Faculty Scholarship: A Study of the Accepted Forms of Scholarly Activity and the Perceived Importance in Granting Faculty Tenure in TAC of ABET Accredited Baccalaureate Engineering Technology Programs

James J. Hurny
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Faculty Scholarship: A Study of the Accepted Forms of Scholarly Activity and the Perceived Importance in Granting Faculty Tenure in TAC of ABET Accredited Baccalaureate Engineering Technology Programs

Abstract
Traditionally engineering technology (ET) faculty members were expected to excel in teaching, maintain currency in their field, and serve the profession and society. Those factors were critical relative to being awarded tenure. Emphasis on scholarship and the engagement in scholarly activity were not generally required of faculty members teaching engineering technology but overall expectations appear to have changed. This study identified the acceptable forms of scholarly activity for engineering technology faculty and examined the perceived importance of those activities to granting tenure. The scholarly activities identified were evaluated within the framework of Boyer’s (1990) four scholarship domains and the relative importance of each of those domains to tenure decision making was examined. An experiment comparing the relative importance of refereed journal publication to that associated with the receipt of patents was included in the study. Data provided by engineering technology faculty and chief administrators via an online survey indicated that (a) faculty and administrators share common views regarding the relative importance of various scholarly activities to the receipt of tenure, (b) Boyer’s scholarship model has been embraced by engineering technology and the importance of each domain to tenure varies by institution type, and (c) there is no difference in importance between refereed journal publication and patent receipt relative to the receipt of tenure. The scholarly activities chosen by faculty seeking tenure to meet their scholarship expectations is an important consideration because of varying perceived importance.

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Faculty Scholarship: A Study of the Accepted Forms of Scholarly Activity and the Perceived Importance in Granting Faculty Tenure in TAC of ABET Accredited Baccalaureate Engineering Technology Programs

By
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Submitted in partial fulfillment of the requirements for the degree Ed.D. in Executive Leadership

Supervised by
Dr. Guillermo Montes

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Ralph C. Wilson, Jr. School of Education
St. John Fisher College

August 2011
Dedication

This dissertation is dedicated to the memory of my parents whose only dream was to see their children have a better walk through life than they had. Their inspiration to develop a love of learning and encouragement to always do my best charted my walk.
Biographical Sketch

James J. Hurny is currently associate professor of electrical engineering technology at Rochester Institute of Technology in Rochester, New York. Mr. Hurny attended Carnegie Mellon University receiving a Bachelor of Science degree in Electrical Engineering in 1963. He received his Master of Science degree in Engineering Technology in 1974 and his Masters of Business Administration in 1978 from Rochester Institute of Technology. Mr. Hurny began his doctoral studies in the summer of 2008 at St. John Fisher College in the Ed. D. Program in Executive Leadership. His research in the accepted forms of engineering technology scholarship and the importance to granting tenure was guided by Dr. Guillermo Montes. Mr. Hurny received his Ed. D. degree in 2011.
Acknowledgements

The completion of a doctoral dissertation is a journey requiring a significant amount of personal effort and work, but that alone does not ensure success. In addition it takes the experience, expertise, guidance, support, and encouragement of others to help along the way. I would like to take this opportunity to acknowledge those who played a special role in helping me with that journey.

First I want to thank Dr. H. Fred Walker who was my biggest supporter and provided me with immeasurable guidance, advice, and counsel along with continual encouragement. Next, I want to recognize my teachers who shaped the direction of my journey. Dr. Guillermo Montes, my committee chair, enhanced my analytical thinking by challenging my thoughts and concepts and forcing me to look deeper. Dr. James Schwartz, my committee member, brought quality to my work by encouraging me to well define my ideas and place them into broad context. Dr. Diane Cooney-Miner through her insight and scholarship lifted me over my research question hurdle. Lastly, Dr. Bruce Blaine and Mr. David Bond, my executive mentors, broadened my practical research knowledge by exposing me to the realities of research.

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cohort member, acting as my “study buddy” and sounding board for my anticipated steps toward progress.

Finally, and most importantly, I would like to thank my family. The encouragement from my daughters, Gina, Beth, and Shari, served as fuel when the challenges seemed overwhelming. I am forever indebted to my wife, Jo Ann, whose saintly patience, never ending understanding, and continuous support made my journey possible.
Abstract

Traditionally engineering technology (ET) faculty members were expected to excel in teaching, maintain currency in their field, and serve the profession and society. Those factors were critical relative to being awarded tenure. Emphasis on scholarship and the engagement in scholarly activity were not generally required of faculty members teaching engineering technology but overall expectations appear to have changed.

This study identified the acceptable forms of scholarly activity for engineering technology faculty and examined the perceived importance of those activities to granting tenure. The scholarly activities identified were evaluated within the framework of Boyer’s (1990) four scholarship domains and the relative importance of each of those domains to tenure decision making was examined. An experiment comparing the relative importance of refereed journal publication to that associated with the receipt of patents was included in the study.

Data provided by engineering technology faculty and chief administrators via an online survey indicated that (a) faculty and administrators share common views regarding the relative importance of various scholarly activities to the receipt of tenure, (b) Boyer’s scholarship model has been embraced by engineering technology and the importance of each domain to tenure varies by institution type, and (c) there is no difference in importance between refereed journal publication and patent receipt relative to the receipt of tenure. The scholarly activities chosen by faculty seeking
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Chapter 1: Introduction

Engineering Technology (ET)

The field of engineering technology can best be described by the definition established by the Technology Accreditation Commission (TAC) of ABET, Inc. (formerly called the Accreditation Board for Engineering and Technology), and approved by the Engineering Technology Council (ETC) of the American Society for Engineering Education (ASEE) (Northeastern University, 2010).

Engineering technology is the profession in which a knowledge of mathematics and natural sciences gained by higher education, experience, and practice is devoted primarily to the implementation and extension of existing technology for the benefit of humanity. Engineering technology education focuses on the applied aspects of science and engineering aimed at preparing graduates for practice in that portion of the technological spectrum closest to product improvement, manufacturing, construction, and engineering operational functions.

In summary, engineering technology is the application of basic engineering and scientific principles along with current technology to the identification and solution of technical problems.

The applied nature of the engineering technology profession gives rise to educational programs that are supported by extensive student laboratory experiences. Those experiences create a technical education environment that is very “hands-on”
which appeals to students desiring practical application of engineering principles to problem solution in lieu of the purely theoretical approach.

Evolution of the Engineering Technology Field

The engineering technology discipline has roots in industrial arts and has risen over the years from trade school status (Dyrud, 1999). The history of engineering technology offers a view of the field’s foundation in application and practice. That foundation is essential in the evolution of engineering technology, and demonstrates the importance of the scholarship issue to the professoriate.

Prior to the mid-19th century, engineers learned their craft through apprenticeship and shop floor application (Barbieri and Fitzgibbons, 2008). The land grant college movement created by the Morrill Act of 1862 expanded mechanical arts training to support the industrial revolution and shift education from the shop floor to the classroom (Wolf, 1990). Technical institutes were created to fulfill the need for training (Dyrud, 1999). Engineering continued to evolve as a discipline embracing the theoretical and the applied until 1955, when the first definitive study of engineering technology education was conducted; it identified the engineering technology sector as an important part of the engineering field (Wickenden-Spar Report as cited in Dyrud, 1999). Engineering and engineering technology then began to acquire separate identities. That seminal report, from the American Society for Engineering Education Committee on Evaluation of Engineering Education (Grinter, 1955), identified engineering technology as a discipline and laid the foundation for baccalaureate engineering technology programs. The first Bachelor of Science engineering technology program was accredited in 1965 (Dyrud).
Post World War II technical advances created demands on education to support the research and technology application resulting from the war effort (Taber and Sanders, 1988). Engineering and engineering technology continued to develop their own separate and distinct focus because neither could satisfy both dimensions. The launch of Sputnik by the Soviet Union in 1957 ignited the rapid acceleration of technical education and the recognition of two engineering areas: research and application (Grinter, 1984).

Engineering technology history indicates two things. First, it is a relatively new discipline that must continue to develop its focus on application and practice. Second, that focus requires a definition of scholarship that embraces and enhances engineering technology’s applied nature.

_Accredited Engineering Technology Programs_

“Engineering technology programs are located in community colleges, technical institutes, four-year colleges, and universities” (Shouldis, 1991, p. 3). Accreditation of these programs may occur at the associates or baccalaureate degree level (ABET, Inc., 2007). Engineering technology programs are specifically accredited by the Technology Accreditation Commission of ABET, Inc. (TAC of ABET). Programs receiving accreditation by ABET (formerly called the Accreditation Board for Engineering and Technology) achieve national recognition. Educational programs leading to the granting of degrees are accredited as opposed to institutions, departments, or individual degrees (Abet, Inc., 2007).

The ABET 2008 Annual Report (ABET, Inc., 2009) indicates that there are 233 higher education institutions having a total of 702 accredited engineering technology programs. Of those 702 programs, 317 are at the associate level and 385 are at the
baccalaureate level. Twenty three disciplines are represented by the accredited programs. Electrical, mechanical, civil, computer, chemical, industrial, and bioengineering/biomedical are the seven largest curricular areas based on the number of accredited programs.

Regardless of discipline or institutional setting engineering technology programs must meet the following criteria in order to achieve accreditation (ABET, Inc., 2008):

The program must provide an integrated educational experience that develops the ability of graduates to apply pertinent knowledge to solving problems in the engineering technology specialty.

The orientation of the technical specialization must manifest itself through program educational objectives, faculty qualifications, program content, and business and industry guidance.

In order to satisfy those criteria, programs must be supported by faculty with special skills and knowledge capable of teaching engineering concepts which are rooted in mathematics and the sciences and the application of those concepts.

*Engineering Technology Faculty*

A review of the literature surrounding the engineering technology field indicates that historically individuals appointed to ET faculty positions possessed the following minimum credentials and characteristics: A minimum of three years industrial experience; professional engineering licensure; and a master’s degree in engineering or engineering technology which was considered an appropriate terminal degree (ABET, Inc., 1999; Fox and Hundley, 1999; Goodson, 1987 and Lipscomb, 1999). Traditionally ET faculty members are expected to excel in teaching, maintain currency in their field,
and serve the profession and society (Lozano-Nieto, 2004). These factors were critical relative to achieving tenure. Emphasis on scholarship and the engagement in scholarly activity were not generally required of faculty members teaching engineering technology but overall expectations are changing (Lozano-Nieto, 2004, Shouldis, 1991, Aghayere, 2004). Literature indicates that the expectation of ET faculty engaging in scholarship is becoming a significant factor in the awarding of tenure (Lipscomb, 1999; Lozano-Nieto, 2004; Aghayere, 2004;).

**Engineering Technology Compared to Engineering**

Engineering technology programs are different from engineering programs because of the focus on application and practice (Aghayere, et al. 2003). Engineering programs are highly theoretical and emphasize analysis and the application of mathematics (Barbieri and Fitzgibbons, 2008). Engineering technology programs, on the other hand, emphasize design (synthesis) and the application of technology to solve problems (Wolf, 1990). For engineering technology faculty, that application focus historically has been supported by teaching and consulting; scholarship was not emphasized as a faculty requirement (Aghayere and Buchanan, 2006).

Aghayere and Buchanan (2006) indicate that a shift is taking place regarding the role of scholarship for engineering technology faculty. Scholarship increasingly is being required of such faculty members to support the changing missions of colleges having engineering technology programs. That view is also supported by Lozano-Nieto (2004). Although teaching, scholarship, and service continue to define the parameters for tenure, teaching and service have become less significant than scholarship at a majority of four-year institutions (Green, 2008). Engineering technology needs a definition of scholarship
different from the traditional one of research and publication because of ET’s applied nature and focus on practice-oriented education, according to Agheyre, et al. (2003).

The word scholarship in academia connotes original empirical work and publication, with publication having the further definition of peer review and dissemination (Paulsen and Feldman, 1995). That definition is too narrow for use in engineering technology because it does not include scholarly activity characteristic of the field (Aghayere and Buchanan, 2006)—such as consulting with industry, receiving patents and publishing pedagogical articles. Those forms of scholarly activity; though not traditionally accepted by academia; support teaching and the application of technology. Engineering technology programs need a broader definition of scholarship in order to preserve their characteristic focus on students and orientation toward application (Aghhayere, 2004). A wider array of accepted scholarly activity is needed in order to satisfy the scholarship requirement while also supporting the applied nature of the discipline.

Arguments for the traditional definition of scholarship appear to be based on the fact that it is the predominant quality standard by which colleges and universities are assessed and judged. Teaching, scholarship, and service are the key factors in determining tenure and promotion (Green, 2008). If a wider array of scholarly activity is accepted as an extension of traditional scholarship for engineering technology faculty, then identifying the acceptable forms and their individual importance to tenure offers value to the professoriate. Glasick, Huber, and Maeroff (1997) assert that for scholarly activity to be acceptable, it must meet quality standards equivalent to traditional scholarship. Aghayere, et. al., (2003) states that “The common denominator for all
engineering technology scholarly activities should be peer review in some form and the
dissemination of the results of those scholarly activities” (p. 6). Peer review and
dissemination of engineering technology scholarly activities would equate to the quality
standard of traditional scholarship.

*Engineering Technology Accreditation and Scholarship*

Boyer (1990) suggested that higher education accrediting bodies could contribute
to the encouragement of multiple forms of scholarship, but the established criteria
prevented colleges and universities from being innovative and restricted a broad range of
scholarly activity. He went further by indicting professional accrediting associations by
“dictate detailed regulations and, in the process, violate the integrity of the campus,
pushing institutions toward conformity” (pp. 79-80). Boyer focused on regional
accrediting associations, but his assessment also applied to technology program
accreditation by ABET.

Prior to 2004 the TAC of ABET criteria for accreditation was as Boyer described.
It was very quantitative and prescriptive describing in detail requirements for program
content and focus, program level and content, curriculum composition, number of faculty
and credentials, program facilities and administrative financial support (Criteria for
Accrediting Engineering Technology Programs, 2000-2001). The criteria identified an
array of measures for assessing faculty competence and effectiveness including
pedagogy, publication, and other scholarly activities. The criteria identified applied
research as a method of maintaining current knowledge. Even though prescriptive and
constraining the accreditation criteria acknowledged and supported scholarship.
TAC of ABET eliminated its quantitative and prescriptive criteria in 2004 and converted to a continuous improvement process based criteria which is qualitative in nature and completely non-prescriptive (Criteria for Accrediting Engineering Technology Programs, 2009-2010). The new criteria focus is on program graduate skill sets necessary for practice in the discipline and are based on program and educational outcomes and their measurement. Programs and institutions have complete freedom relative to establishing and achieving those outcomes. Boyer’s described rigid accreditation environment was reversed. Literature and anecdotal evidence suggests that regional accreditation associations are also moving in this direction. In keeping with its non-prescriptive characteristic the 2004 change no longer specifies specific scholarly activities, but still acknowledges and supports scholarship. One of the identified faculty competence measures is “scholarly activity.” Scholarly activity continues to be a faculty competence measure used for TAC of ABET accreditation (Criteria for Accrediting Engineering Technology Programs, 2010-2011).

**Background for the Study**

In recent years, a wide range of literature relative to faculty scholarship in higher education has been published. The vast majority of that literature seems to address the significance of scholarship in evaluating faculty for tenure. Authors such as Green (2008), Sorcinelli (2002), Paulsen and Feldman (1995), Rubin (2000), Glassick (2000), Locke (1995), Johnston (1998), Stull and Lantz (2005), Arreola, Theall, and Aleamoni (2003), Freedenthal, Potter, and Grinstein-Weiss (2008) have written about scholarship over the last two decades. A number of other authors have directly addressed scholarship for engineering technology faculty, including Aghayere (2004), Aghayere et al. (2003),
Aghayere and Buchanan (2006), and Lozano-Nieto (2004). Although the area of faculty scholarship in higher education has been widely explored and some specific attention given to engineering technology, there is a lack of consensus regarding the definition of scholarship for those who teach in fields that are, by their nature, not purely theoretical, but rather theory based and focused on applying principles and concepts to solving problems as simple as correcting process malfunctions and as complex as designing and constructing a bridge. Engineering technology is such a field.

