015 should have been roughly $66,896 (+7.8%; +$4,846). Nevertheless, the 2010 median salary of $62,050 (in the Winter of 2013 report from a listed 2010 BLS website) increased to $72,470 (+16.8%, +$10,420) in the May of 2015. Therefore, some salary escalation has been realized by faculty.

There also has been no change in the applied engineering college-level educator requirements to deliver remedial, introductory, intermediate, and advanced technical content to students in traditional-classroom, hybrid/blended, and 100% online delivery settings. As reported in the 2013 report, many faculty members are not only teaching typical lecture courses but also being tasked with managing student laboratories, advising students, participating in professional association events, continued service in faculty governance committees, financial responsibilities, and continued personal professional development at high competency levels (Chikasanda, Otrel-Cass, & Jones, 2010). Many faculty members have forsaken education as a profession due to these factors. The words of Steinke and Putnam (2011) still hold true that applied engineering educators leave the teaching profession due to "low salaries, lack of career advancement, or administrative support, student and peer issues, and other school and environment-related concerns" (p. 41). Again, this renewed study was conducted to collect updated information from educators in postsecondary applied engineering/technology programs, and institutions across the United States of America, and hopefully draw meaningful trends on issues that faculty care about.

ONGOING CHALLENGES FACING EDUCATORS

Readers of this updated study are encouraged to read the Winter of 2013 article for a more detailed literature review. Key faculty challenges in the previous study included Wheeler's (2004) seven fundamental reasons for the decline of the traditional university system (and the faculty wrapped up in the system): "technological innovation, adverse economic climate, mounting commercial competition, demands for greater flexibility, subject proliferation, erosion of academic staff base and globalization" (p. 12). Mention was also made of an educator's passion for teaching (McClellan, 2012), educational reality adaptation (Osborn, 2012) – aka "do more for less," and Privateer's (1999) observation "factoring in the growing tendency of federal officials, governors, legislators, governing boards, and college and university administrators to envision instructional technologies as a panacea able to maintain the status quo while dramatically cutting delivery costs" (p. 66).

Financial Challenges

Kelderman (2012) reported in the previous study that state appropriations for colleges had declined 7.6 percent from 2011-2012. Mitchell, Leachman, and Masterson (2016, August 15) reported the following anecdotal information on ending state financial support (p. 1):

- Forty-six states – all except Montana, North Dakota, Wisconsin, and Wyoming – are spending less per student during the 2015-16 school year than they did before the previous recession (2007-2008).
- Tuition increases have compensated for only part of the revenue loss resulting from state funding cuts. Over the past several years, public colleges and universities have cut faculty positions, eliminated course offerings, closed campuses, and reduced student services, among other cuts.
- A sampling of state funding cuts and increases from 2008-2016 (see the article for a listing of all states) from the worst to the best: Arizona (-55.6%), South Carolina (-37.0%), Kentucky (-32.0%), Delaware (-28.8%), New Jersey (-23.2%), Missouri (-22.2%), Georgia (-19.8%), Utah (-13.7%), Colorado (-8.4%), Nebraska (-5.3%), California (-3.2%), Montana (+1.8%), Wyoming (+21.0%), and North Dakota (+46.0%). Note: only four of the fifty states had increases in state appropriations.

Even though these financial adjustments are disheartening, a few academics and higher education technology-proficient support personal, believe that increasing enrollments and class sizes, through higher use of technology and institution image-upgrading, may be a temporary solution to revenue loss (Baggetta, 2016; Donoghue, 2011; Doggett & Lightner, 2010; Sevier, 1996) and retaining of faculty (Field, 2011; Miller, 2011).

Salaries

Salaries may help to retain and attract qualified faculty. Postsecondary teachers earned a 2010 median salary of $62,050 per year with no requirement of related occupational experience, which increased to $72,470 in May of 2015 (BLS, 2016, December). In the Winter of 2013 study, it was reported that faculty in the more specialized area of career and technical education (technology and applied engineering) teachers earned a median salary of $53,920 per year with 1 to 5 years of related occupational experience (Bureau of Labor Statistics, 2010; Occupational Outlook Handbook, 2012). The 2015 Median Pay had now decreased to $52,800 per year (Bureau of Labor Statistics, 2016; Occupational Handbook, 2016).

Technological Advancement

Although technologies used for education continue to be more advanced, and somewhat more taxing in terms of student topic competency attainment (Jones, 2013), technology and innovation are still viewed as a necessity for the applied engineering college-level educator (Baggetta, 2016; Devine, 2006; Kenney, McGee, & Bhatnagar, 2012; Donlevy, 2005; Grumwald, 2010; Wheeler, 2004).

