

The Engineering Technology Education Bibliography: A Retrospective Glance

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Since 1987, the Publications Committee of ASEE's Engineering Technology Council has sponsored the compilation of the annual Engineering Technology Education Bibliography, which lists the publications of the engineering technology community by calendar year and appears in the fall issue of the *Journal of Engineering Technology*.

As information needs have grown, the bibliography has followed suit. Indeed, the bibliography provides an annual snapshot of scholarly activities within the engineering technology community, and as one of the original bibliography crew, I have, I believe, a unique perspective on the project. This paper offers a retrospective view of the bibliography, focusing on chronology and purpose, trends and issues.

Chronology and Purpose

The bibliography is the brainchild of Frank Gourley, now division director for engineering technology at West Virginia Institute of Technology and long-time chair of the ETC Publications Committee. For about 10 years, starting in 1974, *Engineering Education* featured engineering technology in its May issue, initially as an AET Comments column. Worried that engineering technology was losing visibility in the society, Frank suggested that an annual bibliography of articles written by, for, and about engineering technology educators/education seemed to be one way to say to the engineering education community that engineering technology is alive and well.¹

After the establishment of the *Journal of Engineering Technology* in 1984 and ASEE's 1992 reorganization of its journals into the *Journal of Engineering Education* and *Prism*, the bibliography has appeared in each fall issue of *JET*. Feeling that the bibliography was established after shepherding the project for two years, Frank turned it over to another member of the Publications Committee.¹

The original purpose of the bibliography, to increase visibility within ASEE, still stands, but, according to feedback, another purpose has emerged over the years: the publication now serves as a research aid to members of the engineering technology community.

Trends

In addition to providing an annual snapshot of engineering technology scholarship, the bibliography also reflects changes within the discipline. The first bibliography, which listed 1986 publications, included just a few entries for computers and electronics: SPICE was the rage for teaching electronics, and computer-aided engineering was touted as the wave of the future. By the end of the decade, the number of entries for electronics had quadrupled, indicating both the growing attractiveness of that field and an increase in professional opportunities.

The 1980s also offered previews of what would become distance education: Susan Garrod, who was then at Purdue University, wrote a piece called "How to Adapt Your Teaching Style for Teaching on TV," and Bill Dalton, also of Purdue, penned two articles which suggested that paper was becoming a thing of the past: "Smart ET Textbooks: Why Bind Them at All?" and "Text on a Disk." 1988 recorded some of the first scholarly articles examining computer networking and a number of "predictive" pieces were published, reflecting a growing interest in what the 21st century might hold for the engineering technology discipline. Bruce Harding's witty title for a *Frontiers in Education* conference paper, "Windows & Icons & Mice, Oh My! The Changing Face of Computing," aptly captures this concern for the future.²

Articles published in the 1980s tended to focus on either technical skills or a host of administrative concerns: program development, accreditation issues, promotion and tenure. Listings reflecting scholarship on the "softer" issues, such as teaching methodology and the social implications of technology, were slim. In fact, the first bibliography listed only one article on technology and society, from the *European Journal of Engineering Education*, and four on integrating the liberal arts.³ Teaching methodology fared slightly better, with 7 listings in the 1988 bibliography⁴ and 14 in 1989.⁵

In formatting, the early bibliographies listed article titles first and included the author's professional affiliation, as a way, I assume, of giving credit to the institutions and also identifying those schools whose faculty are major contributors to the profession. Bibliography contributors were primarily members of the Publications Committee, and solicitations for contributions consisted of announcements in *Engineering Education*. Listings were drawn primarily from ASEE publications.

Things changed in the 1990s: academic access to email and the Internet revolutionized search techniques and made communications regarding the bibliography much faster and more convenient. Of the many trends in engineering and engineering technology education, the pervasiveness of computers has had the most dramatic impact on how we educate our students and how we conduct research. Accordingly, the bibliography reflects this change.