The literature presents an inconsistent picture of the role of scholarship in the policies and practices for granting tenure to engineering technology faculty. Furthermore, the literature does not appear to address the significance of scholarship to the application and practice-orientation in teaching engineering technology. Clarity is needed regarding the accepted forms of scholarly activities and the associated policies and practices for engineering technology faculty and their effect on preserving the application and practice-orientation of the field.

The literature defines the role of faculty as teaching, scholarship, and service regardless of discipline. Engineering technology specific literature also identifies the faculty role as teaching, scholarship, and service. Engineering technology literature also identifies types of scholarly activity, expanding the definition of scholarship by using the Boyer model (Boyer, 1990). The weightings of those three roles, the importance of individual scholarly activities, and the relative importance of the Boyer model categories are essential in determining faculty tenure. Literature also suggests that weightings vary by academic institution and program, but does not address current practices.
This study will examine the accepted forms of scholarly activity and their relative importance to granting tenure to engineering technology faculty members associated with TAC of ABET accredited four-year colleges and universities. Included will be an assessment of the relative importance of Boyer’s four domains of scholarship (Boyer, 1990).

Theoretical Rationale

Engineering technology is not the only discipline arguing for a broader definition of scholarship. The literature indicates that other application and practice-oriented fields such as nursing (Stull and Lantz, 2005; Alteen, Didham, and Stratton, 2009), pharmacy (Leslie et al., 2004), and business (Srinivasan, Kemelgor, and Johnson, 2001) are also calling for a more inclusive definition of scholarship. Boyer’s seminal work (Boyer, 1990) has become the basic framework for those alternative definitions. Boyer proposed an expanded definition of scholarship based on four elements: scholarship of discovery, scholarship of integration, scholarship of application, and scholarship of teaching. The scholarship of discovery includes what academics call research satisfying the traditional definition of scholarship. That definition is expanded by adding integration scholarship, application scholarship, and teaching scholarship.

Scholarship of discovery embraces what academics describe as research that expands knowledge and contributes to the intellectual climate of colleges and universities. Scholarship of integration encompasses scholarly contributions across disciplines offering a broader perspective and comprehensive understanding. Scholarship of application addresses the use of knowledge to solve societal problems, presenting an interaction between theory and practice. Scholarship of teaching includes pedagogical
contributions in addition to knowledge delivery. Boyer claims that those four elements of scholarship are not mutually exclusive, but rather are interdependent. Boyer’s Model, which will be discussed in more detail in chapter two, will be used as the theoretical framework for this study. Literature indicates that it is the most widely used model in academia for establishing a broader definition of scholarship.

Purpose of the Study

The purpose of this study was to identify the currently accepted forms of scholarly activity for engineering technology faculty, and to show their influence on tenure decision making. This study examined how the perceived relative importance of scholarly activities provides a basis for faculty choice of scholarship. The researcher gathered and analyzed information from four-year colleges and universities having engineering technology programs, representing diverse organizational structures, geographical locations, classifications, and public and private governance. The study surveyed Chief Academic Officers (CAO’s), college deans, chancellors, directors, faculty, and former and current faculty members who served on tenure committees at colleges and universities that offer engineering technology programs.

Research Questions and Hypotheses

Primary Research Questions

P1. What are the accepted forms of scholarly activity for engineering technology faculty?

P2. What is the perceived importance of the accepted forms of scholarly activity relative to granting tenure to engineering technology faculty?
Secondary Research Questions

S1. Are there differences between types of institutions relative to the importance of various forms of scholarly activity and the granting of tenure?

S2. What is the importance of publication relative to the receipt of patents in the granting of tenure?

S3. What is the relative importance of Boyer’s (1990) four domains of scholarship to the granting of tenure?

Hypotheses

H1. The perceived importance of the scholarly activity of peer reviewed publication will rank the highest compared to other scholarly activities.

H2. The perceived importance of discovery will rank higher than the other three Boyer (1990) scholarship domains relative to tenure decision making.

H3. Scholarly activity associated with publication will rank higher compared to the receiving of patents.

Significance of the Study

This study examines the crucial issue of scholarship definition for engineering technology faculty when considered for tenure. Scholarship is required of engineering technology faculty for tenure and promotion (Aghayere, et al., 2003), but such faculty are engaged in a variety of scholarly activities not traditionally accepted by academia (Aghayere and Buchanan, 2006).

By answering the primary research questions; this study identified scholarly activities in which engineering technology faculty can engage in addition to traditional empirical research and achieve the scholarship expectation for receiving tenure. The
categorization of the accepted forms of scholarly activity with Boyer’s four domains of scholarship yielded the perceived priority of each domain as it relates to tenure evaluation. Having multiple perspectives from faculty, and tenure decision makers, namely, Chief Academic Officers, deans, and tenure committee members; engineering technology administrators can use the findings as a basis for evaluation of the current scholarship requirements at their own institutions. Furthermore, the study will provide engineering technology administrators with significant variables to be considered when developing tenure scholarship criteria.

This study also satisfies an important current need in the discipline. In particular the identification and perceived importance of an array of scholarly activities regarding engineering technology scholarship and tenure decisions are documented. That information can serve as baseline data for future engineering technology studies, can provide guidance to administrators for evaluating tenure policies and practices, and can assist engineering technology faculty in prioritizing future scholarly activity in meeting their institution’s scholarship expectations. The important findings of this study are significant for administrators to assure that the perceived priority of scholarly activity across perspectives is aligned and supportive of their institution’s mission.

Definition of Terms

The terms and definitions used for the purposes of this study are shown in Appendix A.

Conclusion

As discussed earlier, engineering technology (ET) is the application of basic engineering and scientific principles coupled with current technology to the identification
and solution of technical problems. The history and evolution of engineering technology is rooted in application and practice, and traditionally scholarship was not a requirement for ET faculty. Aghayere and Buchanan (2006), however, imply that a shift has taken place regarding the role of scholarship for engineering technology faculty. ET needs to be supported by an array of accepted scholarly activity that will satisfy the scholarship requirement while also preserving the applied nature of the discipline.

Scholarship today has more emphasis as a critical element in the granting of tenure to engineering technology faculty (Aghayere, 2004; Lozano-Nieto, 2004). The definition of engineering technology scholarship, however, remains elusive. The literature presented in chapter two demonstrates that within higher education the definition of scholarship is changing in the direction of Boyer’s model (Boyer, 1990), but the focus on scholarly activity associated with specific disciplines is minimal. Furthermore, the literature review addresses a number of studies relating scholarship to faculty systems of rewards, but illustrates a scarcity of studies centered on faculty scholarship and tenure decisions for engineering technology.
Chapter 2: Review of the Literature

Introduction and Purpose

The higher education faculty role of teaching, service, and scholarship and its importance to the faculty system of recognition and reward is the subject of much discourse in the literature. Significant anecdotal evidence exists indicating that the link between that role and the reward system, namely, tenure and promotion is the performance of scholarly activity while research studies provide support and significance to that conclusion. Shelton (2000) indicates that the assessment of scholarly activity plays a “critical career role” (p.265) in influencing promotion, tenure, advancement, and other recognition and reward decisions. That critical career role is dependent on the description and definition of scholarly activity. In the American academe today, the description and definition of scholarly activity centers on the four domains of scholarship proposed by Ernest Boyer (Braxton, Luckey, and Helland, 2002). The following will present a review of the literature describing the current state of knowledge regarding scholarship and its relationship to faculty rewards. Specifically addressed will be the evolution of scholarship in the faculty role, the work of Ernest L. Boyer as a theoretical framework, and a review of empirical studies focusing on scholarship as it relates to the faculty system of rewards.

Evolution of Scholarship in American Higher Education

“Higher education has evolved through successive stages as society’s needs have changed” (Schuster and Finkelstein, 2006, p.4). Boyer identified these stages occurring throughout the history of higher education in America as “traditions” (Boyer, 1995). He specifically identified three traditions that shaped the current faculty role.
The first tradition began with the founding of Harvard College in 1636 dedicated teaching (Boyer, 1995). That commitment to teaching reflected the English collegiate tradition brought to America (Glassick, Huber, and Maeroff, 1997). Two hundred and thirty three years later the following quote from an inaugural address by a Harvard president in 1869 reinforced the direction and longevity of teaching as a central theme: “The prime business of American professors must be regular and assiduous class teaching” (as cited in Glassick, Huber, and Maeroff, 1997, p.6). Teaching was cast as a faculty function.

The second tradition began to surface in 1824 with the founding of Rensselaer Polytechnic Institute (RPI) (Boyer, 1995). RPI viewed its mission as the provider of builders for the nation’s infrastructure (Boyer, 1995; Glassic, Huber, and Maeroff, 1997). That mission began the coupling of higher education to the application of technology to serve society in helping to build a nation. S. Van Rensseler’s founding letter of 1824 describes that service to society-“My principal object is, to qualify teachers for instructing the sons and daughters of farmers and mechanics by lectures or otherwise, in the application of experimental chemistry, philosophy, and natural history, to agriculture, domestic economy, the arts, and manufactures” (Rensseler, 1824). The land grant college movement of 1862 expanded and accelerated the relationship between higher education and the application of technology to support the industrial revolution that was taking place (Dyrud, 1995). “Higher education’s mission of teaching was joined by a mission of service beyond the campus gate” (Glassic, Huber, and Maeroff, p.7). Faculty responsibilities had been broadened to include teaching and service to society.
The third, and most impacting tradition, emerged during the late 19th to early 20th century when the German university model with its heavy orientation towards research began to influence the American university system (Malloy, 2002). The watershed event occurred with the founding of Johns Hopkins University in 1876 modeled on the German system (Boyer, 1995). Johns Hopkins was built and developed as a graduate university with heavy orientation towards research (Malloy, 2002). Scholarship had suddenly become a faculty focus. The permeation of the Germanic model of scholarship into American higher education was gradual, but since it has taken roots, research and publication have become the major measure of faculty productivity (Lidstone, Hacker, and Oien, 1996). The faculty’s professional obligations currently encompass teaching, service, and scholarship with scholarship being the dominant force for institutions moving towards a research orientation.

Academic scholarship today is virtually synonymous with research that is reviewed by peers and then published in a scholarly journal with dissemination as an expectation (Paulsen and Feldman, 1995). Research and publication have become the predominant standard by which faculty performance and productivity are assessed at four-year colleges and universities (Boyer, 1990). Boyer also asserts that American educational needs and social issues have changed profoundly since the founding of Harvard in 1636 through the 1980’s. He further states that the scholarship standard has become too narrow because it does not address the dimensions of teaching and service which are significant elements in responding to the current education and societal realities. The emphasis on research and publication has increased over the decades. Schuster and Finkelstein (2006) state that the number of surveyed faculty indicating that
research and publication are key tenure criterion increased steadily from 40% in 1969 to 65% in 1997. The literature indicates that the trend has continued. That trend has caused stakeholders inside and outside of colleges and universities to argue that faculty are spending too much time on research and ignoring undergraduate students and society as a whole (Sorcinelli, 2002). Glassick (2000) placed the scholarship trend in perspective: “Ernest Boyer proposed that higher education move beyond the tired old ‘teaching versus research’ debate and the familiar and honorable term ‘scholarship’ be given a broader meaning.” (p. 877).

Boyer’s Scholarship Model

Boyer’s Imperative

Boyer (1995) wrote that he found it ironic that, while individual access to higher education continued to increase, thus placing teaching at the forefront, the definition by which faculty are rewarded was narrowing to recognize only those who engage in research and publication. He observed that “it became far more important for most professors to deliver a paper at the Hyatt in Chicago than to teach undergraduates back home [and] that thinking about the priorities of the scholar, we give more attention to those who fly away and teach their peers than to those who stay home and inspire future scholars in the classroom.” (p.131). He further stated that “it is an educational trend that must be examined” (p. 131). Driven by that imperative, Boyer, as president of the Carnegie Foundation, prepared the report, Scholarship Reconsidered: Priorities of the Professoriate which challenged the true meaning of scholarship.
Boyer’s Report

Ernest L. Boyer (1928-1995) a renowned American educator who served as Chancellor of the State University of New York system of higher education, United States Commissioner of Education, and President of the Carnegie Foundation for the Advancement of Teaching created a seminal work with the publication in 1990 of his *Scholarship Reconsidered: Priorities of the Professoriate*. That report, published by the Carnegie Foundation, challenged the priorities given to the current faculty role of teaching, scholarship, and service; and further challenged the established definition of scholarship. That definition implies research and publication, with publication, having further definition of peer review and dissemination (Paulsen and Feldman, 1995). Boyer claimed that faculty members could participate in not just one, but rather in four valid types of scholarship. He identified the existing definition of scholarship as discovery, but expanded the overall definition to include the dimensions of integration, application, and teaching. Boyer argued that all four types of scholarship should be recognized, valued, and rewarded (Boyer, 1990). The significance of Boyer’s work was not that it provided enlightenment regarding unknown dimensions of scholarship, but that it reframed how faculty members perform as scholars by offering an alternative definition for assessing scholarship (O’Meara and Rice, 2005).

Boyer’s Scholarship Domains

In the Carnegie Foundation report, Boyer framed four dimensions of scholarship to expand the definition of “what it means to be a scholar” (p.24). He presented the scholarship of discovery, the scholarship of integration, the scholarship of application, and the scholarship of teaching as the foundation for a revised and broadened definition.
It is important to understand what Boyer meant by these four domains in order to interpret how they embrace the faculty role of teaching, service, and scholarship.

**Scholarship of discovery.** “Discovery is the equivalent of the generation of new knowledge” (Malloy, 2002, p.110). That dimension encompasses the traditional definition of scholarship involving original research and eventual publication (Boyer, 1995). The generation and validation of theory is an essential aspect of the scholarship of discovery (Braxton, Luckey, and Helland, 2002). That inquiry is essential because it not only expands the knowledge base for the world in general, but also contributes to the intellectual spirit and prestige of colleges and universities (Boyer, 1990; Glassick, Huber, and Maeroff, 1997). Boyer (1995) attests that the scholarship of discovery will always be pursued by American higher education due to its focus on the pursuit of leading-edge knowledge.

**Scholarship of integration.** Scholarship of integration embraces contributions across disciplines, offering a broader perspective and understanding of knowledge discovered through research (Boyer, 1990). Boyer (1995) indicates that “scholars not only discover knowledge, they have to find a place for it and integrate it into a larger pattern” (p.131). That knowledge integration gives purpose to discrete pieces of knowledge by interconnecting them across disciplines (O’Meara and Rice, 2005). The scholarship of integration offers new insights into original specialty research by placing it into a larger context (Boyer, 1990).

**Scholarship of application.** Scholarship of application addresses the use of knowledge to solve societal problems, presenting an interaction between theory and practice. Boyer (1990 and 1995) refers to the scholarship of application as a form of
service required in the traditional faculty role definition. Application presents the
benefits of acquired knowledge to communities and the world at large, “enriching the
quality of life” (Jacelon, Donoghue, and Breslin, 2010, p.61). In recent years the
scholarship of application has been termed the scholarship of “engagement” (O’Meara,
2005; Jacelon, Donoghue, and Breslin, 2010; Wise, Retzleff, and Reilly, 2002).

Scholarship of teaching. Scholarship of teaching includes pedagogical
contributions in addition to knowledge delivery. A faculty member uses the knowledge
acquired from the scholarship domains of discovery, integration, and application to
“expand students’ knowledge base for effective functioning in society” (Chepyator-
Thompson and King, 1996, p.165). That expansion of student knowledge is teaching
predicated on pedagogical contributions that enhance delivery and learning. Of the four
domains, the scholarship of teaching has garnered the most attention and the least
consensus regarding definition (Luckey, 2001). One possible explanation for that
prominence and lack of consensus is that teaching is the primary function of faculty
instructors and everyone has their perspectives and views as to what constitutes effective
teaching and what should be considered scholarship. Lucky indicates that the
scholarships of discovery, integration, and application are less prominent in the literature
because there is general consensus regarding what Boyer meant by his definitions.

