Technology and Design Programs

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Technology & Industrial Design Programs

Abstract

During the summer of 2016, visits were undertaken to six post-secondary academic institutions with programs in construction management, industrial design, information technology, manufacturing or mechanical engineering technology, and technology & engineering education. The purpose of these visits was to learn more about how they are structured, their history, their faculty, and other related items. This paper presents findings from these visits, in the areas of types of faculty, teaching loads, enrollment trends, local organization, placement, experiential learning, scholarship & scholarly productivity, industry experience, industry advisory boards, and program accreditation.

Motivation

The primary purpose of this study was to better understand programs in construction management, industrial design, information technology, manufacturing engineering technology, and technology and engineering education. Each of these programs are substantially different from each other, in history, culture, industry focus, and academic structure. Because of these substantial differences, it was the author's intent to learn more about each program and as many related details as possible.

Methodology

The author serves as the Director of the School of Technology (SoT) at his institution of employment, Brigham Young University (Provo, UT). This SoT includes programs in construction and facilities management, industrial design, information technology, manufacturing engineering technology, and technology and engineering education. Accordingly, the author looked for and found six institutions with several or all of these same programs, or

Table 1: Institutions and Programs in This Study

Institutions and Programs in This Study							
	Arizona State Univ	**Brigham Young Univ**	**Univ of Houston**	**Univ of Wisconsin, Stout**	**New Jersey Inst of Tech**	**Univ of Cincinnati**	**Purdue Univ**
Location	Gilbert & Tempe, AZ	Provo, UT	Houston, TX	Menomonie, WI	Newark, NJ	Cincinnati, OH	West Lafayette, IN
Year Established	1885	1875	1927	1891	1881	1819	1869
# of Students	82000	33000	42700	9600	11300	44300	40400
CM Program	not found	Construction Mgmt	Construction Mgmt	Construction Mgmt	Construction Eng Tech; Construc-tion Mgmt Tech	Construction Mgmt	Construction Mgmt Tech
ID Program	Industrial Design	Industrial Design	Industrial Design	Industrial Design	Industrial Design	Industrial Design	Industiral Consumer Product Design
IT Program	Information Tech	Information Tech	Information & Logistics Tech	Information Tech	Information Tech	Information Tech	Computer & Information Tech
Mfg Program	Mfg Eng	Mfg Eng Tech	Eng Tech	Manufacturing	Mfg Eng Tech	Mech Eng Tech	Eng Tech
TEE Program	Tech Education	Tech & Eng Education	Science Education	Tech & Eng Education	Tech & Eng Education	Tech & Eng Education	Eng Tech Teacher Education
Notes: CM = Construction Management; ID = Industrial Design; IT = Information Technology; Mfg = Manufacturing; TEE = Technology and Engineering Education; Eng = Engineering; Tech = Technology; Mgmt = Management							

close equivalents. Table 1 includes each of the institutions included in the study, some basic information about each institution, and the programs included in this study.

Some of the data was gathered from the institutions' websites, but most was gathered through personal visits with the heads or a faculty member in each of these programs. The visits were conducted in the summer of 2016, and consisted of going over a list of questions (same questions for each institution and program), taking notes on the responses, and compiling the information into some organized findings.

Findings

Enrollment

It was found that enrollment was not a consistent theme across all programs. All programs were experiencing steady enrollment, and some institutions had experienced substantial increases in enrollment in some programs. None of the programs reported a substantial decrease in their enrollment.

Faculty

Across these seven institutions and the programs in each institution, there were four types of faculty: full-time tenure-track – professorial; full-time tenure-track – professional; research only; and adjunct. It was also learned that there are four types of adjunct faculty.

Full-time tenure-track (FT-TT) – professorial faculty were the backbone of these programs, and they had responsibilities in teaching, research/scholarship, and citizenship/service. Their research/scholarship expectations meant that they also had responsibility to find ways to fund their research and to publish their results.

