Journal of
INDUSTRIAL
TECHNOLOGY

Volume 18, Number 3 - May 2002 to July 2002

A Comparison of Selected Categories of Accreditation Standards of NAIT, TEC-ABET and AACSB

By Dr. C. Douglas Ward and Dr. John Dugger

KEYWORD SEARCH

Administration
Curriculum
Higher Education
NAIT
Research

Reviewed Article

The Official Electronic Publication of the National Association of Industrial Technology • www.nait.org

A Comparison of Selected Categories of Accreditation Standards of the National Association of Industrial Technology, the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology and the American Association of Collegiate Schools of Business

By ***Dr. C. Douglas Ward and Dr. John Dugger***

Dr. C. Douglas Ward is Owner/President of Knowledge Based Change, LLC in Ames, Iowa. Dr. Ward teaches Continuous Quality Improvement concepts to organizations as well as facilitating the application of quality improvement principles within process improvement teams. He has served in numerous leadership and management positions in government and was among the first group of senior military personnel to be educated in the Deming philosophy. Prior to establishing his own company, Dr. Ward was the Business Development Leader and Associate for the Center for Continuous Quality Improvement. He is a retired Commissioned Officer from the United States Navy with a great deal of experience in training, education and operations. He served as Commanding Officer of a major training facility, a nuclear submarine and as Professor of Naval Science at Iowa State University.

Dr. John C. Dugger is Dean of the College of Technology and Professor of Interdisciplinary Technology at Eastern Michigan University. From 1989 to 1997 he served as the department chair of Industrial Education and Technology at Iowa State University. Dr. Dugger has secured more than $950,000 in grants and has authored more than 40 publications in juried journals. His scholarly interests include assessing the impacts of training interventions in manufacturing organizations. He has more than 20 years of experience as a faculty member and administrator in higher education.

Industrial technologists frequently work with graduates of engineering and business programs suggesting that there may be some workplace derived benefit from establishing programs based on consistent standards. What makes a program? What are the essential elements of business, engineering, and industrial technology programs? The authors attempt to answer these and other questions by exploring how the accreditation systems define and specify the content and experiences that constitute a program.

The National Association of Industrial Technology (NAIT) has assumed a key role in defining the essential elements of Industrial Technology. The Association, for example, has accredited 93 baccalaureate and 30 associate level programs. The purpose of the NAIT accreditation process, as defined in the Industrial Technology Accreditation Handbook (NAIT Handbook), is "providing recognition of the attainment of certain professional goals and standards for Industrial Technology"(p.1).

The NAIT Handbook has defined Industrial Technology as a "field of study designed to prepare technical and/or technical management oriented professionals for employment in business, industry, education, and government"(NAIT Handbook, p.1). The accreditation standards established by NAIT are particularly useful in providing a basis for discipline development because they are well publicized and frequently utilized in program curriculum development to ensure initial and periodic accreditation. Accreditation standards must be clear, explicit, and consistent to be effective. The NAIT definition of Industrial Technology certainly

suggests needed competence in technical as well as business/management fields.

Based on more than 25 years of higher education experience, which involved constant interaction with companies that hire industrial technology graduates, there continues to be much confusion about the intent of industrial technology, engineering technology and certain business curricula such as production and operations management among human resource professionals and other interested parties. A study of the key components of engineering technology and business accreditation standards and a comparison of those with the NAIT baccalaureate accreditation standards would be helpful in promoting a better understanding of the differences and similarities between industrial technology, engineering technology and business. This increased knowledge should result in more consistent terminology and a better basis for academic collaboration and collaboration among graduates of the respective programs. The purpose of this paper is to analyze and compare the National Association of Industrial Technology (NAIT) accreditation standards, the American Association of Collegiate Schools of Business (AACSB) accreditation standards and the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET) standards. This analysis required the creation of a structure that was used to group similar standards for each accrediting body. The standards for each accrediting body were compared within the structure to help identify similarities and differences that will result in a better understanding of programs within each of the three academic areas.

Logical groupings of standards appear to be curriculum, instruction, and faculty. The "curriculum" heading attempts to group standards that address the identification of content and the structure of this content. "Instruction" on the other hand groups those standards that specify how content is delivered. While "faculty" contains standards that specify required and desired backgrounds and formal education for each field. This comparative analysis provides a focused approach for identifying differences between disciplines and therefore, may be useful in revealing opportunities for change as part of the strategic planning process.