Examining Boyer’s four domains of scholarship indicates that each of them offers
value to students relative to learning, to faculty in terms of reinforcing their roles of
teaching, service, and scholarship, and to the general public regarding the expanded
knowledge that can be applied to the solution of societal problems. When colleges and
universities limit themselves to a narrow definition of scholarship, that value is
significantly reduced. Strong argument can be made for colleges and universities to adopt a broader definition of scholarship in concert with Boyer because of the benefits offered. Figure 1 illustrates how Boyer’s view of scholarship enhances the traditional faculty role and how the four domains of scholarship can be assessed using the academe scholarship publication standard.

Institutionalizing Boyer’s Four Domains

Shuster and Finkelstein (2006) acknowledge Boyer’s seminal work, Scholarship Reconsidered, (Boyer, 1990), and the expanded notion of what should count as scholarship within faculty reward systems. They further acknowledge that Boyer’s work “had the potential to significantly shift faculty work efforts from conventional research toward more teaching-oriented ‘scholarly’ activities” (p.357). The question is: Have college and university scholarship policies and practices been changed to reflect Boyer’s other suggested forms of scholarly activity (Shuster and Finkelstein)?
Figure 1.1. Enhancing the faculty role with Boyer’s view of scholarship
“Almost every education reform movement in higher education today relates to Ernest Boyer’s *Scholarship Reconsidered*” (Braxton, Luckey, and Helland, 2002, p. xiii). The literature review indicates that articles addressing scholarship inevitability refer to Boyer’s broader view of scholarship. Case studies found in the literature indicate that Boyer’s four scholarship domains; scholarship of discovery, scholarship of integration, scholarship of application, and scholarship of teaching, are being embraced by colleges and universities and are affecting scholarship policies and practices.

_Scholarship Studies_

The empirical review focuses on studies regarding multiple forms of scholarship relative to the system of faculty rewards in American four-year colleges and universities. Studies after 2002 are reviewed with the exception of Glassick, Huber, and Maeroff (1997) which proposes assessment schemes for the scholarship domains presented by Boyer. That study has become a supporting sequel to Boyer’s original work. Expanding the literature key word and phrase search for additional studies resulted in duplication of a number of studies reviewed. Although the possibility exists that all related studies were not reviewed, the author feels that significant studies identifying the knowledge base are contained in the review.

_Case Studies of Boyer’s Model Being Implemented_

O’Meara and Rice (2005) included eight case studies of colleges and universities that are engaged in expanding their scholarship definition. Each case study was authored or co-authored by scholarship practitioners serving as members of the college and university campuses described following case study research. The studies indicate a changing faculty role, the expanding definition of scholarship and the associated rewards.
Franklin College of Indiana (Brailow, 2005), a baccalaureate college founded in 1834, revised its faculty handbook to reflect Boyer’s definition. The level of scholarly activity has not changed since the handbook revision, but the implementation of a reward and incentive system has increased the faculty perception that multiple forms of scholarship are supported and rewarded.

Madonna University of Michigan (Bozyk, 2005), a medium-sized, independent liberal arts university, endeavored to redefine its scholarship culture to encourage and reward faculty for scholarly activity supportive of its mission. Boyer’s scholarship model provided the framework for that redefinition. The broadened scholarship definition legitimized the change in scholarship practice, but did not create a significant increase in the amount of scholarly activity regardless of form. The groundwork, however, was laid for future substantive changes regarding scholarship.

The faculty of Albany State University of Georgia (Holmes, 2005), a comprehensive historically black college and university (HBCU), had little traditionally defined scholarship. Any scholarly activity that existed centered on teaching and student success. The university desired to enhance faculty scholarship and chose to encourage and support multiple forms of scholarship as defined by Boyer. They redefined scholarship to include teaching effectiveness and expanded the definition to include the scholarship of application, and the scholarship of discovery. The scholarship of integration was defined to focus on applying the knowledge gained to student achievement and skill building. Albany State revised its policy and procedures and faculty reward system to recognize action research, applied knowledge activities, and cross-discipline collaborative efforts in order to encourage a variety of scholarship.
University leadership has observed, over a three year period, new forms of scholarship and increases in faculty productivity. The university remains committed to scholarship as an institutional priority.

The University of Phoenix (Garner, Pepicello, and Swenson, 2005) is unique in that it is an on-line university. It employs 250 full-time faculty members to manage curriculum, quality assurance, and training, and 17,000 part-time faculty members called practitioner-scholars to teach and participate in administration activities of the university. The practitioner-scholars include professionals from corporations, government, and educational institutions, and have a broader adjunct faculty role than is typically found in higher education. They are involved in traditional full-time faculty tasks like curriculum development and serving in administrative and governance roles. The university adopted Boyer’s framework to emphasize scholarship as a means to support a paradigm shift from a teaching focus to a student learning focus. A 2002 campus study analyzed vitas from 32% (5,622) of the 17,544 practitioner-scholars and indicated that faculty members were engaged in substantial scholarly activity involving all four of Boyer’s scholarship domains. The University of Phoenix has adopted Boyer’s model to formalize their definition of scholarship.

South Dakota State University (Peterson and Kayongo-Male, 2005), a comprehensive land-grant university, adopted Boyer’s framework to mitigate the imposition of traditional scholarship standards on all disciplines during the tenure and promotion process. Standards documents were revised to reflect multiple forms of scholarship. A 2001 campus-wide study indicated that the standards documents reflecting Boyer’s scholarship framework were being used as a basis of rewards and that,
after a decade-long journey, more effort was needed to incorporate Boyer’s dimensions of scholarship into the university culture.

Kansas State University (Clegg and Esping, 2005) has been involved for more than ten years in broadening the definition of scholarship. Cultural change has been and is occurring at a slow but steady pace.

Portland State University (Rueter and Bauer, 2005), an urban doctoral granting university, expanded the definition of scholarship used for faculty evaluation and rewards to support their role in teaching, learning, and community service. Promotion and tenure guidelines were rewritten to reflect Boyer’s multiple forms of scholarship and included how different forms of scholarship would be reviewed. A study reflecting a seven-year period following the promotion and tenure guidelines revision indicated that a cultural shift had taken place relative to scholarship definition and that scholarship productivity had increased. Portland’s expanded definition of scholarship has been validated with numerous national recognitions between 1994 and 2003.

Arizona State University (ASU) (Evans, Grace, and Roen, 2005), a Carnegie Research Extensive university, is engaged promoting the scholarship of teaching and learning. ASU appears to be embracing Boyer’s scholarship of discovery and scholarship of teaching. Discovery and teaching were able to be integrated. The institute culture is changing around teaching and learning. Indications are that teaching and learning is recognized and rewarded.

Studies Addressing the Institutionalization of Boyer’s Four Domains

Shuster and Finkelstein (2006) acknowledge Boyer’s seminal work, *Scholarship Reconsidered*, (Boyer, 1990) and the expanded notion of what should count as
scholarship within faculty reward systems. They further acknowledge that Boyer’s work “had the potential to significantly shift faculty work efforts from conventional research toward more teaching-oriented ‘scholarly’ activities” p.357. The question is: Have college and university scholarship policies and practices been changed to reflect Boyer’s other suggested forms of scholarly activity (Shuster and Finkelstein)?

Glassick, Huber, and Maeroff (1997) conducted a 1994 national survey of college and university Chief Academic Officers (CAO) to examine whether changes occurred in evaluating and rewarding faculty work since the advent of Scholarship Reconsidered in 1990. The CAO’s of all of the four-year colleges and universities in the United States were surveyed using a fifteen question, selected response survey. Percentage distributions of the responses were made by all institutions across the top four Carnegie level classifications. Sixty-two percent of the CAO’s reported that Scholarship Reconsidered played a role in the discussion about faculty roles and rewards (p.111, Table 56). Seventy-eight percent of the CAO’s indicated that “the definition of scholarship is being broadened to include the full range of activities in which faculty is engaged” (p. 86, Table 5). Eighty percent of the CAO’s reported that “the definition of teaching is being broadened to include activities such as curriculum development, advising, and conducting instructional and classroom research” (p. 86, Table 5). Fifty-four percent of CAO’s stated that applied scholarship is being clearly identified (p. 87, Table 7). Seventy-eight percent of CAO’s indicated that they have in place or are considering “special awards for teaching excellence” (p. 107, Table 40). Thirty-nine percent of the CAO’s said that changes had been implemented in the criteria used for awarding tenure. The findings of Glassick, Huber, and Maeroff illustrate that Boyer’s
broadening definition of scholarship had an early impact on colleges and universities (O’Meara, 2005).

Braxton, Luckey, and Helland (2002) investigated the extent to which college and university faculty engage in scholarly activities associated with each of Boyer’s four domains and the degree to which those domains were institutionalized into their scholarly role. The data for the Braxton, Luckey, Helland study was gathered in 1999. Full-time, non-tenure track and tenure track faculty members representing five types of Carnegie classified colleges and universities across four disciplines were selected as the population for the study. A random sample of 4000 faculty members representing the four disciplines was selected. The sample represented 200 faculty members from each of the four disciplines from each of the five types of Carnegie classified institutions. A survey was sent to each individual in this sample and a 35.6% response rate yielded 1,424 participants for the study. Percentage distributions were used to measure engagement in Boyer’s four domains of scholarship relative to publication productivity found in research. Factor analysis was used to compare institutional types and determine whether the engagement in Boyer’s four domains varied across disciplines. Hierarchical linear multiple regression analysis was used to examine the influence that faculty characteristics have on engagement in the four domains of scholarship and whether engagement in the four domains and engagement in publication productivity are influenced in the same way.

Braxton, Luckey, and Helland identified three levels of institutionalization- structural, procedural, and incorporation (Curry as cited in Braxton, Luckey, and Helland, 2002). Structural represents basic institution change described by individuals having new fundamental behavioral knowledge required by the change and an understanding of how
to apply that knowledge to engage in the new desired behaviors. At the procedural level
the behaviors and policies associated with the change are implemented as standard
operating procedure. Incorporation is “the most in-depth” (p. 7) level of
institutionalization where the values and norms associated with the change are woven
into the fabric of the institution’s culture. Braxton, Luckey, and Helland found that all
four scholarship domains-discovery, integration, application, and teaching, achieved
structural-level institutionalization; discovery and teaching had reached procedural-level
institutionalization; discovery, however, was the only domain to attain incorporation-
level institutionalization (O’Meara and Rice, 2005). They also found that faculty
characteristics influenced engagement in Boyer’s scholarship domains and, within each
of the domains, the degree of involvement, and those characteristics influenced the
amount of faculty unpublished scholarly activity versus publication productivity. The
findings indicated that Boyer’s four scholarship domains are being institutionalized with
discovery, analogous to the traditional scholarship definition of research and publication,
still maintaining prominence within four-year institutions.

O’Meara (2005) conducted a national study of Chief Academic Officers (CAO’s)
of four-year colleges and universities to assess the impact of policy change efforts to
encourage multiple forms of scholarship in faculty roles and systems of recognition and
rewards. She used survey research for the study. The study focused on four-year
colleges and universities identified as not-for-profit by the 2000 Carnegie classification
system. The study was based on a population of 729 respondents. Her findings indicated
that four-year institutions have initiated policy and procedure changes to encourage and
reward multiple forms of scholarship (p. 488). Sixty-eight percent of all CAOs indicated
that their institution had modified governing documents like mission statements, strategic plans and faculty evaluation criteria; and provided incentive grants or flexible workloads to encourage and reward multiple forms of scholarship. Seventy-six percent of the CAOs involved with reforming scholarship reported that they were broadening the definition of scholarship for faculty evaluation policies. Fifty-one percent of all CAOs reported that the value of publication productivity has increased at their institutions during the past decade. No significant difference was found between the responses of CAOs from institutions making policy and procedural changes and those that were not. The findings of this study indicated that changes to faculty scholarship are being actively encouraged and evaluation policies are being changed to encompass an expanded definition of scholarship.

*Studies of the Implementation of Boyer’s Model in Engineering Technology*

Studies addressing the application of Boyer’s Model in engineering technology in higher education today suggested alternative definitions of scholarship center on Boyer’s seminal work, *Scholarship Reconsidered* (Braxton, Luchey, and Helland, 2002). The literature indicates that in addition to the engineering technology community other applied and practice oriented fields such as nursing, pharmacy, and business are suggesting broader definitions for scholarship.

Scholarship studies indicate that faculty is engaged in a broad array of scholarly activity that can be categorized with Boyer’s four scholarship domains. Scholarship studies contained in the literature are broadly focused presenting results pertaining to all faculty studied with no focus on engineering technology faculty. Only two studies were identified focusing on the scholarship of engineering technology educators. The first
study conducted by the Engineering Technology Council (ETC) Task Force on Scholarship (Aghayere, et al., 2003) surveyed the existing level of scholarly activity and workload policies among engineering technology faculty. The second conducted by Aghayere and Buchanan (Aghayere and Buchanan, 2006) surveyed the types of scholarly activity and the levels of activity required for tenure and promotion of engineering technology faculty.

The ETC scholarly activity survey instrument consisted of fourteen questions sent via e-mail to all engineering technology faculty of the American Society of Engineering Education registered on Engineering Technology Division listserv. A total of 50 faculty responded representing 38 colleges and universities. Eighty-three percent of the respondents indicated that their institutions required scholarly activities for tenure and promotion. That scholarly activity included the traditional journal publication in addition to conference presentations, review of papers, curriculum development, product development and professional practice to name a few. All (100%) of the two-year engineering technology program respondents indicated that no scholarly activity is required for tenure and promotion. The difference between these two groups indicates that the level of scholarly activity required of engineering technology faculty may be dependent on the level of degree offered by the engineering technology program.

The ETC used a web-based literature survey of faculty to examine workload policies at various colleges and universities across the country. Inferred from the study is that information available from all colleges and universities was used in the survey. These institutions ranged from community colleges to research universities. The survey
results indicate that a positive correlation exists between the amount of scholarship required and the amount and level of research being done at the institution.

The scholarship benchmark study survey instrument (Aghayere and Buchanan, 2006) consisted of 43 questions sent via e-mail to all engineering technology faculty of the American Society of Engineering Education registered on Engineering Technology Division listserv covering a four year period. A total of 106 engineering technology faculty members responded representing 44 baccalaureate colleges and universities or approximately 37% of the institutions having TAC of ABET accredited engineering technology programs. The composite results of the survey indicated that scholarship is required of engineering technology faculty for tenure and promotion and that faculty are engaged in a variety of scholarly activities. The study also found that documentation, peer review, and dissemination were required for a scholarly activity to be considered scholarship. Aghayere and Buchanan indicated that engineering technology scholarship was “heavily skewed toward the scholarship of pedagogy and the scholarship of application” (p. 50) as defined by the Boyer scholarship model (Boyer, 1990). The authors also indicated that the consulting activity of engineering technology faculty was not considered a scholarly activity unless it results in “publications, grant funding, or technical reports” (p. 50). Correlation studies indicated that there is a positive relationship between the amount and level of scholarship required and the highest degree offered by the college or university.

*Studies Addressing the Scholarship of Teaching and Learning (SoTL)*

The major effort to “move teaching from the periphery to the [center] of the university” was driven by Boyer’s (1990) and Glassick, Huber, and Maeroff’s Carnegie
Boyer’s scholarship of teaching embraced knowledge delivery coupled with pedagogical contributions. The scholarship of teaching transcends scholarly teaching and includes the “systematic study of teaching and/or learning” (McKinney, 2007, p.8). That systematic study of teaching and/or learning, which focuses on the educational process, gives rise to pedagogical contributions. Boyer’s scholarship of teaching has been broadened to include learning and describes what we refer to as the scholarship of teaching and learning (SoTL) (Boshier, 2009).