Professional Experience

Colleges and universities still strive to hire experienced industrial professionals who can serve as faculty (Garrison, 2005; Levine, 2015). Furthermore, Garrison (2005) mentioned that industrial professionals switch to teaching because they have a "desire to teach," which benefits students because of their varied experiences from industrial settings. These industrial-to-academia professionals typically switch professions through adjunct work, teaching part-time at community colleges, and often become night-class mentors for community colleges and universities (Zackal, 2014). While these faculty members may lack a terminal degree required at a major university, "[they] do possess the needed skills to help students reach their educational goals through a greater connection to what happens in the real world" (Nickolich, Feldhaus, Cotton, Barrett, & Smallwood, 2010).

Course Loads, Class Sizes, and Faculty Hours Worked

Increasing faculty course loads and class sizes appears to be one way in which academia is seeking to offset downturns in financial support (Donoghue, 2011) – while at the same time community college and university administrators ignore the additional loads of faculty governance committees, higher levels of scholarship, more professional development, increased recruitment, and accreditation duties they have placed upon these faculty, not to mention, the need for these same faculty to teach assigned courses (which often seems to be an afterthought by many administrators). Furthermore, release time and reduced teaching time, to handle the extra duties and increased class sizes, have become a thing of the past (Barwick, 2007; Wilson, 2011). As one example of defined faculty work hours, under the new Texas State Technical College "Faculty Expectations and Workload" statewide operating standard, and Texas Education Code – Section 51.402, "full-time salaried employees may not be authorized to work less than 40 hours per week (TSTC, 2016, October 3, p. 2)." This same document also provides detailed faculty duties and definitions regarding the following: administrative assignments, direct instructional activities, faculty workload, full-time faculty members, instructional activities, instructional development, professional development, and service.

Globalization

No changes were made to this section in the Winter of 2017 report. The following information was detailed in the Winter of 2013 study and is still pertinent today. Wheeler (2004) also mentions globalization as a cause for decline. Globalization is affecting how students should be educated (Ayokanmbi, 2011). Therefore technology educators should align course content with the needs of industry (Hogan, 2009; Jones, Smith, & Callahan, 2010). Demographic changes, technology advances and globalization are claimed to be the game-changers in the 21st century (Donlevy, 2005; Karoly & Panis, 2004). In fact, many educators are being encouraged to insist that their applied engineering students acquire global perspectives through exposure to cultures in other countries and be prepared for mobile careers (Ayokanmbi, 2011).

Lack of Advancement Opportunities

As was mentioned in the 2013 study, the lack of opportunities for advancement or clearly outlined paths for advancement also seem to be a concern for faculty. Today's educator may or may not be tenured or in a tenure-track position as a lecturer, instructor, assistant professor, or associate professor. Naturally this all varies greatly with the type of institution and the mission of the institution. Once into academia as an associate professor, the industrial-turned-academic professional is faced with many issues: non-clear definitions to attain full professor status; aligning institutional with personal professional goals; creating (and following through) a clearly defined research agenda; balancing teaching with research (scholarship) and service and while, at the same time, providing leadership to junior faculty (Fox, n.d.).

PURPOSE OF THE STUDY

The purpose of this renewed study was four-fold for applied engineering college-level educators: (a) conduct a broad literature review on employment conditions affecting faculty, (b) administer a career-status-update survey to faculty in the United States, (c) report summarized survey results on the current and evolving characteristics in order to identify future, more in-depth research needs, and (d) compare the results from the Winter of 2013 study to the results of this Winter of 2017 study.

METHODOLOGY

A 23-question online survey was developed for distribution to faculty through the Association of Technology, Management and Applied Engineering (ATMAE) and Texas A&M Engineering Technology (tamu.edu) Listservs at United States' community colleges and universities who possess Engineering Technology, Industrial Technology, or Technology programs. Information was obtained from faculty through an introductory listserv email and enclosed web link to the survey. The survey was posted in late December of 2016 and continued through the middle of January, 2017. Survey responses were kept confidential for this study.