In 1990, the 10-volume compendium, *The Evolution of Engineering Technology in the Field of*

Engineering Education, appeared and collected all previously published articles from ASEE national and regional proceedings. Edited by Biedenbach, Morrison, and Tilmans, this collection was a major scholarly effort and distributed engineering technology education articles to audiences literally around the world. It was a precursor to the explosion of international activity that has occurred in the latter half of the decade. In a sense, the effort was an extended bibliography.

1991 is a significant year in the evolution of the bibliography. *Engineering Education* ceased publication, and, when ASEE introduced its two new journals, the bibliography became an orphan, as it didn't fit the scholarly profile of the *Journal of Engineering Education* nor the popular bent of the new *Prism*. Fortunately, the *Journal of Engineering Technology* provided a home; with publication in *JET*, the bibliography underwent a facelift, a major change in formatting to comply with the *Chicago Manual of Style*.

The early 1990s saw a change not only in the content of scholarly articles but in vocabulary as well. Things became hyper: Ahypercard,@ Ahypertext,@ Ahypermedia.@ Japanese terms, such as ATaguchi@ and Apoka yoke@ crept into article titles, and the language of business, courtesy of TQM, was applied to academia: students became Acustomers@; affected others were Astakeholders.@⁵ AContinuous improvement@ was seemingly required of all educational programs, and engineering and technology educators became more eclectic, as they strove to teach not only technical material but integrate the soft skills as well, as required by the new outcomes-based ABET criteria. Interdisciplinary degree programs, such as STS (Science, Technology, and Society), were being offered at both undergraduate and graduate levels, and Adesign@ extended to areas other than engineering-related disciplines: to the arrangement of technical documents.⁶

The bibliographies of the early 1990s also reflect an increasing consciousness of internationalism. Many US universities partnered with similar institutions around the world, the consequence of a world made smaller by computer technology. Entries listed in 1995 from the World Conference on Engineering Education reveal an astonishing number of international collaborations, both for research and education.⁷

ACollaboration@ also became a key word in teaching methodology as did Ateamwork.@⁸ According to bibliography listings, the ways of teaching engineering and technology were undergoing a radical change, indicating a movement away from the traditional Alecture-lab-test@ format to more student-centered, active learning techniques to enfranchise students in the educational process.

These trends intensified in the later 1990s. TAC followed the lead of EC2000 for new accreditation criteria, and numerous articles explored the effects of outcomes-based assessment on engineering and technology education. The Apredictive@ trend of the late 1980s intensified as

the millennium drew closer, and the debut of an online journal, *The Technology Interface*, gave technology educators a new publications outlet. The 1996 bibliography lists a number of articles detailing new industry/academia partnerships,⁹ perhaps the result of dwindling state funding resources.

Scholarship significantly increased in the field of biomedical technology, first listed in 1989 and rarely again, until 1996. The area of Atech prep@ also saw an increase in publications, focusing on events such as technology summer camps or on-campus programs for budding technologists in junior high and high schools.¹⁰

In 1999, the bibliography had another facelift as a result of a redesigned *JET*. Abbreviations for large conference proceedings were used to conserve space and allow for more listings. In addition, the search process became more convenient, since proceedings were on CDs rather than hard copy. Proceedings which were difficult to obtain, such as those from ASEE regional conferences, started appearing online, simplifying the search process.

The new millennium ushered in the bibliography=s 15th year of publication. Scholarship had increased so significantly in the areas of assessment and distance education that they warranted their own categories. Indeed, if there is one word that captures the most recent trend in engineering and technology education, it is surely Assessment@! In the last three years, 54 articles on assessment in engineering technology were listed, compared to 36 in the prior five years.