McKinney indicates that “learning” includes teacher learning as well as student learning and that the scholarship of teaching and learning as described has a research agenda. Shoen (as cited in Trigwell, Martin, Benjamin, and Prosser, 2000) suggests that the research agenda take the form of action research. He also suggests that for the scholarship of teaching (SoTL) to be considered a true form of scholarship it must be viewed as contributing new knowledge. Healey (2000) reinforces that view by indicating that the scholarship of teaching needs to be involved with teaching and learning research. These research oriented views of the scholarship of teaching and learning represents an obvious link to Boyer’s scholarship of discovery. That link further provides example of Boyer’s view that the four domains of scholarship should be considered as an integrated set providing broader scholarship definition rather than considered as discrete entities (Boyer, 1990). The scholarship of teaching and learning and its definition continues to be a debatable subject within higher education (Glassick, 2000).

Henderson and Buchanan (2007) investigated the scholarship of teaching and learning by examining the SoTL publishing activities of faculty members at comprehensive universities involving four disciplines. They examined the publication of
articles and the participation on editorial boards of four journals publishing articles on pedagogy. Participation in the pedagogical journals was compared to the activity involving the basic research review journals in the same disciplines. SoTL scholarship data represented five different time periods and research scholarship data reflected three of the five pedagogical time periods. Pre-2005 Carnegie Foundation classification levels were used to group colleges and universities into three broad categories: doctoral granting, comprehensive, and baccalaureate. The number of authors and editorial board members affiliated with each of the categories was determined. The total number of authors in each category was divided by the total number of authors in all categories to form a category proportion of authors. Similarly, the total number of editorial board members in each category was divided by the total number of editorial board members in all categories to form a category proportion of editorial board members. These proportions were viewed over the time period of 1977 to 2004 and used to determine results and formulate conclusions. Results of the study indicate that participation of faculty members from comprehensive and baccalaureate institutions in journals reflecting the scholarship of teaching and learning was greater than their involvement in journals reflecting research. Similar results were obtained relative to participation on editorial boards for SoTL journals. The inverse is true regarding both dimensions for faculty members of doctoral granting institutions. The study results also indicated that the involvement of comprehensive university faculty members in the scholarship of teaching and learning has gradually increased over time reflecting on the institutionalization of SoTL at comprehensive universities.
Buch (2008) indicates that the field of psychology has been actively involved in entertaining Boyer’s expanded view of scholarship into integration, application, and teaching. In that regard she conducted a study examining faculty perceptions of how the scholarship of teaching and learning (pedagogy) should be evaluated versus how it actually is evaluated by their department. Thirty-one, full time, tenure-track faculty members were invited to participate in the study. Twenty-two full-time faculty members of a psychology department from a doctoral and research university participated in the study by responding to a questionnaire measuring their perceptions. The response rate was approximately 71%. The questionnaire used a five-point Likert scale (strongly disagree-1 to strongly agree-5). Descriptive statistics were determined for each of the questions contained in the questionnaire. Ninety-one percent of the respondents indicated that they agreed or strongly agreed that the scholarship of teaching and learning benefits department students. Less than 33% of the respondents indicated that the department counted the scholarship of pedagogy for tenure, promotion, and annual performance reviews. Paired-sample t-tests (p < .001) indicated that faculty believed that the scholarship of pedagogy should be counted in the system of rewards more than it actually was counted. One-way ANOVA’s revealed that these perceptions did not vary by faculty rank. The results of this study indicated that the participants, independent of academic rank, advocate a broader definition of scholarship for their department emphasizing that including the scholarship of teaching and learning is very desirable.

Studies Addressing the Scholarship of Engagement

Engagement defined. Braxton (2005) states that Boyer’s scholarship of application centers on the application of “disciplinary knowledge and skills” to the
resolution of significant societal problems. That translates into providing practical solutions to real problems (Wise, Retzleff, Reilly, 2002). Boyer (as cited in Braxton, 2005, and as cited in Fogel and Cook, 2006) referred to that application of disciplinary knowledge and skill outside of the academic environment as the scholarship of engagement. Boyer (1990) indicated that the activities associated with engagement needed to be directly related to a faculty members discipline, knowledge, and skills in order to be deemed scholarship. Traditionally engagement as we defined it has been regarded as service relative to the faculty role and has not been significantly valued relative to research and teaching by colleges and universities (Jacelon, Donoghue, Breslin, 2010). Qualifying engagement activities with Boyer’s specification defining engagement scholarship offers potential of raising the perceived comparative value relative to research and teaching. This possibility could be significant when considered in conjunction with the system of faculty recognition and rewards.

The scholarship of engagement involves the application of each of the four types of scholarship-discovery, integration, application, and teaching; and a dynamic interchange between theory and practice (Boyer, 1990, 1995). Once again the implication is that the four domains of scholarship should be viewed as an interlocking set rather than being independently exhaustive and mutually exclusive as they often are (Rubin, 2000).

Huyser (2004) performed a survey research study examining perceptions of full-time faculty about their institute’s commitment to the scholarship of engagement. Research participants responded to the survey using a five-point Likert scale. The sample was comprised of 274 faculty members from five colleges and universities belonging to
the Association of Reformed Institutions in Higher Education (ARIHE). The study focused on the United States institutions.

Perceptions were evaluated in three categories: faculty colleagues, institutional mission, and the faculty reward system. The study results indicated that faculty members have strong (positive) perceptions relative to their institution’s commitment to the scholarship of engagement in the areas of faculty colleagues and institutional mission. The results also indicated that faculty members do not have strong (positive) perceptions about their institution’s commitment to the scholarship of engagement based on their faculty reward system. These conclusions led to the following interpretation: Faculty is very positive about participating in the scholarship of engagement. Their institutions acknowledge and support scholarship of engagement through the mission, but the faculty reward system does not recognize its value.

**Scholarships of discovery and integration.** The scholarship of discovery is synonymous with what is traditionally known as research (Boyer, 1990). As such, it is the most understood domain of scholarship and the most defined. Literature indicates no issues with it as a form of scholarship and; even though it was the last evolutionary element defining the faculty role of teaching, service, and scholarship; it is the most valued form of scholarship relative to faculty reward systems (O’Meara, 2005).

Boyer (1990) stated that “The scholarship of integration is, of course, closely related to discovery. It involves, first, doing research at the boundaries where fields converge…Such work is, in fact, increasingly important as traditional disciplinary categories prove confining” (p. 19). Boyer further stated that “[t]he scholarship of integration also means interpretation, fitting one’s own research—or the research of
others--into intellectual patterns (p. 19). That linking of the scholarship of discovery to
the scholarship of integration defines multi-disciplinary activity (le Grange, 2007).
Similar to the definition of discovery used in scholarship of discovery the definition of
multi-disciplinary is well defined and understood and consequently multi-disciplinary
scholarship is minimally addressed in the literature.

Studies Addressing Scholarship and Faculty Rewards

Searching the literature relative to scholarship and faculty rewards indicates that
tenure and promotion are the two faculty rewards that are most often associated with
discourse on scholarship. That is understandable and presents no surprise since tenure
and promotion are the two most significant rewards in an academic career. That same
literature search also indicates that the predominant form of scholarship is research and
publication-Boyer’s scholarship of discovery. Fairweather (1993) indicated that across
institutions there is a positive correlation between the amount of time devoted to research
and faculty salary and a negative correlation between the amount of time devoted to
teaching and faculty salary. Multiple forms of scholarship, however, have impacted
tenure and promotion.

Tang and Chamberlain (2003) conducted a study involving 233 tenure-track
professors from six regional state universities in Tennessee. They examined the effects
of rank, tenure, length of service, and institution on the attitudes of faculty members
towards research and teaching using a survey instrument. The six universities were
arranged by size as identified in the 1994 Chronicle of Higher Education, and Carnegie
classification creating institute stratification. A random sample of 20% of the full-time
faculty members (N=384) were chosen to participate in the study based on the
stratification. The participation was voluntary with each participant requested to complete a survey. A 60% return rate reduced the selected population to 233. The participants completed a 21-item, six-factor survey using a four-point scale: strongly agree (1), agree (2), disagree (3), strongly disagree (4). Analysis of the data using Multivariate Analysis of Variance (MANOVA) yielded the following results: Rank had no impact on faculty attitudes (research orientation, teaching orientation, belief that rewards influence research, belief that rewards influence teaching, personal interest, and mission of the university). The effect of tenure on faculty attitudes approached significance with F-tests indicating that non-tenured faculty members had a stronger belief that rewards influence teaching than tenured faculty members. The length of service had significant effects on research orientation and the belief that research rewards influence teaching. That belief was characteristic of faculty members with one to six years of service. Faculty members with twenty or more years of service felt the opposite. There were significant institutional effects on research orientation, the belief that rewards influence research, the belief that rewards influence teaching, and the university mission. Faculty members from institutions having a higher research orientation were more inclined to believe that rewards influence research and less inclined to believe that rewards influence teaching. Faculty members from institutions with a teaching and service orientation were more inclined to believe that rewards influenced teaching rather than research.

O’Meara (2006) conducted a research survey to investigate the effect of reward system changes on faculty involvements and activities, satisfaction, and retention by surveying 460 Chief Academic Officers (CAOs) from institutions that embraced Boyer’s
scholarship framework and 214 CAOs from institutions that had not embraced Boyer and comparing their responses. All of the CAOs represented four-year universities. Z-tests indicated significant differences between non-changed and changed institutions relative to observed increases in faculty activities over a decade. The CAOs of changed institutions reported were more likely to report an increase in faculty involvement in the scholarships of application, teaching and learning, and integration. Z-tests also indicated significant differences between non-changed and changed institutions relative to faculty satisfaction with roles and rewards. The CAOs of changed institutions were more likely to report an increase in overall satisfaction of their faculty than the CAOs of the non-changed institutions. T-tests indicated that significant differences existed between changed and non-changed institutions regarding how the respective CAOs felt about the influence that their reforms had on observed increases in faculty activities and satisfaction. The CAOs from the changed institutions were more likely than non-changed institution CAOs to report that the activity and satisfaction increases were due to their efforts.

Green (2008) examined the relative importance of the faculty role-teaching, service, and scholarship in tenure and promotion decisions. An internet survey was conducted involving deans and directors of master-in-social work (MSW), fully accredited, programs listed by the Council on Social Work Education. Of the 154 identified deans and directors 130 chose to participate in the study (84.3% response rate). A three-question survey instrument addressing each of the work roles was used. Green constructed a Work Role Salience Index (WTSI) to assess the importance of each of the three faculty role dimensions by faculty rank. Descriptive statistics and chi-square tests
of independence were used to analyze national norms and trends in tenure and promotion relative to graduate programs and to understand the similarities and differences in the weightings assigned to teaching, service, and scholarship in recent tenure and promotion decisions. Results of the study indicate the following: Academic units having doctoral programs are more likely to weight scholarship more importantly than non-doctoral programs for professors, associate professors, and assistant professors. Only 6.2% of the surveyed academic units indicated that teaching was prominent in tenure and promotion decisions. Service was considered the least important of the three faculty roles when it came to tenure and promotion. Tenure and promotion decisions vary by academic rank when considering teaching as the salient faculty role. Of the 130 deans and directors surveyed, 17.7% indicated importance for assistant professors, 10% indicated importance for associate professors, and 6.2% indicated importance for full-professors. Green concluded that efforts to elevate the importance of teaching in tenure and promotion decisions had not taken hold.

**A Study Defining Scholarship Assessment**

Boyer’s original work (Boyer, 1990) articulated an expanded definition of scholarship, but did not indicate how that scholarship was to be assessed and measured. Glassick, Huber, and Maeroff (1997) provided the answer with their study.

They investigated the availability of existing standards that may be used to for judging scholarly performance. Significant amounts of scholarship oriented documents were gathered from a number of colleges and universities including tenure and promotion practices and institution forms provided for student and peer evaluation of teaching. They asked 51 granting agencies, from editors and directors of 31 scholarly journals, and
clear goals, adequate preparation, appropriate methods, significant results, effective presentation, and reflective critique (p.25).

Clear goals. “A scholar must be clear about the aims of his or her work” (Glassick, Huber, and Maeroff, 1997, p. 25). Clear goals are the basis for defining project scope and an indication of a scholar’s breadth and depth of understanding regarding his or her project. The authors indicate that the clarity of goals regarding scholarly work can be assessed with three questions (p. 25): “Does the scholar state the basic purposes of his or her work clearly?” “Does the scholar define objectives that are realistic and achievable?” “Does the scholar identify important questions in the field?”

Adequate preparation. “[A]dequate preparation is one of the most basic aspects of scholarly work” (Glassick, Huber, and Maeroff, 1997, p. 26). The quality of a scholarly activity is predicated on the breadth and depth of knowledge and understanding that a scholar has regarding the subject matter (p. 27). The authors indicate that a scholar’s achievements can be assessed with the following three questions (p. 27): “Does the scholar show an understanding of existing scholarship in the field?” “Does the scholar bring the necessary skills to his or her work?” “Does the scholar bring together the resources necessary to move the project forward?”

Appropriate methods. “Virtually all evaluating agencies inquire into the merit of a scholar’s methods” (Glassick, Huber, and Maeroff, 1997, p. 27). The chosen research methods provide integrity and credibility to the results. Recognized and understood methods provide foundation for acceptance of the scholarly activity within academia.
The authors suggest that a scholar’s methods be addressed by the following questions (p.28): “Does the scholar use methods appropriate to the goals?” Does the scholar apply effectively the methods selected?” “Does the scholar modify procedures in response to changing circumstances?”

**Significant results.** “Any act of scholarship must also be judged by the significance of its results” (Glassick, Huber, and Maeroff, 1997, p. 29). Scholarship results should add to the existing level of knowledge regarding subject matter. The following questions are presented to evaluate the significance of a scholar’s results (p.29): “Does the scholar achieve the goals?” “Does the scholar’s work add consequentially to the field?” “Does the scholar’s work open additional areas for further exploration?”

**Effective preparation.** “The contribution made by any form of scholarship relies on presentation” (Glassick, Huber, and Maeroff, 1997, p.31). The value of scholarship is limited if it is not disseminated for others to benefit. In reviewing a scholarly work for presentation the following questions offer clarity (p.32): “Does the scholar use suitable style and effective organization to present his or her work?” “Does the scholar use appropriate forums for communicating work to its intended audience?” “Does the scholar present his or her message with clarity and integrity?”

**Reflective critique.** Glassick, Huber, and Maeroff (1997) stated that the last of the standards involves the scholar seeking feedback on their scholarly activity to learn from the process with the intent of improving their overall scholarship (p.33). The authors found very little evidence indicating that this standard has much consideration in the overall assessment of scholarship except for funding agencies requiring project
evaluation plans (p.34). The following questions, however, are important (p.34): Does the scholar critically evaluate his or her work?” “Does the scholar bring an appropriate breadth of evidence to his or her critique?” “Does the scholar use evaluation to improve the quality of future work?”

Methodological Review

Individual Studies Summarized

Eight of the twelve studies reviewed used survey research to gather data. The surveys involved self-reporting by the participants. Consequently, reporting bias is a consideration in the evaluation of the study results. The survey studies involved Chief Academic Officers (CAOs) and/or faculty. The CAOs were asked about embracing multiple forms of scholarship and the relationship between doing so and implementing institutional changes to faculty reward processes to encourage and recognize those multiple forms. Consideration has to be given to the fact that some of the CAOs surveyed may be influenced by a desire for their institutions to appear in a positive light, which may have influenced them to indicate a fuller implementation of Boyer, thus skewing their responses in that direction. If that behavior were indeed a reality, it would serve as an indicator of the influence that Boyer (1990) is having on colleges and universities. Faculty perceptions were solicited relative to involvement in multiple forms of scholarship, the relationship of multiple forms of scholarship to the system of rewards, and the degree to which Boyer’s scholarship domains are rooted in their institutions. The possibility exists that some of the faculty responses may be influenced by dissatisfaction with how their scholarly activities are perceived and valued or a desire to leverage greater recognition of multiple forms of scholarship thus skewing their responses in favor of
those objectives. A limitation of the studies is that the results and interpretation are restricted to the populations studied except for those studies using large group random samples.