Summarized survey data using Microsoft Visio, Microsoft Excel, and IBM SPSS Statistics (2017) were used to categorize:

- State of employment
- Positional status
- Faculty rank
- Length of time in current rank
- Length of time in a non-academic position (before or after academia)
- Primary academic program for employment
- Number of students taught
- Academic salary
- Non-academic salary
- Accreditation agencies supporting the program
- Degree levels obtainable for students
- Institutional offering of market pay
- Level of academic freedom
- Benefits cost of coverage
- Effective use of faculty talents
- Manageability of teaching requirements Credit hours taught per semester
- Percent of share for class type (face-to-face, hybrid, online)
- Ease in getting resources for teaching and labs
- Level of expectations for research (scholarship)
- Unique ways in which the institution supports faculty beyond base contract salary
- Expectations for promotion and tenure and general comments related to the college/university
- Satisfaction level at your institution

Study limitations could exist due to information provided by survey respondents in 2013 and 2017. For instance, as in the 2013 survey, and in this 2017 study, faculty may not possess a comprehensive understanding of the actual reasons for the way in which their institution is managing academic affairs. Furthermore, low salaries or benefits could be due to poor faculty performance or discord present between the faculty member and his/her immediate chair or supervisor. Another potential limitation was the use of a researcher-developed instrument with limited validity and reliability.

SURVEY RESULTS

State Representation for Study

2013 Study: Two hundred and forty-four people from 39 states provided survey data, although this number was reduced to 212 survey respondents after removing individuals who did not provide one of the following responses: 1. The primary

applied engineering-related program, 2. State worked in, 3. Faculty rank, 4. Positional status, or 5. Average academic salary. This action was taken since these five questions were the baseline for extraction of information for summarization for faculty.

2017 Study: One hundred and three people from 27 states (see Figure 1) provided survey data, although this number was reduced to 90 survey respondents after removing individuals who did not provide one of the five responses reported in the 2017 study.

Positional Status

Table 1 provides information on the primary positional status for survey faculty in 2013 and 2017.

Faculty Rank

Table 2 provides information on faculty rank of survey respondents for 2013 and 2017.

Length of Time in Current Rank

2013 Study: The mean years of service for the respondents were ten years. The range was from one year to 40 years with a surprising number of respondents with less than ten years of service.

2017 Study: The mean years of service for the respondents were 9.23 years. The range was from one year to 38 years.

Length of Time in a Non-academic Position

2013 Study. The respondents had varying lengths of service in non-academic positions with a range of 0-50 years and a mean of 12.34 years.

2017 Study. The respondents had varying lengths of service in non-academic positions with a range of 0-35 years and a mean of 14.1 years.

Primary Programs and Degree Levels

Figure 2 illustrates the number of 2013 and 2017 faculty who teach in academic programs (with greater than 5 responses for each item).

Figure 3 depicts degree levels taught as reported by greater than 10 survey respondents for 2013 and 2017.

Faculty Credit Load by Semester and Students per Semester

The mean credit hours faculty taught by semester is 12.27 for 2013. This value decreased to 11.45 credit hours taught by semester in 2017.

The number of students typically taught by a faculty member in 2013 versus 2017 resulted in a mean of 63.86 students taught per semester for 2013. This value increased to 74.45 students in 2017.