Accreditation and its influence on the academic discipline

An objective of accreditation, no matter what the academic discipline, is to ensure that certain predetermined sets of standards that have been established by the particular profession are being followed. Program approval by the accrediting body recognizes this compliance. For example, all three accrediting bodies address the need to establish program benchmarks such as student admission requirements, retention, scholastic success and graduate placement data. While not directly affecting the discipline development, the collection and analysis of these data, where appropriate, plays a key role in ensuring that the needs of industry as well as students and society are being met. NAIT, AACSB, and TAC of ABET set the standards for program accreditation in Industrial Technology, Business Administration, and Engineering Technology respectively. Each of the accrediting organizations has identified standards appropriate for their respective academic bodies. The basic approaches to establishing, monitoring and modifying these standards is very similar. In fact, an ABET representative sits on the NAIT Board of Accreditation and a NAIT representative sits on the ABET board of Accreditation suggesting a cooperative approach to accreditation in the technology related disciplines.

Industrial Technology covers content that is specific only to industrial technology, but may include elements of engineering technology and/or business. The NAIT, the AACSB and the TAC of ABET define their disciplines based on scholarly activities reported at conferences and through publications reflected in established accreditation standards. This comparison of the accreditation standards published by NAIT, AACSB, and TAC of ABET was conducted in part to stimulate interest in change, if appropriate, that would improve the accreditation process as well as each discipline.

Program components

Each of the standards establishes the direction of the accreditation process with guidelines focused on the major categories of curriculum, instruction, faculty, student body, administration, and industrial advisory committees. Where differences occur as the result of the inclusion of several minor categories the differences can be appropriately assessed by including them in one of the broader categories. This paper focuses on the major categories of curriculum, instruction, and faculty since these areas provide a means to define the discipline content that directly supports the students.

Curriculum

The curriculum focus of each of the accreditation programs is similar although different enough for each to benefit from a comparative analysis. In many respects Industrial Technology is very closely aligned with the Engineering Technology component of ABET and the accreditation standards established by NAIT and TAC of ABET are likewise quite similar. Based on the specificity of requirements and program content, TAC of ABET and AACSB seem to be the most prescriptive with respect to major programs and curricula. Table 1 provides a comparison of the accreditation agencies with respect to the curriculum requirements of each standard.

Instruction

The instructional component of each of the accrediting bodies has a different focus. The NAIT, as discussed in Section 6.4 of the Industrial Technology Accreditation Handbook, is more student oriented in this component with clear guidance that is directed toward helping the student complete the course of study. The AACSB is generally more prescriptive

with regard to faculty and institution requirements. There is very little student specific guidance provided by TAC of ABET in this area, TAC of ABET is however, very focused on the faculty and the institution.

Faculty

TAC of ABET states that the faculty is the heart of any educational program and provides numerous specific qualification requirements. TAC of ABET is also very specific with regard to academic preparation of faculty for Engineering Technology and the requirements are very nearly the same as those specified for NAIT and AACSB with respect to degree requirements.

AACSB is the only accrediting agency that addresses, in their respective accreditation standard, the need to ensure diversity as well as requiring demonstrated support for a faculty intellectual development program. Both TAC of ABET and AACSB do, however, require a specific number of full time faculty based on individual program, but NAIT simply states that there needs to be an adequate number of appropriately qualified faculty without reference to program. Important also is the need to address effective advising, emphasized by all three agencies, to ensure that students are well prepared to be successful.

Administration (philosophy/ objectives)

All three accrediting organizations effectively address the administrative aspects of accreditation. Table 4 summarizes the major components of each.

NAIT, unlike TAC of ABET and AACSB, puts a great deal of emphasis on institutional compliance. TAC of ABET and AACSB are both very specific in requiring that everything from the mission statement to the development of educational objectives must be clearly established by the college of engineering or the school of business, while NAIT focuses more on the compatibility and understanding of the mission statement and objectives.

NAIT and TAC of ABET address the need for effective administrative leadership while AACSB is relatively silent on the issue. NAIT is clear in stating the need to identify a leader and ABET in its Engineering Technology standard goes one step further by requiring the leader be a full time faculty member. TAC of ABET is much more aggressive than either NAIT or AACSB at establishing standards for good communications and its relationship to program effectiveness.