The Glassick, Huiber, and Maeroff (1997) study used a Chief Operating Officer (CAO) population representing all of the four-year colleges and universities in the United States, and the colleges and universities were stratified by Carnegie classification. This method yielded results that are representative of four-year institutions and aligned with institution missions due to the stratification. A limitation of the reviewed study is that it only represented the CAO perspective. Surveying two other relevant groups, deans and faculty, would allow correlation of perceptions and offer insight into whether changes are being engrained in institutional culture. The survey used was the Carnegie Foundation National Survey on the Reexamination of Faculty Roles and Rewards. An opportunity for future research is to repeat the study and compare the results to determine what changes have occurred over more than a decade relative to multiple forms of scholarship and faculty rewards.

The Braxton, Luckey, and Helland (2002) study used a faculty population representing five types of Carnegie classified colleges and universities across four disciplines. The stratification recognizes the potential alignment between Boyer’s scholarship domains and institution mission. Examining Boyer’s domains across disciplines recognizes that the level of faculty engagement in scholarly activity within each domain and the involvement across domains may depend on discipline. They used one factor analysis for institution comparison and hierarchical linear multiple regression
analysis to assess the influence of faculty characteristics on engagement in the four domains which adds credibility to the results.

The study had several limitations. The disciplines addressed were not representative of all academic disciplines and were far removed from practice and application oriented disciplines. Including those disciplines may result in different institutionalization of the domains across disciplines. The study population was limited to five Carnegie classification categories. The use of all of the Carnegie classifications may have yielded a different view of the institutionalization of each of Boyer’s four domains across institutions. The measure of faculty scholarly productivity used in the study was a limited set of scholarly activities. A broader set of activities may have yielded a different level of faculty engagement across the four domains. The study contained an inventory of scholarly activity that could be used for definition in future studies with prior approval.

The O’Meara (2005) study presented results based on the use of extensive statistical analysis. The use of descriptive and univariate statistics for data analysis, independent sample t-tests for comparison of question answers from two groups of respondents, ANOVA to analyze differences between institution types and survey questions, and Chi-square tests to examine significant associations between population characteristics provided the basis for those credible results. A limitation of this study was that it represented a Chief Academic Officer perspective only. CAOs may be critical to any changes relative to accepting multiple forms of scholarship and modifying faculty reward systems to encourage them, but they are not the only influencers. A survey of
deans, department chairs, and faculty leaders in addition to the CAOs may have yielded different results.

The ETC (2003) survey to study scholarly activity presented results with descriptive percentages. The response rate was small relative to the total number of American college and university engineering technology faculty surveyed. A study limitation is that no interpretation or conclusion regarding the results was presented.

The Aghayere and Buchanan (2006) study presented the use of the engineering technology faculty listserv as a convenience relative to distributing the survey and allowed for potentially reaching 100% of the engineering technology faculty within the American Society of Engineering Educators (ASEE). The study provided a survey instrument and an inventory of scholarly activity that can be used in future studies involving engineering technology scholarship. The use of descriptive statistics and Pearson correlations between selective variables and the highest degree offered by the institution offers credibility to the results. A limitation of the study is that it applies only to engineering technology faculty.

The Henderson and Buchanan (2007) study presented a method of assessing the scholarship of teaching and learning (SoTL) by counting published articles and participation on editorial boards of pedagogical journals. This approach centered on the traditional standard of publication and dissemination to assess scholarship. That narrow definition in itself is a limitation. The broader definition of what constitutes SoTL is not considered. Another limitation is that only four disciplines were considered and the journals evaluated could be considered prestige journals by each discipline. SoTL publication could take place in lesser journals and venues. Henderson and Buchanan’s
conclusion that the involvement of faculty members in SoTL had increased over time could be interpreted as an increase in SoTL publication in the prestige journals.

Buch’s (2008) faculty study centered on a single psychology department. Paired-sample t-tests were used to compare faculty perceptions of whether the scholarship of pedagogy is counted in promotion, tenure, and annual review decisions versus whether it should be. ANOVAs were prominent in this study.

Huyser (2004) presented an extensive study using in depth statistical analysis support for the presented results making them very credible. A limitation of the study is that it only included reformed Christian institutions where the scholarship of engagement may be a priority item due to mission. An opportunity exists for future contribution by repeating the study involving other classes of colleges and universities.

*Study Procedure Summary*

The reviewed studies suggested several legitimate approaches to reaching the intended study participants-internet, listserv, and mail. The relative effectiveness of each regarding response rate was not discernable. Likert scale surveys appear to be the preferred method for soliciting perception data while suggested response, yes or no, open ended questions surveys, and quantified responses are used for gathering discreet data. The stratification of respondents by Carnegie classification is paramount in studies involving multiple forms of scholarship due to the link between an institution’s mission and the encouraged portfolio of faculty scholarly activity to support that mission. Faculty members from an institution exist within a hierarchical education structure. The institution’s culture drives homogeneity within the faculty. That needs to be a consideration when analyzing data from those faculty members. Depending on the
direction of a study and sample size, HLM may need to be used to address the lack of total independence of the data.

Conclusion

Gap Analysis and Future Research

The reviewed studies examining the multiple forms of scholarship and the system of faculty rewards were focused at the institution level. Responses from Chief Operating Officers (CAOs) represented the institution perspective. Faculty responses indicated perceptions regarding the institution. That participant selection approach of involving CAOs and faculty provided valuable knowledge regarding the level of institutionalization of Boyer’s expanded view of scholarship across institutions, the role of multiple forms of scholarship in the faculty rewards system, faculty commitment and engagement in certain scholarly activities, the relative importance of teaching, scholarship, and service to tenure and promotion, the significance of the scholarship of teaching and learning (SoTL), and that institution culture is changing and becoming increasingly supportive of an expanded view of scholarship. It is recognized that the CAOs are the key responsible individuals for driving these cultural scholarship dimensions, but there is a wealth of knowledge to be gained regarding multiple forms of scholarship and faculty reward systems by studies involving the key influencers in the rewards, namely, deans, program chairs, faculty leaders, and tenure committee members who control the ultimate faculty reward-tenure. Incorporating these influencers as participants in studies may yield a different assessment of what is transpiring relative to scholarship and faculty rewards within colleges and universities.
The assessment elements of faculty performance involve teaching, service, and scholarship. The studies reviewed examined the faculty role and the relative importance of teaching, service, and scholarship to rewards, but within the role of scholarship there is no indication that accepted forms of scholarly activities supporting an expanded definition of scholarship per Boyer have been identified. The identification of these accepted forms of scholarly activity and their importance (weightings) to faculty rewards is an opportunity for future research.

The defined missions of institutions determine the required balance between teaching, service, and scholarship for their respective faculty. The reviewed studies recognized the mission differences of colleges and universities by stratifying these institutions by Carnegie level classifications. These mission differences resulted in different types of faculty scholarly activity necessary to support those missions. There is another factor that influences the type of scholarly activity performed by faculty. It is the discipline that the faculty member represents. All scholarly activities are not common to all disciplines nor are the relative importance of Boyer’s four domains. Any study focusing on addressing accepted forms of scholarly activity or multiple forms of scholarship and importance needs to look at specific disciplines or groups of disciplines having common characteristics. Two of the studies narrowly incorporated disciplines as a factor. The results from proposed future research directions would enhance those obtained by the reviewed studies.

Summary

Evidence presented in this literature review indicates that the broadened definition of scholarship proposed by Boyer has been and is alive and well within colleges and
universities, but the degree of implementation varies within the academe. Evidence indicates that to varying degree it is influencing faculty expectations and systems of recognition and rewards. That evidence also indicates that Boyer’s expanded definition of scholarship (Boyer, 1990) is widely used to embrace the total faculty role of teaching, service, and scholarship and elevate teaching and service to scholarship status. A question that remains is whether Boyer’s scholarship definition is influencing a change in institution culture and to what degree. Arreola, Theall, and Aleamoni (2003) wrote that after more than a decade of discourse stimulated by *Scholarship Reconsidered* (1990), Boyer’s ideas have not had a major impact on teaching and rewards for teaching. Boshier (2009) stated that “more than 17 years after Boyer (1990), SoTL [scholarship of teaching and learning] lurks at the periphery of university life and discourse” (p.2). These comments imply that complete incorporation of Boyer’s ideas in college and university life has been a long arduous journey, but progress has been made.

Previous research and current literature support the significance of scholarship to the granting of tenure, and that Boyer’s four domains of scholarship (Boyer, 1990) are being used to broaden the definition of scholarship. What are not well defined are the accepted forms of scholarly activity to support that broadened scholarship definition and their relative importance to tenure decisions. This study is intended to begin that scholarly activity definition.
Chapter 3: Research Design Methodology

Research Context

The purpose of this study was to identify the currently accepted forms of scholarly activity for engineering technology faculty, and to show their influence on tenure decision making. The researcher gathered and analyzed information from four-year American colleges and universities having baccalaureate level engineering technology programs. All 50 of the United States were represented, reflecting diverse organizational structures, geographical locations, Carnegie classifications, and public and private governance.

Glatthorn and Joyner (2005) indicate that a quantitative research perspective is phenomenological in that “reality inheres in the perceptions of individuals” (p. 40). Cottrell and McKenzie (2005) also suggest that quantitative research designs are phenomenological in nature centered on trying to understand a “selected group of people’s perceptions, understandings, and beliefs concerning a particular situation or event” (p. 8). Those descriptions readily apply to the topic of interest in this study, namely, academics’ perceptions of relative importance of various scholarly activities to the granting of tenure. As such, this topic was well suited for a quantitative study.

The study format was a questionnaire data gathering with Chief Academic Officers (CAOs), college deans, faculty members, and former and current faculty members who served on tenure committees participating as respondents. The questionnaire respondents were chosen from colleges and universities that offer TAC of
ABET accredited engineering technology programs. Appendix B identifies 140 of those colleges and universities. Appendix C lists seventeen different engineering technology programs that were a part of the study.

The identities of the respondents and the institutions were kept confidential. The survey questionnaire was anonymous and any identifying information that accompanied a response was similarly protected.

Research Participants

The Engineering Technology Division (ETD) of the American Society of Engineering Educators (ASEE) maintains a listserv having approximately 2,700 faculty members representing about 370 four-year schools (Buchanan, 2010). Faculty participants for the research study were selected by identifying those faculty members associated with the colleges and universities having TAC of ABET accredited engineering technology programs (Appendix B). The target population for the study was the entire identified faculty. A research questionnaire was sent to all of those individuals via electronic communication.

The information contained in Appendix B represents an extract summary from the ABET, Inc. website (www.abet.org) indicating only the colleges and universities having accredited four-year engineering technology programs (140 institutions). The website, however, also includes a website link to each of the institutions. Those website links and internet searches were used to identify the Chief Academic Officers and deans for the administrative targeted population. A research questionnaire was sent to all of the identified individuals via the Internet.
Data Collection Instrument

The baseline instrument used for collecting data for the research study was the three-part questionnaire contained in Appendix D (Coogan, 2007). The survey was modified in accordance with the outline presented in Appendix E. Additional demographic information was added to Part One. Questions addressing specific disciplines were eliminated along with references to promotion. The emphasis on promotion was changed to an emphasis on the granting of tenure in Part Two along with linking the identified scholarly activities to Boyer’s four domains of scholarship, which is the theoretical framework for the study. Part Three was altered to include only four vignettes. References to ABET and engineering technology were added wherever appropriate to assist participants in maintaining focus and perspective while completing the questionnaire. A pilot study was conducted to validate the modified questionnaire.

Pilot Study Questionnaire

The questionnaire (Appendix F) has four parts and asks the participants to provide responses to 38 items. Part One has eleven items concerning background and demographic information to characterize the sample more accurately. Participants were asked to respond to the items by checking an option provided.

Part Two solicited responses to 22 items that address scholarly activity linked to the theoretical framework that may be used to evaluate a candidate for tenure. Participants were asked to rate how important they feel each specific scholarly activity item is relative to being granted tenure at their institution. Participant importance ratings were gathered by asking the participants to check the number that corresponds to a defined importance level on a five-point Likert scale.
Part Three included four items presenting different vignettes of select information from a hypothetical candidate’s curriculum vitae (CV). The vignettes are gender neutral. Participants were requested to evaluate the scenarios regarding the granting of tenure by indicating the percent likelihood that the individual described by the scenario information would be granted tenure at their institution. The four vignettes reflected different levels of scholarly activity. Part four was an open ended question asking for the rationale behind the answers to Part Three.

Procedures

Discussion in the Data Collection Instrument section indicated that the survey instrument was a modification of the questionnaire used by Theresa A. Coogan (2007) in her dissertation (Appendix D). Creswell (2009) indicated that whether the instrument used for research was developed by someone other than the researcher and used intact or developed by someone else and modified, permission from the instrument originator needs to be obtained. The first procedural step was to obtain permission from Dr. Coogan to use her questionnaire (Appendix G).

Face and content validity of the modified questionnaire was verified. The modified draft of the questionnaire closely aligned with Dr. Coogan’s instrument. She conducted a pilot study to test for validity which included ten people of various academic backgrounds. The results indicated the demographic questions (Part One) and the criteria questions (Part Two) were clearly written and no changes were made. Results from the vignettes (Part Three) indicated that they were clear and concise, adequate in length, contained no value-laden or biased wording skewing participant responses, and the level of proficiency associated with the tenure considerations presented were not easily
detected. Due to the close alignment of the two instruments, the assumption was made that Dr. Coogan’s validity test would extrapolate to the draft research instrument and provide some confidence in its validity. The final draft, however, was piloted to verify and assure validity.

Pilot Study

General Perspective

The researcher is a tenured engineering technology faculty member in the College of Applied Science and Technology (CAST) at the Rochester Institute of Technology (RIT). Engineering technology faculty and chief administrators from RIT and CAST were not included in the research study to eliminate perceptions of any possible conflict. RIT engineering technology faculty, however, was used for a research instrument pilot study. Since the pilot study results were used only to validate the survey and not included in the research, the pilot study was exempt from RIT Institutional Review Board (IRB) approval.

CAST maintains seven TAC of ABET accredited four-year engineering technology programs: Civil Engineering Technology, Mechanical Engineering Technology, Manufacturing Engineering Technology, Electromechanical Engineering Technology, Electrical Engineering Technology, Computer Engineering Technology, and Telecommunications Engineering Technology. Those programs are supported by 32 tenured faculty member comprised of 26 instructional faculty, three department chairs, and three deans (one dean and two associate deans). Only the instructional faculty was used as the pilot population. The deans and department chairs were eliminated because
of the risk associated with the preservation of participant confidentiality due to their small representation.

Pilot Study Participants

Twenty-six tenured engineering technology faculty members of CAST were identified to participate in the pilot study. The 26 identified participants were randomly divided into two groups of thirteen individuals identified as Group A and Group B. Each group received a personal invitation inviting them to participate on a different day. A total of twelve individuals agreed to participate in the study—four from Group A and eight from Group B. The overall participation rate was 46.2%.

Pilot Methodology

The methodology for the pilot study was a focus group format. Each of the focus groups lasted for one hour. Each of the participants was requested to complete the test questionnaire at the beginning of each session to gain familiarity with its contents. Following completion of the questionnaire by each participant, a focus group discussion was conducted using the questions of Appendix H as a guide. The discussions were recorded with permission of the participants and later transcribed and used for questionnaire improvement.

Focus Group Results

The participants of each focus group completed the questionnaire within eight to twelve minutes. The intent and interpretation of all four parts of the questionnaire were validated with discussion indicating no need for significant changes. Participant feedback indicated several minor changes involving word substitutions to reduce the possibility of different interpretations of meaning, broadening of question answer choices
to lessen the need for the use of the “other” category, and the reversal of the Likert scale to range from “Not At All Important” on the low end to “Extremely Important” on the high end. The scholarly activity ratings of Part Two yielded satisfactory descriptive statistics, and the experimental scenario responses of Part Three indicated inadequate discernable differences between the variables. The open ended question of Part Four gave no useful information.

**Final Research Questionnaires**

The results of the pilot study along with the specific supporting suggestions were incorporated into a revised questionnaire (Appendix I). The final questionnaire has three parts plus an informed consent and requested that the participants to provide responses to 37 items. Part One has twelve items concerning background and demographic information to characterize the sample more accurately. Participants were asked to respond to the items by clicking an option provided.