Figure 1. Survey participation by region, sub-region and state in 2016/2017

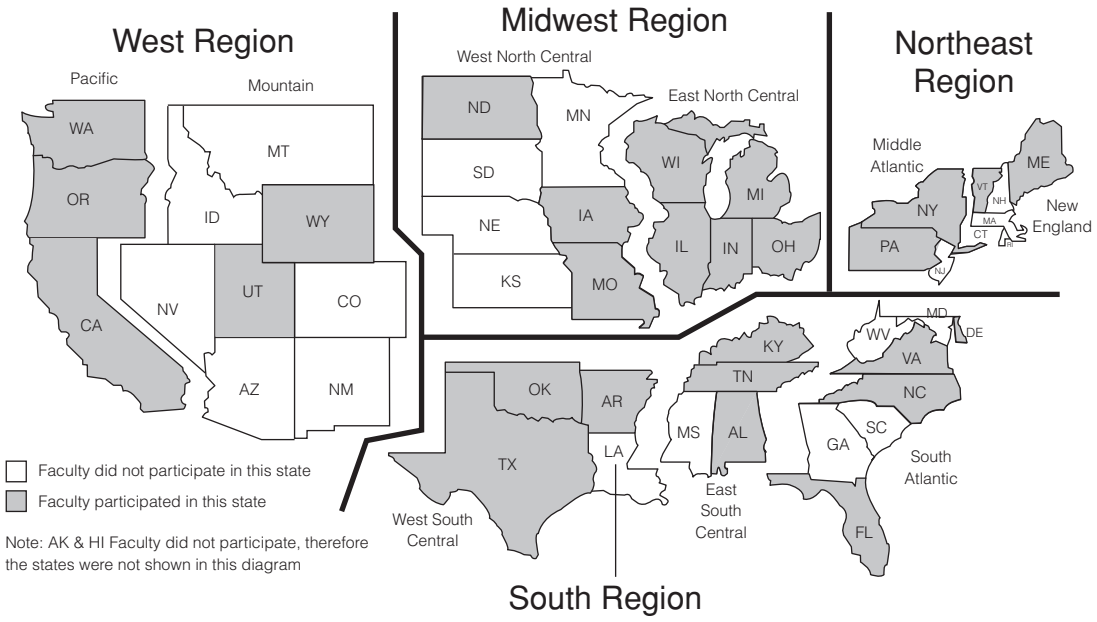


Table 1. Positional Status of Survey Respondents for 2013 and 2017

	2013		2017	
Positional Status	*n*	%	*n*	%
Contract-only	44	21	25	28
Tenure-track	41	19	10	11
Tenured	127	60	47	52
Emeritus	NA	NA	1	1
Adjunct	NA	NA	7	8

Table 2. Faculty Rank of Survey Respondents for 2013 and 2017