Support (facilities/equipment, financial resources)

TAC of ABET is very clear in establishing specific responsibility for facility and financial support for Engineering Technology while the AACSB and NAIT accreditation standards are less clear concerning the institutional requirements with regard to facilities to house and operate the Industrial Technology and business programs. All three are clear about particular needs but only TAC of ABET suggests who is responsible for

Table 1: Major program curriculum (Excerpted from NAIT, AACSB, and TAC of ABET Accreditation Guidelines)

NAIT	AACSB	ABET
Requires 120 semester hours of properly sequenced course work including appropriate application of the course work: general education & humanities 18-36 hrs math & computer science 6-18 hrs physical science 6-18 hrs Management 12-24 hrs technical (CIM, CAD, etc.) 24-36 hrs electives 6-18 hrs Competencies must be identified and validated. Effective oral and written communications Program development, revision, and evaluation should include students, instructors, graduates and employers Adequate public disclosure At least 15 semester hours of junior or senior level major courses from the institution. Transfer course work must be validated. Program validation should be ongoing Appropriate industrial experience is expected	General education should be 50% of a four year program that follows 12 years of pre-collegiate education with a maximum of 9 semester hours of economics and 6 semester hours of statistics. Fifty percent of the business hours should come from the degree granting institution. Foundation courses required: accounting behavioral science economics mathematics and statistics additional humanities, natural science and math/statistics courses Demonstration of effective written and oral communications. Curriculum coverage ethical and global issues influence of political, social, legal and regulatory, environmental & technological issues impact of demographic diversity on organizations Each degree plan should be monitored to assess effectiveness and should be revised to reflect new objectives as appropriate.	Requires a minimum of 124 semester hours or 186 quarter hours characterized by the following minimum course requirements: technological courses 48 hrs basic sciences and math 24 hrs to include: physics, chemistry, life/earth science 8 hrs college algebra, trigonometry, calculus 12 hrs social sciences 24 hrs to include: study of communications 9 hrs social sciences and/or humanities 8 hrs maximum cooperative education credits 8 hrs Social science component must broaden the student in the general education area. Effective oral and written communications Appropriate laboratory experience Appropriate computer based experience to include proficiency in a computer language used in the practice of engineering technology Cooperative education experience must include an appropriate academic component such as a seminar or written formal report addressing the experience.

Table 2: Major program instruction (Excerpted from NAIT, AACSB, and TAC of ABET Accreditation Guidelines)

NAIT	AACSB	ABET
Study guide with course objectives, content, references utilized, student activities and examples must be available. Reference material must be available to supplement course work. Balance program between practical application and concepts. Problem solving activities should reflect contemporary industrial situations. Effective motivation of students should be evident. Supervision of instruction should be evident. Scheduling of instruction should allow adequate time for completion of assignments and laboratory problem solving.	Established as the primary responsibility of the faculty. School must demonstrate that the available instructional resources are sufficient to satisfy the instructional objectives of the programs offered. Instructional technology and support should be available and utilized by the faculty. Students should have access to and be required to make use of the library and computing facilities. Evaluation of instructional effectiveness and student achievement required. Continual improvement in instructional programs is required.	Program must be technically current supported by: competent and inquisitive faculty active industrial advisory committee adequately funded budget modern library facilities Baccalaureate programs may incorporate the following: continuous four-year curriculum two plus two or three plus one plans with upper division courses selected based on student background Upper division programs that are predominantly management and back to back two year programs will not be considered for baccalaureate accreditation.

providing this. While documenting facility provisions is not an established need of the discipline, it tends to lend creditability when being considered on a par basis between the three disciplines. Certainly facilities need to reflect the requirements of the offered educational programs as well as ensuring that well maintained and modernized equipment is available for program graduates to become adequately versed in industry standards, and each accreditation standard effectively addresses this issue.

NAIT and TAC of ABET are by far the most aggressive in assessing the student support aspects of accreditation with a great deal of emphasis on student needs such as advising, placement, retention, and scholastic success. AACSB places little emphasis on these issues but they are addressed. Financial support is considered in the TAC of ABET and NAIT standards with TAC of ABET being much more specific in the details of required fiscal policy.

Emerging ET2K standards

As has been previously discussed, the accreditation standards for Industrial Technology, Engineering Technology and Business have focused almost exclusively on program and institutional requirements. Each provide detailed guidelines that leave little question about what is required with respect to curriculum, instruction, or faculty. A detailed comparison of specific areas for each discipline is provided in Table 1, Table 2 and Table 3. While all requirements are not repeated in the tables it should be evident from the discipline comparison that the emphasis is currently on the inputs with little attention given to outcomes. This lack of attention to how program graduates or for that matter, students, perform begs a very important question, should the "what to do" paradigm change to one of "what has been or is being accomplished"? This represents a shift from a prescriptive approach, which delineates credit hour requirements to one that focuses on the ability of the graduate to function effectively in a team environment. This revised direction clearly emphasizes outcomes and is directed toward continuous improvement.