Part Two solicits responses to 22 items that address scholarly activity linked to the theoretical framework that may be used to evaluate a candidate for granting tenure. Participants were asked to rate how important they feel each specific scholarly activity item is relative to being granted tenure at their institution. Participant importance ratings were gathered by asking the participants to check the number that corresponds to a defined importance level on a five-point Likert scale.

Part Three included three items presenting different vignettes of select information from a hypothetical candidate’s curriculum vitae (CV). The vignettes are gender neutral. Participants were requested to evaluate the scenarios regarding the granting of tenure by indicating the percent likelihood that the individual described by the
scenario information would be granted tenure at their institution. The three vignettes reflected different levels of scholarly activity. Part Three was conducted as two randomized experiments focused on the scholarly activities of patents and published articles. One half of each population group (faculty and administrators) was randomly assigned question one of Part Three as a control question. The other half of each group was randomly assigned questions two and three of Part Three of the questionnaire.

Experiment 1

Control vignette. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates in and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in one patent. Dr. D has three articles in leading journals.

Intervention vignette. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates in and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in five patents. Dr. D has three articles in leading journals.

Experiment 2

Control vignette. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates in and leads department activities and projects. Dr. D on the average serves on two
institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in one patent. Dr. D has three articles in leading journals.

Intervention vignette. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates in and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in one patent. Dr. D has five articles in leading journals.

Experiment Rationale

The patent prosecution process of the United States Patent and Trademark Office (USPTO) appears to have similar scholarship rigor as the academic scholarship standard of article peer review, publication, and dissemination. It involves patent application review by a subject matter authority, an assurance of utility meaning that one skilled in the art can create the invention, a dialog process between patentee and examiner to assure patentability, and dissemination to the USPTO searchable public web site and technological library following approval (Burge, 1999). The randomized experiment contained in part three of the survey examines the perceived relative importance of patent acquisition and article publication relative to engineering technology faculty tenure.

The questionnaire described above was used to survey the faculty population. A modified version eliminating the demographic information not applicable to the chief academic administrators (deans, provosts, and chancellors) was used to survey the administrator population (Appendix J). Reducing the demographic information did not
affect the research study. The eliminated demographic information also did not affect the
description of the administration population. The study research was accomplished using
two questionnaires—one for each identified population and was administered using the
Qualtrics Online Survey System.

**Data Analysis**

Upon receiving the results of the completed surveys, and after completion of data
collection, the data elements of interest were identified and extracted from the on-line
survey data base. The selected data was transported into the SPSS statistical package for
Windows for analysis. The quantitative analysis was based on the assumption that the
collected data was normally distributed. Vogt (2005) indicates that “the sampling
distribution of a statistic tends to be a normal distribution [and] the normal distribution is
widely used in statistical inference” (p. 211). Statistical tests were performed assuming
normalcy of the data. The central tendency was defined using the mean, and standard
deviation was used as the measure of dispersion.

Descriptive information regarding the final sample was determined in addition to
three major parts of the quantitative data analysis: an evaluation of the perceived level of
importance of each of the identified scholarly activities; an evaluation of the perceived
level of importance of four variables considered in the tenure evaluation process based on
the Boyer theoretical framework (discovery, teaching, application, and integration); and a
practical evaluation of the perceived levels of importance of patents and article
publication using specific vignettes.

The perceived importance of each of the identified scholarly activities was
evaluated by calculating the means and standard deviations of the associated Likert scale
responses. The perceived importance of the various scholarly activities could not be compared by testing for statistical significance regarding their differences within each of the sample groupings (faculty and administrators) because each scholarly activity question was answered by the same respondents within each group. The perceived importance of the various scholarly activities was evaluated by comparing the faculty responses to those of the administrators. The following hypothesis was examined relative to scholarly activity: The perceived importance of the scholarly activity of peer reviewed publication will rank the highest compared to other scholarly activities.

The perceived level of importance of each of Boyer’s (1990) domains of scholarship was measured by determining the composite mean of the 5-point Likert scale results from the questions associated with each variable. The following hypothesis was examined relative to Boyer’s scholarship domains: The perceived importance of discovery will rank higher than the other three scholarship domains relative to tenure decision making. The relative importance of each domain was compared by testing the differences for statistical significance.

Analysis of the practical evaluation part was based on experimental design using a control group and experimental group. The vignettes of the experimental group were identical to that of the control group except for one variable of interest in each vignette. The average perceived likelihood of individuals receiving tenure was compared between the control group and experimental group indicating the effect of patents and article publication in the granting of tenure. The following hypothesis was examined relative to the experiment: Scholarly activity associated with publication will rank higher compared to the receiving of patents
The research sample was represented by two sample groups-Chief Administrators and tenured and tenure-track faculty. There could be differences in the perceived level of importance of each of the two experiment vignettes and control vignette between the two groups. Those potential differences were analyzed using an analysis of variance. The results indicated the perceived differences between the three vignettes regarding the tenure process and the differences between the identified groups.
Chapter 4: Results

Introduction

Background

The survey data presented in this chapter were gathered for the purposes of identifying the accepted forms of scholarly activity and determining their relative importance in granting tenure to engineering technology (ET) faculty in four-year colleges and universities within the United States having TAC of ABET (Technology Accreditation Commission of ABET, Inc. – formerly referred to as the Accreditation Board for Engineering and Technology) accredited engineering technology programs. Those purposes were addressed by surveying faculty members of the identified ET programs (Appendix B) and the administrators responsible for those programs using the surveys shown in Appendices J and K. The surveys were designed to elicit answers to the following two primary and three secondary research questions and to test three hypotheses.

Research Questions and Hypotheses

Primary Research Questions

P1. What are the accepted forms of scholarly activity for engineering technology faculty?

P2. What is the perceived importance of the accepted forms of scholarly activity relative to granting tenure to engineering technology faculty?
Secondary Research Questions

S1. Are there differences between types of institutions relative to the importance of various forms of scholarly activity and the granting of tenure?

S2. What is the importance of publication relative to the receipt of patents in the granting of tenure?

S3. What is the relative importance of Boyer’s (1990) four domains of scholarship to the granting of tenure?

Hypotheses

H1. The perceived importance of the scholarly activity of peer reviewed publication will rank the highest compared to other scholarly activities.

H2. The perceived importance of discovery will rank higher than the other three Boyer (1990) scholarship domains relative to tenure decision making.

H3. Scholarly activity associated with publication will rank higher compared to the receiving of patents.

Data Collection and Analysis

As described in Chapter 3, data were gathered from faculty and administrators associated with the colleges and universities as identified on the ABET, Inc. listing of accredited engineering technology programs (Appendix B). Data collected were summarized and analyzed with all statistical analyses performed using SPSS 16.0 for Windows. This chapter presents research descriptive information about the sample and results from the statistical analyses for each of the research questions and hypotheses.
Survey Response

Faculty. The questionnaire, shown in Appendix J, was sent to 4,035 members of the American Society of Engineering Education (ASEE) Engineering Technology Division (ETD) listserv using the Qualtrics Surveying System. Members included individuals of all academic appointments associated with two-year institutions as well as four-year institutions, non-US institutions, and industry. The targeted sample of U.S., tenured and tenure track faculty members from four-year institutions having TAC of ABET accredited programs needed to be extracted from that population. Specific, forced response, demographic questions with internal designed logic to prevent non-targeted sample participants from completing the questionnaire were used to separate the targeted faculty sample.

Two thousand six hundred eighty-one engineering technology faculty members representing 372 four-year institutions are members of the listserv. Included in those numbers are 113 non-U.S. faculty members representing 67 institutions. Eliminating the non-U.S. members, results in 2,568 U.S. faculty members from 305 four-year US institutions. One hundred forty-one of the 305 institutions have TAC of ABET accredited engineering technology programs (Appendix B). Assuming linearity, it was determined that 1,262 engineering technology faculty members are represented by those 141 US institutions. The methodology just described was used to estimate the baseline sample size. Eighty-four responses were received from the faculty survey representing a 7% response rate. Of the 84 responses 74 completed the survey yielding an 88% completion rate. Ten of the 84 respondents were from Rochester Institute of Technology
and were prevented from completing the survey because that faculty was used in the survey pilot study to validate the instrument. Five of the 74 respondents completing the survey did not answer any of the relevant survey questions exercising their option of not answering any question. Eliminating them from the sample resulted in an effective sample of N = 69.

Administrators. The administrator survey (Appendix K) was sent to 254 identified administrators from the 141 institutions identified in Appendix B which represented the targeted administrator population. The Qualtrics Surveying System was also used to disseminate the questionnaire. Forty-eight responses were received yielding a 19% response rate. Of the 48 responses 44 completed the survey resulting in a 92% completion rate. Four of the 48 respondents, even though not completing the survey, provided partial, useful information resulting in an effective sample of n = 48.

Final Sample Description

Two categories of descriptive information were collected to describe the faculty and administrator samples-institutional and individual. Tables 4.1 and 4.2 present the characteristics of the faculty and administrator sample groups. Table 4.1 shows comparable institution characteristics for each sample group. Table 4.2 shows individual characteristics for both samples. Gender and ethnicity have similar frequencies among faculty and administrators. Faculty is almost evenly distributed over the years of service category with 30% having more than 20 years of service at their institutions. The administrators are grouped differently having fewer years of experience at their institutions. Forty-six percent have five or less years of service. Among the 44 faculty who responded, approximately one half served as members of a tenure committee.
Five of the faculty respondents identified themselves as administrators. The American Society of Engineering Educators Engineering Technology Division listserv used to access faculty also contained administrator members. The five respondents that identified themselves as administrators on the faculty survey were prevented from completing the survey to eliminate the possibility of a double response. The administrators were sent a survey through the ABET, Inc. (formerly identified as the Accreditation Board for Engineering and Technology) list of institutions having engineering technology programs (Appendix B).

Scholarly Activity and Importance

The two primary research questions center on identifying the accepted forms of scholarly activity for engineering technology faculty and the perceived importance of such activity to the granting of tenure. The respondents were asked to rate twenty-two activities related to the granting of tenure on a five-point Likert scale from not at all important to extremely important. Seventeen of those items were specific scholarly activities. The scholarly activity data were analyzed to see if there were differences in perception between faculty and administrators. Table 4.3 compares the faculty and administrator perceptions of those scholarly activities. Faculty and administrators had similar ratings of importance for fifteen of the scholarly activities, and differed significantly (p ≤ .05) regarding number of non-refereed articles and directing student research projects.
Table 4.1

*Institution Demographic Characteristics of Sample Groups*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
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<td>Institution Sector</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>61</td>
<td>88.4</td>
<td>40</td>
<td>83.3</td>
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<tr>
<td>Private</td>
<td>8</td>
<td>11.6</td>
<td>8</td>
<td>16.7</td>
</tr>
<tr>
<td>Institution Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>25</td>
<td>36.2</td>
<td>13</td>
<td>27.1</td>
</tr>
<tr>
<td>Doctoral</td>
<td>5</td>
<td>7.2</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Comprehensive</td>
<td>25</td>
<td>36.2</td>
<td>23</td>
<td>47.9</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>20.3</td>
<td>9</td>
<td>18.8</td>
</tr>
<tr>
<td>ET Program Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering College</td>
<td>7</td>
<td>15.9</td>
<td>7</td>
<td>14.9</td>
</tr>
<tr>
<td>Technology College</td>
<td>11</td>
<td>25.0</td>
<td>12</td>
<td>25.5</td>
</tr>
<tr>
<td>Engineering and ET College</td>
<td>18</td>
<td>40.9</td>
<td>18</td>
<td>38.3</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>18.2</td>
<td>10</td>
<td>21.3</td>
</tr>
</tbody>
</table>

Totals of percentages are not 100 for every characteristic because of rounding.

Demographic totals do not add to total sample because of respondent option to not answer every question.
Table 4.2

Demographic Characteristics of Sample Groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Faculty (N = 69)</th>
<th>Administrators (N = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>58</td>
<td>85.3</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>14.7</td>
</tr>
<tr>
<td>Ethnicity/Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian Indian</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Black or African American</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Chinese</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Korean</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>White</td>
<td>54</td>
<td>84.4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Academic Role</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Director</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Academic Dean</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Provost/Chancellor</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Faculty</td>
<td>44</td>
<td>84.6</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>5.8</td>
</tr>
<tr>
<td>Years of Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 5</td>
<td>8</td>
<td>18.6</td>
</tr>
<tr>
<td>6 – 10</td>
<td>10</td>
<td>23.3</td>
</tr>
<tr>
<td>11 – 15</td>
<td>8</td>
<td>18.6</td>
</tr>
<tr>
<td>16 – 20</td>
<td>4</td>
<td>9.3</td>
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<tr>
<td>&gt;20</td>
<td>13</td>
<td>30.2</td>
</tr>
<tr>
<td>Academic Rank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>9</td>
<td>20.5</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>20</td>
<td>45.6</td>
</tr>
<tr>
<td>Professor</td>
<td>10</td>
<td>22.7</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>11.4</td>
</tr>
<tr>
<td>Tenure Committee Membership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served as Member</td>
<td>24</td>
<td>54.5</td>
</tr>
<tr>
<td>Did Not Serve as Member</td>
<td>20</td>
<td>45.6</td>
</tr>
</tbody>
</table>

Totals of percentages are not 100 for every characteristic because of rounding.

Demographic totals do not add to total sample because of respondent option to not answer every question.
Table 4.3 shows the mean and standard deviation scores for all categories for both faculty and administrators. The faculty means ranged from 2.33 for the number of non-refereed articles to 4.13 for the number of publications in peer-refereed journals, with standard deviations ranging from 0.76 for the number of editorial, reviewer positions held to 1.16 for the number of patents and copyrights held. The administrator means ranged from 2.7 for providing expert testimony to 3.74 for course development, with standard deviations ranging from 0.77 for the number of conference presentations to 1.16 for the number of citations of the candidate’s publication.

Figure 4.1 shows the faculty and administrator rankings, in descending order, for the seventeen identified scholarly activities. Defining an accepted form of scholarly activity as a mean greater than three, faculty and administrators had similar perceptions of importance for nine of the activities. Faculty ranked the number of patents and copyrights held and the number of citations of a publication higher (greater than three) than administrators while administrators ranked article publishing across disciplines (greater than three) higher than faculty.