	2013		2017	
Positional Status	*n*	%	*n*	%
Coordinator	2	1	0	0
Director	2	1	0	0
Adjunct	4	2	7	8
Lecturer	4	2	6	7
Instructor	28	13	11	12
Assistant Professor	35	16	16	18
Associate Professor	76	36	22	24
Full Professor	61	29	28	31

Figure 2. 2013 and 2017 Study. Number of academic programs by study year (n > 5)

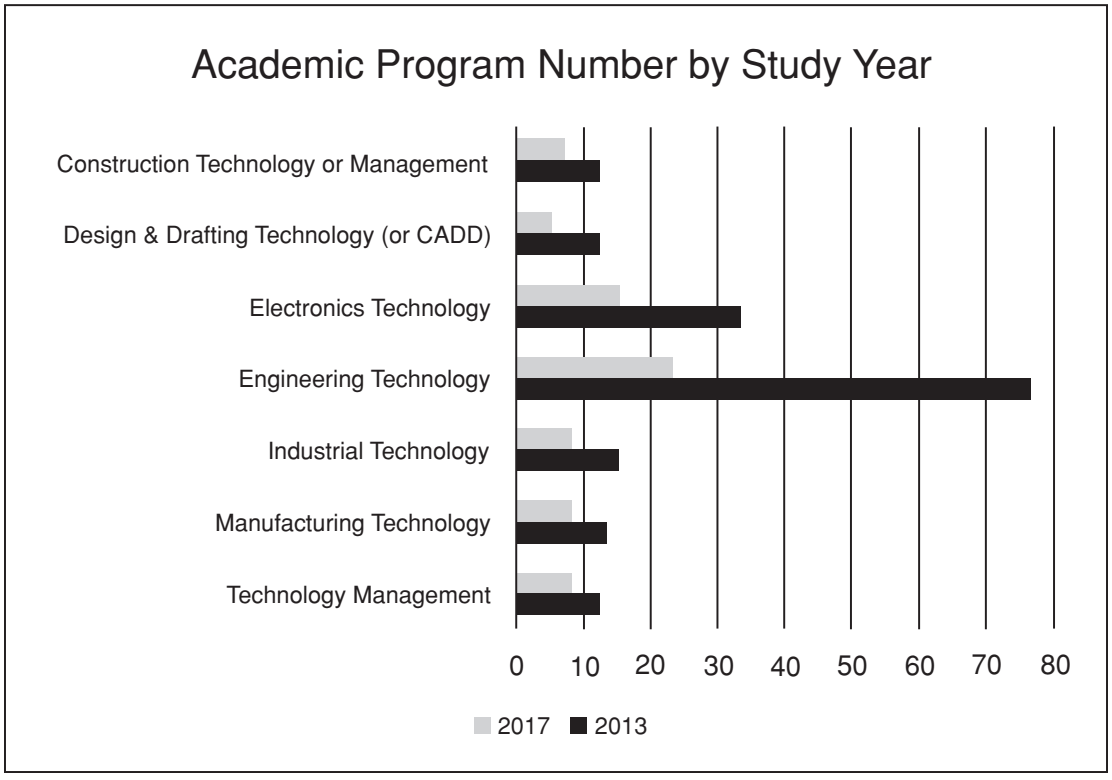
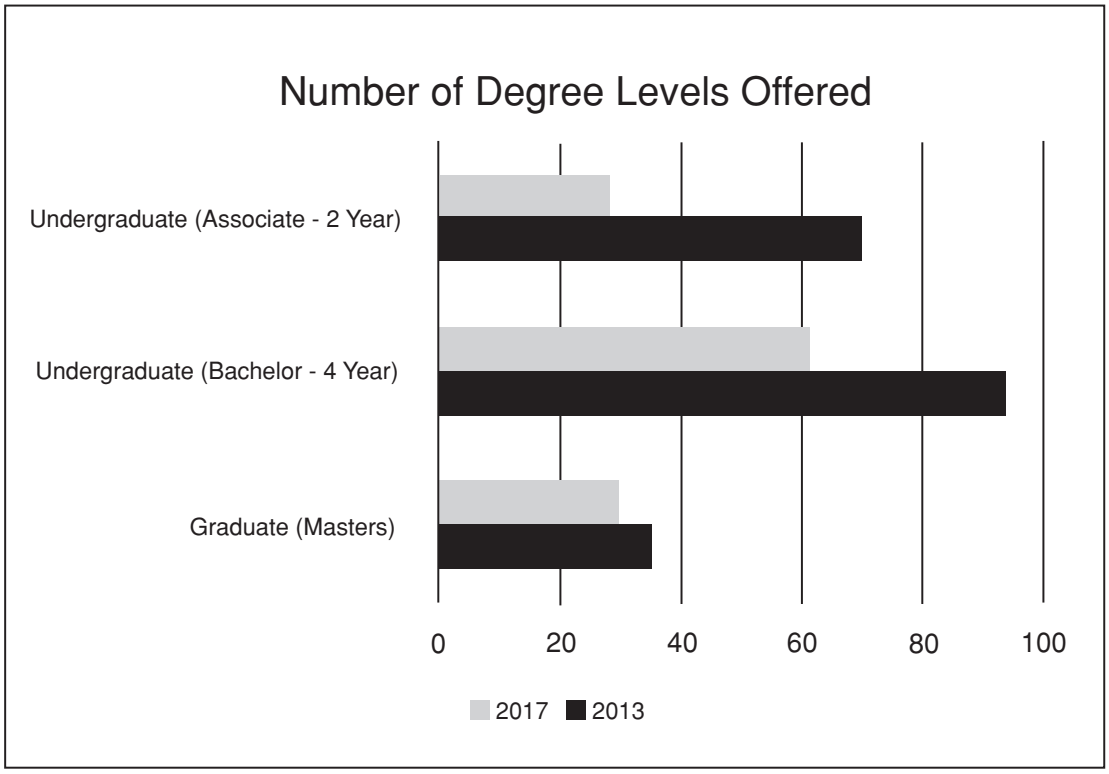