TAC of ABET in their proposed Engineering Technology Criteria 2000 (ET2K) may be leading the way towards a more outcomes based accreditation process that focuses almost entirely on demonstrated ability on the part of students, graduates, faculty and the institution seeking accreditation for its programs. TAC of ABET, in the proposed new standard, has eliminated nearly all of the current specific requirements. A requirement for the minimum number of semester hours (124) or quarter hours (186) for baccalaureate programs as well as similar appropriate associate degree program requirements is an example of one of the very few remaining specific requirements. This shift in criteria moves from a highly structured format that is based on general and program criteria to a format that establishes five criteria that clearly address program expectations.

This dramatic shift in philosophy makes it possible for the development of more innovative programs that could, in the opinion of the authors, contribute to program improvements that may bring extremely positive benefits to the participating disciplines.

Assessment

A key component to the success of any discipline is the demonstrated satisfaction of its customers. This comparison of the AACSB, TAC of ABET, and NAIT suggests that expanding the accrediting body focus on employer satisfaction with graduates, graduate satisfaction with employment, career mobility, starting salary, and the ability of graduates to function effectively in industry without additional training would be appropriate in improving the method for assessing the effectiveness of each program. This is particularly important for the NAIT because of the relative infancy of industrial technology as a discipline

Table 3: Major program faculty (Excerpted from NAIT, AACSB, and TAC of ABET Accreditation Guidelines)

NAIT	*AACSB*	*ABET*
Adequate number of appropriately qualified full time faculty. Qualification based on the extent, currency, & pertinence of: academic preparation Industrial professional experience applied industrial experience membership and participation in industrial technical professional organizations scholarly activities Minimum faculty academic qualification bachelor/masters closely related to the instructional assignment and 50% of those assigned to teach must have a doctorate. Appointment/selection policy clearly specified and conducive to the maintenance of high quality education. Tenure/reappointment policies should be consistent with other professional programs. Teaching, service, and scholarly outreach shall be clearly specified. Teaching, advising, and service loads shall be comparable to other professional programs	Faculty size, composition, qualification, and development should result from a comprehensive planning process. The school should: recruit and select faculty consistent with mission and degree programs have an appropriate new faculty orientation strive for a demographically diverse faculty Faculty development and promotion should: reflect school mission interact with organizations related to what is taught observe business practices in action posses appropriate procedures for teaching and workload assignment that supports faculty mentoring and the school's mission include a formal periodic review system support continuing faculty intellectual development and renewal support faculty participation in academic and professional organizations Faculty must: effectively create and deliver instruction be innovative in the instructional process maintain currency in instructional field be accessible to students evaluate instructional effectiveness and student achievement show improvement of instructional programs The school should: maintain full time faculty sufficient to provide stability and ongoing quality instruction for the degree program deploy faculty resources consistent with the mission and degree programs Deployment of faculty resources should be consistent with the degree program and should normally exceed the following: 1 FTE/400 undergraduates 1 FTE/300 graduates full time faculty must constitute 75% of major FTE at least 60% of the credits must be taught by full time faculty teaching loads should be less than 12hr per term Qualification: doctorate degree less than a doctorate with specialized course work recent academic and professional experience required	Adequate number of faculty members depending on: number of students in the program appropriate breadth of perspective continuity and offering frequency. FTE's are based on the following: each baccalaureate program must have at least two faculty members with basic credentials and full time commitment to the program; three FTE faculty members (two-thirds of the FTE's must have basic credentials). The student-faculty ratio depends on the nature of the program and courses, but should not exceed the institutional ratio in science-related areas. A full-time faculty member must be assigned as department head, program coordinator, or similar term designating leadership responsibility. Faculty competence and effectiveness may be judged on the following: level of academic achievement diversity of background teaching experience technical currency industrial experience personal educational growth interest in improving instruction publication and other scholarly activities participation in professional and scientific societies favorable evaluations ability to communicate effectively in English exemplary ethical and professional behavior involvement with students in extracurricular activities a masters degree is viewed as the appropriate terminal degree.

compared to engineering or business. By emphasizing concern about these areas through some form of evaluation, the NAIT would make known what is expected from the institution, the graduate, and the program to make the discipline attractive not only to the users of the product (graduates), but also to future students.