Full-time tenure-track – professional faculty were also present in essentially all programs at all these institutions, though sometimes known by a different title. These faculty had no research/scholarship expectations, and typically had a teaching load of four classes/term, which was about double the teaching load of professorial faculty. These faculty were known as professors of practice, clinical professors, professor educators, instructional faculty, or teaching faculty. The expectations of service to the profession of these different titles varied widely, with professor educators having no service expectations, and professional faculty having the same citizenship/service expectations as professorial faculty. The teaching loads also varied according to these service expectations, with professor educators having the greatest teaching load and professional faculty having the smallest teaching load among these professional faculty.

Research faculty were not expected to do any teaching, and generally performed limited service. Their primary assignment was research and scholarship, so they were expected to work with a cadre of research assistants, seek funding for research projects, and publish their findings.

Adjunct faculty were found in four sub-types, and were also known as contingent faculty. The first type were faculty who worked full-time in nearby industries and who taught no more than two classes (usually just one) per term for the academic institution. Most of these adjunct faculty had been doing this for many years and had a strong relationship with the academic program. The second type of adjunct faculty were those who teach as adjuncts for multiple academic institutions; collectively, these teaching responsibilities made up their career. Most of these adjunct faculty had not been doing this for many years, as it seemed to be more of a

temporary situation for them. And as can be expected, these adjunct faculty generally did not have particularly strong ties to each academic institution. The third type of adjunct faculty found were visiting professors on a one- or two-year contract and were procured from local industries. Most of them only did this for one or two years, then returned to their main job at their local industry. The fourth type of adjunct faculty were retired faculty who still wanted to do a little teaching.

As might be expected, adjunct faculty were only expected to teach their respective courses. They generally had no other expectations of any kind.

There was quite a mixture of these four types of faculty, and even of the four sub-types of adjunct faculty. Some programs had no FT-TT faculty at all, while other programs were nearly all FT-TT faculty. Depending on the institution and its academic mission, there many flavors of mixes of the four types of faculty described above, including the proportion of each type. At one extreme was a program with about 80% of their sections being taught by adjuncts; at the other extreme were programs with only 10% of their sections being taught by adjuncts. One institution also used rolling-horizon contract faculty, a form of an adjunct relationship.

In these programs, it is considered a big advantage to have faculty with industry experience, so it came as no surprise that most of the faculty in these programs did have some industry experience.

The terminal degree was important in all programs. Unless faculty had the appropriate terminal degree, they were not eligible for tenure-track positions (if professorial faculty), but they could be hired as tenure-track professional faculty.

Local Organization

As might be expected, the institutional organization around each program varied substantially. Table 2 summarizes this information. The *italicized* rows are those of the author's institution, while the other rows simply give the names of other academic units above the program, and are not specific to any of the institutions included in the study.

Table 2: Local Organization of Programs

Program or Department	**Next Level Academic Unit**	**Next Level Academic Unit**
Construction & Facilities Management	*School of Technology*	*College of Eng & Tech*
Construction Mgmt		College of Science, Tech, Eng & Math
Construction Eng Tech	Dept of Eng Tech	College of Eng
Construction Mgmt Tech	School of CM Tech	Eng & Applied Science
	Dept of Civil & Architectural Eng & CM	
Industrial Design	*School of Technology*	*College of Eng & Tech*
Industrial (Consumer Product) Design	Design School	College of Architecture
	Design Dept	College of Arts, Humanities & Social Sciences

	School of Art & Design	College of Architecture & Design
	Design, Architecture, Art & Planning	College of Liberal Arts
		School of Design
Information Technology	*School of Technology*	*College of Eng & Tech*
Info & Logistics Tech	Polytechnic School	Schools of Engineering
Info Communication Technologies	Dept of IT	College of Tech
Computing and Info Tech	School of IT	College of Science, Tech, Eng & Math
		College of Computing Sciences
		Polytechnic College
		Education, Criminal Justice, & Human Services
Manufacturing Eng Tech	*School of Technology*	*College of Eng & Tech*
Mfg Eng	Polytechnic School	Schools of Engineering
Mfg Eng Tech		College of Tech
		College of Science, Tech, Eng & Math
Tech & Eng Education	*School of Technology*	*College of Eng & Tech*
Tech Education	Teachers College	College of Education, Health and Human Sciences
Eng Tech Teacher Ed	School of Education	College of Eng
	Dept of Eng Tech	College of Education
	Dept of Tech Leadership & Innovation	