Figure 3. 2013 and 2017 Study. Degree levels instructed (n > 10)



Faculty Salary and Contract Length

Faculty salary mean was $73,567 with a standard deviation of $24,890 in 2013. 2017 modestly raised the faculty salary mean to $77,306 with a standard deviation of $29,002 (see Figure 4). The mean yearly contract length for faculty was 9.38 months for 2013 and 9.39 months for 2017.

Administration Position and Pay

Various faculty members reported add-on positions of chair, coordinator, department head, and program director for both the 2013 and 2017 surveys. Very few individuals answered this question in the 2017 survey. Consistent additional means of support for reporting faculty were in online course development, release time, grant work, and teaching summer classes for both surveys.

Market Pay

In the 2013 study, survey respondents reported that 50% of their institutions did not provide market pay. In this 2017 study, the number of institutions has risen to 57%. Professional organizations utilized for market pay comparison included the following for both 2013 and 2017: AAUP, ABET, ACCE, ASEE, ATMAE, CUPA-HR, and IEEE.

Accreditation Body

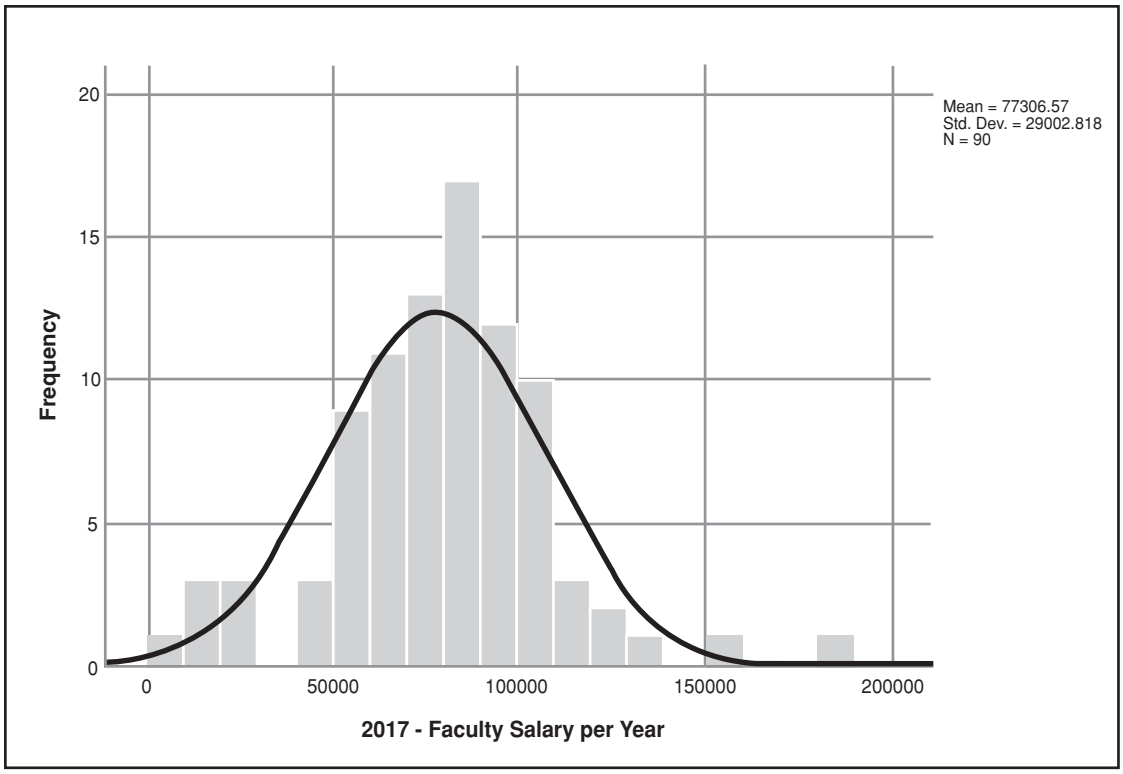
Primary accreditation bodies utilized by academic institutions were as follows (several faculty chose not to answer this question for both the 2013 and 2017 surveys):

- Accrediting Board for Engineering & Technology (ABET-EAC) (2013: 9), (2017: 6)
- Accrediting Board for Engineering & Technology (ABET-ETAC) (2013: 94), (2017: 35)
- American Council for Construction Education (ACCE) (2013: 10), (2017: 5)
- Association of Technology, Management, and Applied Engineering (ATMAE) (2013: 45), (2017: 36)

Academic Freedom, Benefits Cost of Coverage, Talent Usage and Teaching Manageability

Figure 5 provides 2013-to-2017 changes in faculty Academic Freedom (scale of 1-to-5; 5 being the highest), Benefits Cost of Coverage ([how well an institution covers insurance and other benefits], scale of 1-to-5; 5 being the highest), Faculty Talent Usage (scale of 1-to-5; 5 being the highest), and Teaching Assignment Manageability (scale of 1-to-10; 10 being the highest).

Figure 4. 2017 Study. Faculty salary per year



Teaching Method

Teaching online and hybrid classes went up from 2013 to 2017. Teaching face-to-face classes decreased during the same time period (see Figure 6).

Resources and Support, and Research (Scholarship) Expectations

Changes in faculty Resources and Support (scale of 1-to-10; 10 being the highest) was 6.33 in 2013 and at 6.07 in 2017. Research (scholarship) expectations by academic institutions (scale of 1-to-5; 5 being the highest) was 2.87 in 2013; and at 2.87 in 2017.

Promotion and Tenure Expectations

The summarized anecdotal information of the faculty for 2013 and 2017 is provided next in relation to a respondent's university tenure and promotion procedures or expectations.

2013

- Two publications required per year
- Five years teaching and 15 hours of Master's credit to apply for assistant professor
- A joke. No new faculty mentoring. No feedback from administration on how well we are doing
- Absolutely ridiculous and highly arbitrary - even though there are written requirements
- Based strictly on education and years of service
- Does not hire full time but depends on adjuncts
- Expect too much scholarly activity given the teaching loads
- I will get tenure this year - the target is moving
- It is a fair system
- One is completely at the mercy of the academic politics

2017

- Teaching, research, and service are expected to be excellent
- Expectations for research have become excessive to the detriment of teaching
- Fair, but haven't changed since 1980 when state mandates were employed