The NAIT specifically requires, as part of the accreditation process, assessment data from employers and institutions (student achievement across the curricula and academic profiles) to establish a need for follow-up studies that are to be made available to prospective students. TAC of ABET simply requires data that can be used as a record of how successful graduates are in their profession or further academic study. The AACSB requires that each degree program be systematically monitored for revision and improvement, but provides no guidance with respect to the source of data, for example employers or institutions.

There needs to be criteria established to provide consistent direction on how the assessment data should be used and as a minimum should include procedures on how to use the data for program improvement and faculty/student development. These guidelines are particularly important to insure continued program improvement based on outcome assessment.

Conclusions

Each of the three accrediting agencies clearly has their own strengths and weaknesses. Engineering and Business however, have a more defined history and may have gained recognition based on their longevity as academic programs. Industrial Technology has not been well understood as a discipline and it is therefore extremely important for the NAIT to be proactive in taking advantage of the proven aspects of TAC of ABET and AACSB accreditation standards to help define the methodology for program evaluation and improvement. The following are specific areas that would strengthen the NAIT's contribution to defining Industrial Technology as a discipline.

The NAIT standards seem to be very general when compared to TAC of ABET in addressing the conceptual need to maintain technical currency. This area is particularly important in order to stimulate innovation in the instructional process as well as improved coordination between laboratory sessions and theoretical aspects presented in the classroom. This concept is consistent with the increasing emphasis on research at all universities. A clear standard needs to be included in the NAIT accreditation guidelines that assures support for continued faculty development within both associate and baccalaureate programs. The AACSB standards accomplish this by considering basic scholarship, applied scholarship, and industrial development as specific areas for required faculty activity, an approach that could easily be adapted by the NAIT.

While it is important that the NAIT be conscious of host institutions, its standards should reflect the precepts of a professional discipline that stands on its own with clearly focused objectives that reflect the needs of industry and academia through the student. There should be clear guidance with regard to the relative emphasis on teaching, intellectual contributions, and service that is supplemented by university support, thus making the program self-directed and focused. It is also very important that established standards

Table 4: Philosophy and objectives (Excerpted from NAIT, AACSB, and TAC of ABET Accreditation Guidelines)

NAIT	AACSB	ABET
Stresses compatibility with college and institution with respect to program definition. Concerned with acceptability associated with the institution. Stresses the need to have clearly written short and long range goals and objectives that are consistent with mission statements and plans for achieving them. .	Emphasis based on school requirements: must have a published mission mission must be appropriate to higher education and the associated institution. educational objectives of each degree program must be specified relative emphasis on teaching, intellectual contribution, and service must be specified school's activities must be consistent with its mission	Programs must have written goals consistent with institution goals. These goals must focus on: the student body resource allocation other relevant factors The programs must: have plans for continuous improvement demonstrate achievements through student outcome assessments, graduate career performance and employer feedback The program content should provide: an integrated educational experience directed at the application of pertinent knowledge to the solution of practical problems a high degree of specialization with field rather than task orientation

consider effective communications between faculty and administration with an emphasis on including faculty and students in the decision making process. Specifically requiring the individual responsible for the program to be a full time faculty member is certainly appropriate and helps with the communication and coordination effort.

The NAIT leadership must address the adequacy of financial resources to ensure the acquisition, retention, and continued professional development of the faculty. Without the support of the institution in this critical area there can be no expectation that desirable candidates would be attracted to open positions and thus little or no hope for maintaining a credible discipline.

The NAIT has done a commendable job of establishing an effective accreditation standard and the NAIT accreditation guidelines do a very good job of establishing specific coursework guidance at the baccalaureate level. The TAC of ABET and AACSB standards are prescriptive in defining institutional and external support, while NAIT is focused more on consistency within the university. Comparison of the accreditation standards suggests that NAIT, like TAC of ABET has been in its ET2k approach, must be proactive in upgrading its accreditation standards to include language that is clear in its specificity with less dependence on established requirements that are "consistent" with the institution.

References

Criteria for Accrediting Engineering Technology Programs. (2000-2001 cycle) Engineering Accreditation Commission, Accreditation Board for Engineering and Technology, INC

Industrial Technology Accreditation Handbook. (2000) National Association of Industrial Technology.

Standards for Accreditation of Business Administration and Accounting. (2000) American Assembly of Collegiate Schools of Business.