Figure 4.2 illustrates the perceived importance, means and standard deviations of each scholarly activity for faculty and administrators, which was used to define Boyer’s (1990) four domains of scholarship. Figure 4.2 also identifies which scholarly activities fall within the definition of each of Boyer’s four scholarship domains-teaching, application, integration, and discovery. The total means, computed by averaging individual responses of those scholarly activity groupings, were used for analyses relative to faculty and administrator importance perceptions regarding Boyer’s domains. Figure 4.2 shows that faculty and administrators viewed the importance of teaching and
discovery differently. Administrators rated teaching ($M = 3.67$) higher than faculty ($M = 3.33$) and faculty rated discovery ($M = 3.36$) higher than administrators ($M = 3.25$).
Table 4.3
Means, Standard Deviations, and Analysis of Variance of Faculty and Administrator Perceptions of Scholarly Activity Importance

<table>
<thead>
<tr>
<th>Scholarly Activity</th>
<th>Faculty M</th>
<th>SD</th>
<th>Administrators M</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Books/Monographs Published</td>
<td>3.50</td>
<td>0.97</td>
<td>3.27</td>
<td>1.02</td>
<td>.293</td>
</tr>
<tr>
<td>Number of Conference Presentations</td>
<td>3.43</td>
<td>0.80</td>
<td>3.44</td>
<td>0.77</td>
<td>.938</td>
</tr>
<tr>
<td>Number of Book Chapters Published</td>
<td>3.17</td>
<td>0.93</td>
<td>3.09</td>
<td>0.96</td>
<td>.712</td>
</tr>
<tr>
<td>Number of Patents and Copyrights Held</td>
<td>3.14</td>
<td>1.16</td>
<td>2.82</td>
<td>1.04</td>
<td>.175</td>
</tr>
<tr>
<td>Consulting Within Discipline</td>
<td>3.00</td>
<td>0.81</td>
<td>2.95</td>
<td>0.91</td>
<td>.809</td>
</tr>
<tr>
<td>Number of Publications in Peer-refereed Journals</td>
<td>4.13</td>
<td>1.09</td>
<td>3.70</td>
<td>1.13</td>
<td>.087</td>
</tr>
<tr>
<td>Number of Citations of Candidate's Publications</td>
<td>3.18</td>
<td>1.01</td>
<td>2.84</td>
<td>1.15</td>
<td>.161</td>
</tr>
<tr>
<td>Recognized Professional Society Expert</td>
<td>3.15</td>
<td>0.89</td>
<td>3.39</td>
<td>0.95</td>
<td>.243</td>
</tr>
<tr>
<td>Classroom Applied Research</td>
<td>3.35</td>
<td>0.98</td>
<td>3.57</td>
<td>0.93</td>
<td>.296</td>
</tr>
<tr>
<td>Article Publishing Crossing Disciplines</td>
<td>2.93</td>
<td>1.00</td>
<td>3.07</td>
<td>0.96</td>
<td>.508</td>
</tr>
<tr>
<td>Course Development</td>
<td>3.40</td>
<td>0.94</td>
<td>3.74</td>
<td>0.93</td>
<td>.097</td>
</tr>
<tr>
<td>Number of Editorial, Reviewer Positions Held</td>
<td>3.00</td>
<td>0.76</td>
<td>2.98</td>
<td>0.86</td>
<td>.897</td>
</tr>
<tr>
<td>Number of Non-refereed Articles</td>
<td>2.33*</td>
<td>0.93</td>
<td>2.81*</td>
<td>0.88</td>
<td>.016</td>
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<tr>
<td>Number of Research Grants Received</td>
<td>3.80</td>
<td>1.08</td>
<td>3.67</td>
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<tr>
<td>Providing Expert Testimony</td>
<td>2.43</td>
<td>0.94</td>
<td>2.70</td>
<td>0.85</td>
<td>.157</td>
</tr>
<tr>
<td>Directing Student research Projects</td>
<td>3.29*</td>
<td>1.02</td>
<td>3.70*</td>
<td>0.90</td>
<td>.047</td>
</tr>
<tr>
<td>Publishing a Book Crossing Subject Matter</td>
<td>2.83</td>
<td>0.85</td>
<td>2.95</td>
<td>0.99</td>
<td>.545</td>
</tr>
</tbody>
</table>

Note. Likert scale was 1 to 5 with 1=Not at Important and 5=Extremely Important
<table>
<thead>
<tr>
<th>Scholarly Activity</th>
<th>Faculty</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Publications in Peer-refereed Journals</td>
<td>4.13</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Number of Grants Received</td>
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<td>1.08</td>
<td></td>
</tr>
<tr>
<td>Number of Books/Monographs Published</td>
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<td>0.97</td>
<td></td>
</tr>
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<td>Number of Conference Presentations</td>
<td>3.43</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>Course Development</td>
<td>3.40</td>
<td>0.94</td>
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</tr>
<tr>
<td>Classroom Applied Research</td>
<td>3.35</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>Directing Student Research Projects</td>
<td>3.29</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Number of Citations of Candidate's Publications</td>
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<td>1.01</td>
<td></td>
</tr>
<tr>
<td>Number of Book Chapters Published</td>
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<td>0.93</td>
<td></td>
</tr>
<tr>
<td>Recognized Professional Society Expert</td>
<td>3.15</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>Number of Patents and Copyrights Held</td>
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<td>1.16</td>
<td></td>
</tr>
<tr>
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<td>0.76</td>
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<tr>
<td>Article Publishing Crossing Disciplines</td>
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<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Publishing a Book Crossing Subject Matter</td>
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<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Providing Expert Testimony</td>
<td>2.43</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Number of Non-refereed Articles</td>
<td>2.33</td>
<td>0.93</td>
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</table>

<table>
<thead>
<tr>
<th>Scholarly Activity</th>
<th>Administrators</th>
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<th>SD</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Number of Publications in Peer-refereed Journals</td>
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<td></td>
</tr>
<tr>
<td>Directing Student research Projects</td>
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<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Number of Grants Received</td>
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<td>0.98</td>
<td></td>
</tr>
<tr>
<td>Classroom Applied Research</td>
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<td></td>
</tr>
<tr>
<td>Number of Conference Presentations</td>
<td>3.44</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Recognized Professional Society Expert</td>
<td>3.39</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Number of Books/Monographs Published</td>
<td>3.27</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Number of Book Chapters Published</td>
<td>3.09</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>Article Publishing Crossing Disciplines</td>
<td>3.07</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>Number of Editorial, Reviewer Positions Held</td>
<td>2.98</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>Consulting Within Discipline</td>
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<td>0.91</td>
<td></td>
</tr>
<tr>
<td>Publishing a Book Crossing Subject Matter</td>
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<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Number of Citations of Candidate's Publications</td>
<td>2.84</td>
<td>1.15</td>
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</tr>
<tr>
<td>Number of Non-refereed Articles</td>
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</tr>
<tr>
<td>Providing Expert Testimony</td>
<td>2.70</td>
<td>0.85</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 4.1.* Ranking of Faculty and Administrator Perceptions of Scholarly Activity Importance.
<table>
<thead>
<tr>
<th>Scholarly Activity</th>
<th>Faculty M</th>
<th>Faculty SD</th>
<th>Administrators M</th>
<th>Administrators SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom Applied Research</td>
<td>3.35</td>
<td>.98</td>
<td>3.57</td>
<td>.93</td>
<td>.296</td>
</tr>
<tr>
<td>Course Development</td>
<td>3.40</td>
<td>.94</td>
<td>3.74</td>
<td>.93</td>
<td>.097</td>
</tr>
<tr>
<td>Directing Student research Projects</td>
<td>3.29*</td>
<td>1.02</td>
<td>3.70*</td>
<td>0.90</td>
<td>.047</td>
</tr>
<tr>
<td>Total Mean</td>
<td>3.33</td>
<td>.82</td>
<td>3.67</td>
<td>0.78</td>
<td>.054</td>
</tr>
<tr>
<td>Number of Patents and Copyrights Held</td>
<td>3.14</td>
<td>1.16</td>
<td>2.82</td>
<td>1.04</td>
<td>-175</td>
</tr>
<tr>
<td>Consulting Within Discipline</td>
<td>3.00</td>
<td>.81</td>
<td>2.95</td>
<td>0.91</td>
<td>.809</td>
</tr>
<tr>
<td>Recognized Professional Society Expert</td>
<td>3.15</td>
<td>.89</td>
<td>3.39</td>
<td>0.95</td>
<td>.243</td>
</tr>
<tr>
<td>Providing Expert Testimony</td>
<td>2.43</td>
<td>.94</td>
<td>2.70</td>
<td>0.85</td>
<td>.157</td>
</tr>
<tr>
<td>Total Mean</td>
<td>2.91</td>
<td>.61</td>
<td>2.97</td>
<td>0.77</td>
<td>.735</td>
</tr>
<tr>
<td>Article Publishing Crossing Disciplines</td>
<td>2.93</td>
<td>1.00</td>
<td>3.07</td>
<td>0.96</td>
<td>.508</td>
</tr>
<tr>
<td>Publishing a Book Crossing Subject Matter</td>
<td>2.83</td>
<td>.85</td>
<td>2.95</td>
<td>0.99</td>
<td>.545</td>
</tr>
<tr>
<td>Total Mean</td>
<td>2.88</td>
<td>.84</td>
<td>2.99</td>
<td>0.95</td>
<td>.581</td>
</tr>
<tr>
<td>Number of Publications in Peer-refereed Journals</td>
<td>4.13</td>
<td>1.09</td>
<td>3.70</td>
<td>1.13</td>
<td>.087</td>
</tr>
<tr>
<td>Number of Citations of Candidate's Publications</td>
<td>3.18</td>
<td>1.01</td>
<td>2.84</td>
<td>1.15</td>
<td>.161</td>
</tr>
<tr>
<td>Number of Non-refereed Articles</td>
<td>2.33*</td>
<td>.93</td>
<td>2.81*</td>
<td>0.88</td>
<td>.016</td>
</tr>
<tr>
<td>Number of Grants Received</td>
<td>3.80</td>
<td>1.08</td>
<td>3.67</td>
<td>0.98</td>
<td>.542</td>
</tr>
<tr>
<td>Total Mean</td>
<td>3.36</td>
<td>.74</td>
<td>3.25</td>
<td>0.83</td>
<td>.529</td>
</tr>
</tbody>
</table>

Figure 4.2. Means and Standard Deviations of Faculty and Administrator Perceptions of Boyer Scholarship Domain Importance.

Note. Total mean defined as average of summation of individual respondent defining question group average means.

* p ≤ .05

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Scholarly Activity Institution Differences

Secondary research question one focuses on the differences between types of institutions and the perceived relative importance of scholarly activity to granting tenure. That question was addressed by examining the perceptions of the faculty and administrators of each of the types of institutions relative to the importance of each of Boyer’s domains to the granting of tenure.

Four new variables representing Boyer’s scholarship domains (discovery, teaching, application, and integration) were created from composite means of the domain defining scholarly activities. Using the scholarly activity groupings defining each of Boyer’s four domains shown in Figure 4.2, a composite mean for each grouping was determined for each respondent by averaging the responses for each of the questions of the grouping. Those composite means were used to define the perceived relative importance of each domain for each respondent. The individual respondent composite means were averaged to determine the total mean for each domain. A one-way multivariate analysis of variance (MANOVA) was estimated to determine if participants, as a group, at different types of institution (research, doctoral, comprehensive, and other) perceived the importance of each of the domains of Boyer’s scholarship model differently. Table 4.4 shows the results.

Overall, Boyer’s scholarship domains were ranked differently depending on type of institution (Wilk’s Lambda = 3.28, p<.001). Respondents’ perceptions of the importance of discovery differed across institution type (η²=.311, F=12.3, p ≤ .001). There were no detectable differences by institution type for the remaining three of
Boyer’s domains. Participants from all of the types of institutions ranked the scholarship of teaching (F=.447, ns), integration (F=2.45, ns), and application (F=1.96, ns) similarly.

Post hoc analyses revealed that participants at research universities ranked the scholarship of discovery significantly higher than the participants at comprehensive institutions (M=3.75 vs. M=3.20, p=.008). Participants at doctoral universities ranked the scholarship of discovery similarly to participants at research universities (M=3.79 vs. M=3.75, ns). Participants at other institutions ranked discovery significantly lower than research institutions (M=2.59 vs. 3.75, p<.001) and doctoral institutions (M=2.59 vs. M=3.79, p=.002). Within other institutions the scholarship of teaching was ranked the highest (M=3.37) relative to the other three Boyer domains; application (M=2.64), integration (M=2.56, and discovery (M=2.59).
Table 4.4

*Means, Standard Deviations and Analysis of Variance of Boyer’s Scholarship Domains as a Function of Institution Type*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Research</th>
<th>Doctoral</th>
<th>Comprehensive</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
<td>F</td>
</tr>
<tr>
<td>Discovery</td>
<td>3.75** 0.40</td>
<td>3.79** 0.37</td>
<td>3.20** 0.70</td>
<td>2.59** 0.95</td>
</tr>
<tr>
<td>Teaching</td>
<td>3.64 0.55</td>
<td>3.50 0.18</td>
<td>3.46 1.01</td>
<td>3.37 0.93</td>
</tr>
<tr>
<td>Application</td>
<td>3.07 0.60</td>
<td>3.29 0.58</td>
<td>2.91 0.70</td>
<td>2.65 0.81</td>
</tr>
<tr>
<td>Integration</td>
<td>3.24 0.76</td>
<td>3.17 0.82</td>
<td>2.81 0.89</td>
<td>2.59 1.03</td>
</tr>
</tbody>
</table>

Wilk’s Lambda F = 3.28, p = < .001
Note. Individual F and p values are between subject effects.
Note. Institution types represented by faculty and administrator samples combined.
** p<.001
Relative Importance of Publications and Patents

Secondary research question two considers the relative importance of publication relative to the receipt of patents in the granting of tenure. Table 4.3 shows that faculty perceive the importance of publications in peer-reviewed journals (M=4.13) higher than patents held (M=3.14). Administrators have a similar result rating publication in peer-reviewed journals (M=3.70) higher than patents held (M=2.82). The perceived importance of publication of non-refereed articles is below the importance of patents for faculty (M=2.33). Administrators ranked non-refereed articles (2.81) similarly to patents held (M=2.82).

Relative Importance of Boyer’s (1990) Scholarship Domains

Secondary research question three addresses the relative importance of each Boyer scholarship domain to granting tenure. That question was answered by looking at the perceptions of faculty versus those of the administrators. A one-way multivariate analysis of variance (MANOVA) was calculated examining the effect of faculty and administrators on the importance of each of Boyer’s domains. Table 4.5 shows the results. No significant differences were found. Faculty and administrators rated all four of Boyer’s scholarship domains similarly (Wilk’s Lambda = 1.69, p>.05).
Table 4.5

Means, Standard Deviations and Analysis of Variance of Boyer’s Scholarship Domains as a Function of Academic Groups

<table>
<thead>
<tr>
<th>Domain</th>
<th>Faculty</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>F</td>
<td>p</td>
<td>η²</td>
</tr>
<tr>
<td>Discovery</td>
<td>3.36</td>
<td>.738</td>
<td>3.25</td>
<td>.832</td>
<td>.399</td>
<td>.529</td>
<td>.005</td>
</tr>
<tr>
<td>Teaching</td>
<td>3.33</td>
<td>.820</td>
<td>3.67</td>
<td>.796</td>
<td>3.83</td>
<td>.054</td>
<td>.044</td>
</tr>
<tr>
<td>Application</td>
<td>2.91</td>
<td>.612</td>
<td>2.97</td>
<td>.773</td>
<td>.115</td>
<td>.735</td>
<td>.001</td>
</tr>
<tr>
<td>Integration</td>
<td>2.88</td>
<td>.840</td>
<td>2.99</td>
<td>.955</td>
<td>.307</td>
<td>.581</td>
<td>.004</td>
</tr>
</tbody>
</table>

Wilks’ Lambda F = 1.69, p = .173

Individual F and p values are between subject effects.
Importance of Peer Reviewed Publication

Hypothesis one states that the perceived importance of the scholarly activity of peer-reviewed publication will rank the highest compared to the other identified scholarly activities contained in Table 4.3. That hypothesis was examined by comparing the rankings of the stated scholarly activity by all participants. Figure 4.1 shows that faculty ranked publications in peer-reviewed journals first relative to all other scholarly activities (M=4.13) and that the administrators ranked publication second (M=3.70). The difference between the two rankings is not significant (p > .05). Table 4.6 shows the scholarly activity ranking by all participants. The number of publications in peer-reviewed journals was ranked first. Research hypothesis one is supported.