Figure 5. 2013 and 2017 Study. Various faculty indicators

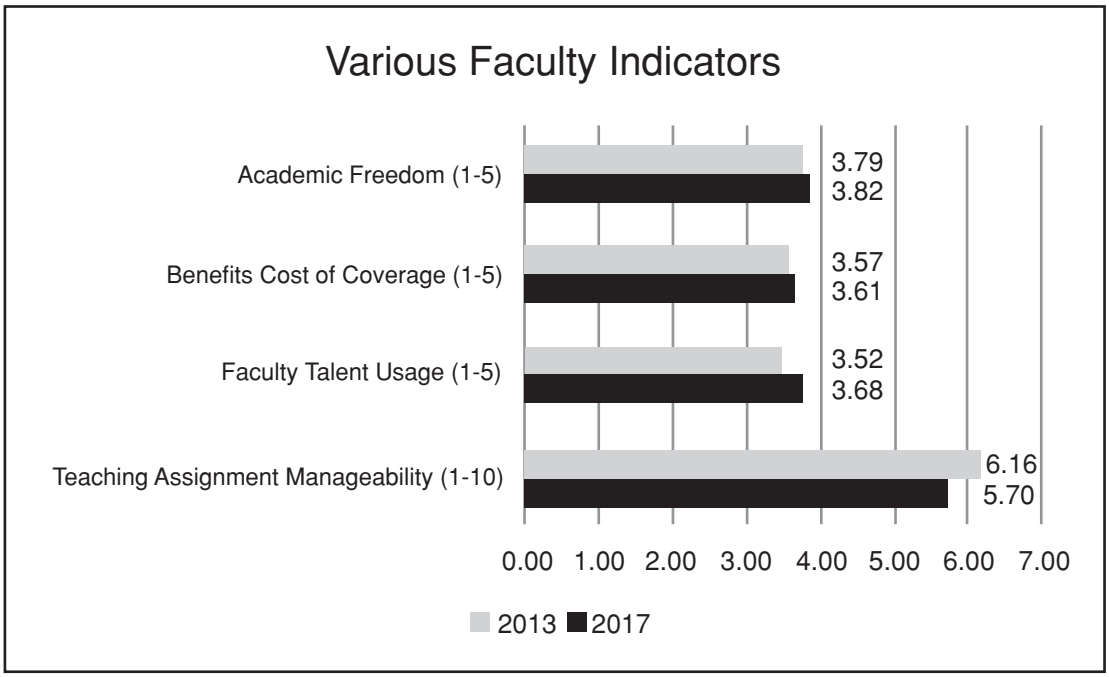
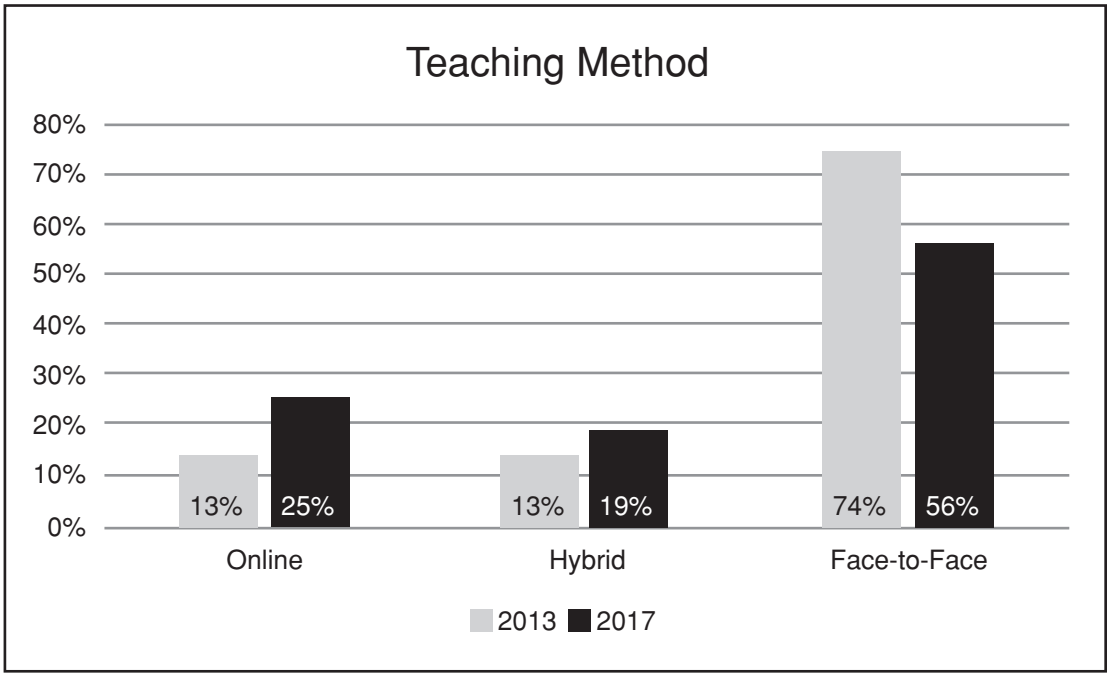