Issues

In addition to reflecting disciplinary changes within the field of engineering technology, the bibliography also encapsulates issues affecting the community. While computers have penetrated into every aspect of our lives and have irrevocably changed the educational landscape, the issues remain curiously consistent from 1986 to the present. They include the following:

Identity crisis: Ever since the split occurred between engineering technology and engineering science, the technology community has struggled to maintain a discreet identity from engineering. Larry Wolf, for example, wrote a 1986 ASEE *Proceedings* paper entitled AThe Emerging Identity of Engineering Technology@³; in 1997, James Kamm presented ADefining Engineering Technology@ for the ASEE North Central section meeting.¹⁰ In 2002, S. K. Vaypayee writes about AThe Good, the Bad, and the Ugly of the Divide between Engineering and Engineering Technology@ for the ASME International Congress.¹¹

Recruiting minorities: The lack of underrepresented groups, specifically women and minorities, in engineering, science, and technology programs remains an area of concern, with women accounting for only about 20% of 1999 undergraduate enrollments and minorities accounting for

about 9%.¹² From 1986 to the present, the bibliography records university efforts to increase recruiting and provide student support in articles such as "Blood, S.W.E.T., and Tears: The Society of Women in Engineering Technology" (Gayle Hughes, Nashville State Technical Institute) and "Southern Technical Institute's Comprehensive Minority Program" (Harris Travis, Southern Technical Institute).³ 2002 titles are surprisingly similar, despite such national programs as WISE and TWIST to increase female enrollments: "Recruitment and Retention: Programs to Increase Diversity in Engineering" (Lisa Anderson) and "Understanding the Barriers to Recruiting Women in Engineering and Technology Programs" (Mark Thom).¹¹

Promotion and tenure: Professional advancement is another continuing issue for the engineering technology community. For decades, engineering technologists in academia have grappled with the appropriate standards for promotion and tenure, and for 17 years, the bibliography has listed articles that are variations on a common theme, from John Goodlet's 1986 "Proposed Model for Tenure and Promotion Criteria in Baccalaureate Engineering Technology Programs"³ to Oner Yurtseven's 2002 "Effective Use of Faculty Development Plan for Promotion and Tenure of Engineering Technology Faculty."¹²

Accreditation: While ABET accreditation has remained a consistent concern over the years, nothing has ruffled technology (and engineering) feathers as much as EC2000's outcomes-based standards. Beginning in 1997, a flurry of articles has addressed, complained about, and criticized the new criteria, much of it centering on assessment. When TAC adopted virtually verbatim the new criteria, the debate began in earnest. Fred Emshousen detailed "Issues and Challenges for TAC of ABET Accreditation" in a 1997 CIEC article,¹³ Robert English brought the issue online in a 1999 piece for *The Technology Interface*, "A Few Concerns about TAC Accreditation,"¹⁴ and Erdogan Sener questioned the appropriate quantity of assessment materials in his 2002 "Assessment: How Much Is Too Much and How Much Is Enough?"¹¹

From this brief analysis, it may seem as if the engineering community has made little progress in the past two decades, especially in the areas of identity and minorities. However, rather than standing still, I see the engineering technology community as actively and energetically pursuing new answers to old questions: Who are we? How can we grow professionally? How can we better educate and support our students? The time for concern is when the engineering technology community *stops* exploring these questions.

Conclusions

From 1987 to 2002, the "Engineering Technology Education Bibliography" has grown from a modest 5-page, 137-item publication to 15 pages with more than 500 entries. It serves as a central repository for collecting the scholarship of the engineering technology discipline, a body of literature that is growing annually. It serves as a research aid and a catalog of trends and issues in a field that is dramatically and dynamically changing.

The bibliography is a huge project, one that requires hundreds of hours in searching and compiling appropriate entries. However, the effort is validated when I receive communiqués such as this one:

I have spent the afternoon in the library going through old issues of the *Journal of Engineering Technology* for some research. As I did so I noticed the valuable resource you have been putting together for many years in each fall issue. The bibliography has been of much help to me. I just wanted to say thanks for the work and effort you have expended for these many years. I appreciate it very much. It has made my task lighter.

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