As might be expected, there is quite a lot of variation in the college that houses each of these programs, and in the names of the programs. The actual name of a program, and the academic unit in which it is housed, are usually a function of the history of the academic institution, its mission, and the local and state politics where it resides. As noted in Table 2, the Construction and Facilities Management (or closely related) programs were all found in colleges of engineering and technology. The Industrial Design programs were found in colleges of architecture, liberal arts, and arts & humanities. The Information Technology (or closely related) programs were found in colleges of engineering & technology, computing sciences, and education, criminal justice & human services. The Manufacturing programs were all found in colleges of engineering and technology. And the Technology & Engineering Education programs were found in colleges of engineering and technology as well as education.

Placement

All institutions reported two different statistics on placement: the official number, which had varying definitions and was always less than 95%, and the unofficial number, which

generally meant how many of those actively seeking a job were able to obtain one. The latter number was nearly always 95-100%, as these programs were all experiencing great success in placing their graduates.

Experiential Learning

All programs had experiential learning as a core component. There was some variation in how this was accomplished, but not in the commitment – all were very committed to using this as an integral part of their educational program. All had some form of maker space, usually multiple ones, with a wide range of equipment. Students were all required to spend time learning to use the equipment and were expected to then use the equipment to build ideas into solutions or projects. This commitment to experiential learning was one of the key topics that was common to all five of these very diverse academic programs.

Teaching Load

The teaching load was generally a function of the type of faculty (see preceding section on Faculty above), but at some institutions this is tied to research grant dollars – the more money a faculty member brings in, the smaller their teaching load, such that in some cases, the faculty member became a full-time researcher with no teaching load. Where the AAUP (American Association of University Professors – a union) had a chapter on campus, the load was defined by the AAUP contract.

Scholarship

Several factors determine the definition of scholarship, including impact, quality of venue, and peer review. Some programs include work with local industry as part of scholarship, as it shows impact. Some institutions valued conference proceeding publications, while others did not. Most institutions allow the individual programs to define what scholarship means to them. All engineering technology (ET) programs agreed that ET does not have a cultural history of research expectations, and that this continues to be a defining characteristic of scholarship expectations for ET faculty. In the past two decades, these expectations have been changing such that all tenure-track professorial faculty are expected to do some research and publish.

As might be expected, scholarly productivity was defined differently at each institution, and even each program. The most common quantity that was accepted as good was two journal publications per year. In most programs, four conference proceeding publications per year were also considered good.

Industry Advisory Boards

All programs had IABs and used them, though there was some variation in the titles of these industry representatives. Some programs required IAB members to contribute to the program to be on their IAB. In return, IAB members had first pick for the graduates. One institution charged $4000/year, which also paid for a booth at the career fair.

Accreditation

All programs in this study valued accreditation. Some programs were pursuing accreditation for the first time, while other programs had been continuously accredited for many years. Accrediting bodies included ABET (formerly the Accreditation Board for Engineering and Technology), NASAD (National Association of Schools of Art and Design), ACCE (American Council for Construction Education), and CAEP (Council for the Accreditation of Educator Preparation, formerly NCATE (National Council for Accreditation of Teacher Education).

Conclusion

The information gathered from program websites and personal visits with program representatives provided many insights and gave several benchmarks for understanding similar programs at other institutions. This information should lead to a wider understanding of programs in construction and facilities management, industrial design, information technology, manufacturing, and technology & engineering education (or similarly-named programs).