Figure 6. 2013 and 2017 Study. Teaching method



- My department has fairly low standards
- Generally reasonable, although I think tenure is an outdated concept
- The expectations are very fair and doable
- Getting harder. Skewed heavily toward Ph.D.s
- Moving target
- Fair for tenure. Lofty for full professor
- Faculty members are not treated fairly, even if you meet the requirements for tenure. Top leaders, and the provost, make their own decisions

CONCLUSION AND DISCUSSION

Both the 2013 and 2017 surveys attempted to get at the heart of issues of most concern to academics in the United States of America. These issues included positional status (adjunct, contract, tenure-track, tenure), faculty rank, length of time in current rank, length of time in non-academic professional work (before or after academic work), primary academic program, total number of students taught per semester, average academic salary, contract length, administrative duties and salary benefits, academic professional accreditation, degree levels offered, market pay (competitive) presence, academic freedom, benefits cost of coverage (health insurance, life insurance, etc.), using faculty talent, managing of teaching assignments, number of credit hours taught per semester, percentage of teaching load (face to face, hybrid, online), resource and ease of support acquisition, expectations for research (scholarship), unique ways that an academic institution compensates educators beyond the base salary, expectations for promotion and tenure, and other comments pertinent to an academic's role in academia. In the 2013 study, 244 people (from 39 states) participated (only 212 responses were valid). This number dropped to 103 people from 27 states in 2017 (only 90 responses were valid). Even though the survey population was smaller for 2017, the number of respondents was determined to be sufficient for reporting to other academics in a publication.

Key stable or trending changes from 2013 to 2017 were identified and provided below:

- There was very little change in the mean years of service for faculty (2013: 10 years; 2017: 9.23 years)
- Length of time in non-academic positions before or after academic employment increased from 12.34 years (2013) to 14.1 years (2017)
- Engineering Technology remains to be the highest recorded program by respondents from either 2013 or 2017
- Faculty credit load went down from 12.27 credit hours (2013) to 11.45 credit hours (2017)
- The number of students taught, per semester, by faculty increased from 63.86 (2013) to 74.45 (2017)
- Faculty salary mean went up from $73,567 (2013) to $77,306 (2017), a modest 5% increase
- Academic institutional use of competitive (market) pay increased from 50% (2013) to 57% (2017) by survey respondents. Note: this is not conclusive because some of the faculty members reporting could have been from the same institution as another faculty member who participated in the survey
- Very little change for faculty in 2013 to 2017 was noted in terms of academic freedom, benefits cost of coverage, use of faculty talent, or the managing of teaching assignments.
- Teaching methods increased for online education (13% to 25%) and hybrid education (13% to 19%), but decreased for face-to-face education (74% to 56%) from 2013to 2017. Little change for research expectations (scholarship) were noted
- Anecdotal information on university tenure and promotion procedures or expectations seemed to be same from 2013 to 2017. Some faculty stated that the expectations are fair while other faculty believed that upper administrators have their own agenda regarding promotions or tenure

Note that many of the factors listed previously are intertwined in terms of cause and effect.

When one factor changes, another factor is affected. Therefore, it is difficult to draw extensive conclusions about why faculty teaching methods have increased for online and hybrid courses, but decreased for face-to-face type courses. This could be due to administrative changes at some institutions but not at others. It could also be due to the student culture in one

part of the United States is different from the culture in another area of the United States. That is why this study provides the basic facts of what survey respondents have provided.

FUTURE RESEARCH

The one glaring requirement for a future is more passage of time. Four years may seem like a long time, but academia moves slowly in terms of change. The author recommends a new survey after another 4 years has passed beyond 2017, using the same criteria in this survey in order to collect trending data. It is hopeful that after 4 years, faculty will be able to report more information on salary changes, rank upheavals (use of more adjuncts), loss of tenure (states appear to be questioning the need for it), and general cost-cutting methods employed by state academic institutions to remain fiscally solvent during state cutbacks in financial support.

The academic's life is not an easy one. The indicators utilized in this survey attempted to obtain a "pulse" on the state of the faculty in the United States of America. The two elements missing, which also appear to be missing in many surveys, is of "hope" and "overall satisfaction" of the academic in nurturing minds. When, and if, this survey is repeated, it is the author's sincere hope that the next researcher will determine a unique way to capture these two vital areas for a satisfied faculty member.

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