Relative Importance of Boyer’s (1990) Discovery Domain

Hypothesis two indicates that the perceived importance of Boyer’s discovery scholarship domain will rank higher than the other three domains (teaching, application, and integration). Table 4.5 shows that faculty ranked discovery the highest of the four domains (M=3.36) while administrators ranked teaching (M=3.67) higher than discovery (M=3.25). The difference between the two rankings is not significant (p > .05). Table 4.7 shows the scholarship domain ranking by all participants. Scholarship of teaching was ranked first. Faculty and administrators both ranked the domains of application and integration similarly. Research hypothesis two is not supported.
Table 4.6

Means and Standard Deviations of Participant* Perceptions of Scholarly Activity Importance

<table>
<thead>
<tr>
<th>Scholarly Activity</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Publications in Peer-refereed Journals</td>
<td>3.90</td>
<td>1.13</td>
</tr>
<tr>
<td>Number of Research Grants Received</td>
<td>3.73</td>
<td>1.03</td>
</tr>
<tr>
<td>Course Development</td>
<td>3.58</td>
<td>0.94</td>
</tr>
<tr>
<td>Directing Student Research Projects</td>
<td>3.50</td>
<td>0.98</td>
</tr>
<tr>
<td>Classroom Applied Research</td>
<td>3.46</td>
<td>0.95</td>
</tr>
<tr>
<td>Number of Conference Presentations</td>
<td>3.44</td>
<td>0.78</td>
</tr>
<tr>
<td>Number of Books and Monographs Published</td>
<td>3.38</td>
<td>1.00</td>
</tr>
<tr>
<td>Recognized Professional Society Expert</td>
<td>3.27</td>
<td>0.92</td>
</tr>
<tr>
<td>Number of Book Chapters Published</td>
<td>3.13</td>
<td>0.94</td>
</tr>
<tr>
<td>Number of Citations of Candidate's Publication</td>
<td>3.00</td>
<td>1.09</td>
</tr>
<tr>
<td>Article Publishing Crossing Disciplines</td>
<td>3.00</td>
<td>0.98</td>
</tr>
<tr>
<td>Number of Editorial, Reviewer Positions Held</td>
<td>2.99</td>
<td>0.81</td>
</tr>
<tr>
<td>Number of Patents and Copyrights Held</td>
<td>2.98</td>
<td>1.11</td>
</tr>
<tr>
<td>Consulting Within Discipline</td>
<td>2.98</td>
<td>0.86</td>
</tr>
<tr>
<td>Publishing a Book Crossing Subject Matter</td>
<td>2.90</td>
<td>0.92</td>
</tr>
<tr>
<td>Number of Non-refereed Articles</td>
<td>2.58</td>
<td>0.93</td>
</tr>
<tr>
<td>Providing Expert Testimony</td>
<td>2.57</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Note. Likert scale was 1 to 5 with 1=Not at all Important and 5=Extremely Important

* Faculty and administrators combined
Table 4.7

Means and Standard Deviations of Participant* Perceptions of Scholarship Domain Importance

<table>
<thead>
<tr>
<th>Scholarship Domain</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>3.51</td>
<td>0.82</td>
</tr>
<tr>
<td>Discovery</td>
<td>3.31</td>
<td>0.78</td>
</tr>
<tr>
<td>Application</td>
<td>2.94</td>
<td>0.70</td>
</tr>
<tr>
<td>Integration</td>
<td>2.94</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Note. Likert scale was 1 to 5 with 1=Not at all Important and 5=Extremely Important

* Faculty and administrators combined

Comparison of Publication to Receipt of Patents

Hypothesis three states that scholarly activity associated with publication will rank higher compared to the receiving of patents. An experiment was conducted to examine that hypothesis. The experiment involved three hypothetical scenarios describing candidates for tenure. One of the scenarios was used as a control and the other two were used as interventions. One half of each sample (faculty and administrators) was given the control scenario and the other half of each sample was given the two intervention scenarios. Each of the two interventions were treated as an individual experiment and compared to the control. The control group and the experimental group were asked to respond to their respective scenarios by indicating the percent likelihood (0-100) that the candidate described would be granted tenure at their institution. Table 4.8 describes the experimental control and the interventions relative to their publication and patent combinations and identifies the two experiments.
An analysis of variance (ANOVA) was estimated to evaluate each experiment. Table 4.8 shows the results. The table indicates that for faculty there is no significant difference between experiment one and the control ($F=2.50, \ p>\ 0.05$), and that there is no significant difference between experiment two and the control ($F=3.29, \ p>\ 0.05$). Table 4.8 also shows that for administrators there is no significant difference between experiment one and the control ($F=2.57, \ p>\ 0.05$), and that there is no significant difference between experiment two and the control ($F=3.68, \ p>\ 0.05$). Research hypothesis three is not supported.
Table 4.8

*Descriptive Data for Experiment Variable Pairs and Likelihood of Receiving Tenure*

<table>
<thead>
<tr>
<th>Group</th>
<th>Experimental* Condition</th>
<th>1 Patent/3 Articles</th>
<th>1 Patent/5 Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Faculty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*One half of each experimental group was given the control and the other one half was given both experiments.*
Table 4.9

*Mean Scores, Standard Deviations and Analyses of Variance for Randomized Experiment and Control*

<table>
<thead>
<tr>
<th>Experiment (Multivariate)</th>
<th>Faculty</th>
<th>Administrators</th>
<th>F</th>
<th>p</th>
<th>Partial $\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>#1 (5 Patents/3 Articles)</td>
<td>75.3</td>
<td>20.0</td>
<td>80.0</td>
<td>20.6</td>
<td>.620</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.435</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.014</td>
</tr>
<tr>
<td>#2 (1 Patent/5 Articles)</td>
<td>77.4</td>
<td>20.5</td>
<td>82.5</td>
<td>19.1</td>
<td>.762</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.388</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.017</td>
</tr>
<tr>
<td>Wilk’s Lambda F = .372, p = .691</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Control (Univariate)

| 1 Patent/3 Articles       | 62.0    | 31.1           | 65.7| 36.5| .097            |
|                          |         |                |     |     | .758            |
|                          |         |                |     |     | .003            |
| Wilk’s Lambda F=.372, p=.691 |
Analysis of Group Effects

A one-way multivariate analysis of variance (MANOVA) was estimated comparing the effects of faculty and administrators on the two experimental scenarios. No significant effects were found (p > .05). A univariate analysis of variance (ANOVA) was estimated regarding the control scenario and indicated that there were no differences between control groups regarding minimum patents and publications regarding the granting of tenure. Table 4.9 illustrates the results.

According to Table 4.8, the faculty estimated the likelihood of a person obtaining tenure with a record of high patents and low article publication or low patents and high publication at 75%, whereas the administrators estimated the likelihood at about 80%. Faculty indicated that with a record described by the control, low patents and low article publication, the likelihood of granting tenure is estimated at 62%. The administrators estimated the likelihood at 65.7%. Those differences between faculty and administrators are not statistically significant. The standard deviations are high; around 20% for faculty and administrators for each experiment scenario, and over 30% for faculty and administrators for the control scenario, indicating that any observed differences in means would have to be quite high in order to show statistical significance.
Summary of Results

The accepted forms of scholarly activity (M > 3.00) identified by faculty were similar to the accepted forms of scholarly activity identified by administrators (Figure 4.1). There is significant difference between faculty and administrators regarding the perceived importance of those accepted forms of activities to the granting of tenure for only one activity-directing student research projects (Table 4.3).

The importance of Boyer’s scholarship domains to the granting of tenure were ranked differently depending on the type of institution (Table 4.4). There were no detectable differences by institution type for the scholarship domains of teaching, application, and integration; participants ranked those domains similarly. Respondents’ perceptions of the importance of discovery differed across institution type with participants from research universities ranking the scholarship of discovery significantly higher than the participants from comprehensive institutions. Participants from doctoral universities ranked the scholarship of discovery similarly to participants at research universities, while participants from other institutions ranked discovery significantly lower than both research institutions and doctoral institutions.

Faculty and administrators had a similar perception of the relative importance of publication in refereed journals to the receipt of patents in the granting of tenure. Both groups ranked publication in referred journals higher than patents held (Table 4.3). Faculty and administrators also had a similar perception relative to the importance of each of Boyer’s scholarship domains to the granting of tenure. Faculty and administrators rated all of the domains similarly with no significant differences (Table 4.5)
Few significant differences were found regarding the perceptions of scholarly activity importance between faculty and administrators to the granting of tenure. The importance of non-refereed articles, directing student research projects, and Boyer’s scholarship domain of discovery across institution type presented the only significant differences. Implications of the findings and recommendations for further study are presented in Chapter V.
Chapter 5: Discussion

Introduction

Purpose of the Study

The purpose of this study was to determine the accepted forms of scholarly activity and their relative importance to granting tenure by determining faculty and chief academic administrator perceptions. An additional purpose was to view acceptable scholarly activity through Boyer’s (1990) four scholarship domains—scholarship of teaching, scholarship of application, scholarship of integration, scholarship of discovery, and examine the perceived relative importance of those domains to granting tenure. Those objectives were accomplished.

Study Overview

In Chapter I the rationale for this study was presented along with an introduction of Boyer’s (1990) scholarship model as the conceptual framework for the study. In Chapter II faculty scholarship and the broadening of its definition using Boyer’s scholarship model was examined in detail to better understand their relationship to the system of recognition and rewards within the academe. Chapter III presented the researcher’s plan for obtaining quantitative data from faculty and administrators. Chapter IV presented the results associated with the hypotheses tested and the research questions answered. This, the final chapter, presents a discussion of the study. Specifically, the purpose of the study and the research problem are restated, the methodology used in the study is reviewed, the findings are addressed, limitations to the applicability of the
findings are outlined, issues that may have affected the results are presented and
suggestions for future investigation will be offered. An overall summary of the study is
included.

The Problem Addressed

In Chapter I the role of engineering technology (ET) faculty members was
described as traditionally requiring excellence in teaching, continual pursuit of currency
in their field, and service to the profession, society, and institution (Lozano-Nieto, 2004).
Those factors were essential for being awarded tenure. Emphasis on scholarship and the
engagement in scholarly activity were not traditionally required of faculty members
teaching engineering technology but overall expectations appear to have changed
(Lozano-Nieto, 2004; Shouldis, 1991; Aghayere, 2004). Engineering technology faculty
perceptions indicate that the expectation of ET faculty engaging in scholarship is
becoming a significant factor in the awarding of tenure. Those perceptions energized the
topic arena for this study—the examination of engineering technology faculty scholarship.

Prior to the emphasis on scholarship, engineering technology faculty competence
rested on a platform supported by two pillars—education and industrial experience. The
emphasis on scholarship places faculty competency atop a stool having three equal legs—
education, industrial experience, and scholarship. Having well defined forms of accepted
scholarly activity is important because it affects the direction of scholarship which in turn
reflects on engineering technology faculty competency.

Need for the Study

The literature review of Chapter II presented an inconsistent picture of the role
of scholarship in the policies and practices for granting tenure to engineering technology
faculty. The literature also did not appear to address the significance of scholarship to the application and practice-orientation in teaching engineering technology. Consequently, clarity is needed regarding the accepted forms of scholarly activity and the relative importance to granting tenure to engineering technology faculty. That perceived need for clarity became the focus of this study, and the following research questions and hypotheses were addressed.

*Primary Research Questions*

P1. What are the accepted forms of scholarly activity for engineering technology faculty?

P2. What is the perceived importance of the accepted forms of scholarly activity relative to granting tenure to engineering technology faculty?

*Secondary Research Questions*

S1. Are there differences between types of institutions relative to the importance of various forms of scholarly activity and the granting of tenure?

S2. What is the importance of publication relative to the receipt of patents in the granting of tenure?

S3. What is the relative importance of Boyer’s (1990) four domains of scholarship to the granting of tenure?

*Hypotheses*

H1. The perceived importance of the scholarly activity of peer reviewed publication will rank the highest compared to other scholarly activities.

H2. The perceived importance of discovery will rank higher than the other three Boyer (1990) scholarship domains relative to tenure decision making.
H3. Scholarly activity associated with publication will rank higher compared to the receiving of patents.

**Methodology Summary**

The study research design was a quantitative survey including an experiment that collected data from faculty and administrators through a self-administered, online questionnaire. The instrument was a three part questionnaire adapted with approval from a validated survey used in a previous dissertation (Coogan, 2007). The questionnaire included demographic questions, questions regarding the importance rating of scholarly activities, and an experiment requiring the evaluation of scenarios describing faculty scholarly accomplishments and the assessment of the likelihood of receiving tenure. The independent variables were the faculty and administrator roles, and the dependent variable was the perceived importance of scholarly activity. Only baccalaureate engineering technology programs accredited by the Technology Accreditation Commission of ABET, Inc. (TAC of ABET) were identified for the study. A four-year program is the foundation education path to an engineering technology career and TAC of ABET, in general terms, specifies the content and level of engineering technology curriculums while establishing the quality level of those programs. Those two factors gave the study population a certain degree of uniformity.

**Interpretation and Implication of Findings**

**Overview of Findings**

The data for this study was gathered using two separate access methods-the Engineering Technology Division (ETD) listserv sponsored by the American Society of Engineering Educators (ASEE) for faculty and the Technology Accreditation Commission of ABET, Inc. (TAC of ABET) for the study.
Commission (TAC) of ABET, Inc. accredited program list for chief academic administrators. Having the faculty and chief administrator in separate groups allowed the faculty and administrator responses to be examined separately in addition to the aggregate.

The implications of this study resulted from six items associated with the findings: the relative importance of non-referred publication to tenure, the identified accepted forms of scholarly activity as a definition of engineering technology scholarship, the significance of institute mission, the importance of patents as scholarship, the importance of Boyer’s scholarships of integration and application relative to the scholarships of discovery and teaching, and the engineering technology mission as it relates to the future. Faculty, administrators, faculty and administrators as a group, and the engineering technology academe are affected by those implications.

The findings of this study were characterized by the similarity between faculty and administrators regarding their perceptions of scholarly activity and its importance to granting tenure. That was an unexpected finding. The expectation was that there would be a number of significant differences between the scholarship views of faculty and chief academic administrators due to the “them versus us” mentality that typically exist between administration and faculty in higher education organizations. One possible explanation for the similarity is that typically administrators begin their career paths as faculty members, suggesting that the administrators have not forgotten their role as faculty members and the expectations surrounding scholarship.

Only two significant differences were found in the study between faculty and administrator responses. Faculty ranked the importance of directing student research
projects significantly lower than did the administrators, and they also ranked the
importance of non-refereed article publication significantly lower than did the
administrators. The similarities and the significant differences are meaningful study
results.

The lack of significant difference between faculty and administrator views of
acceptable forms of scholarly activity and their importance to being granted tenure
indicates an alignment of those views. That alignment provides a common base for
future scholarship expectation discussions and offers the advantage of not requiring
extensive discussion and debate to arrive at mutual ground. A conclusion drawn from the
study was that the faculty responses reflected personal perceptions and were not heavily
influenced by chief academic administrator perceptions or institution policy, procedures,
and practices. Another conclusion was that the administrator responses reflected
institution policy. A retrospective look at the study offered two improvements that could
have been made. Adding a qualitative portion to the study in support of participant
responses would have provided the ability to qualify the basis for the quantitative
responses, and validate participant views of importance. Providing an expanded Likert
scale (e.g. seven-point), would have provided study participants with the ability to “fine
tune” their responses between major categories identified on the scale, and may have lead
to additional significant viewpoint differences in the study.

Historically, engineering technology programs have not been a part of a research
environment. Engineering technology was, and remains, devoted to the identification and
solution of technical problems through the application of current technology coupled with
basic scientific and engineering principles. Research, including that supported by student
research projects, is unfamiliar to engineering technology faculty. It was to be expected that faculty would rate the importance of directing student research projects significantly lower than administrators. A possible explanation is that faculty had difficulty relating to directing student research as a scholarly activity relative to all of the others because of their unfamiliarity with that activity. Administrators, on the other hand, would rate that activity higher because they have a perspective across institution programs including those programs having a research environment. The administrators were more apt to recognize and appreciate its scholarly value to tenure.

The importance of seventeen scholarly activities was evaluated by faculty and administrators relative to their importance to receiving tenure. Faculty ranked the importance of the publication of non-refereed articles seventeenth or last out of seventeen activities. The administrators ranked its importance next to last or sixteenth out of the seventeen activities. The significant difference between faculty and administrator importance ratings, administrators being higher, possibly indicates that administrators recognize the publication dimension of the activity and, based on that dimension, valued it more for tenure. Both groups of participants, however, ranked it at the bottom of the list of acceptable forms of scholarly activity indicating that it should not comprise a significant portion of a publication portfolio of a faculty member pursuing tenure.

**Scholarly Activity**

The similarity between faculty and administrators regarding their perceptions of scholarly activity and its importance to granting tenure indicates wide agreement relative to the acceptable forms of engineering technology scholarly activity and a clear ranking of their importance to the granting of tenure. As discussed above, seventeen scholarly
activities were presented to the study participants (faculty and administrators) for importance assessment. The participants collectively identified nine of the seventeen as important to tenure. Those nine are presented below in ranked order based on respective means. The number of publications in peer-refereed journals being ranked first supports hypothesis one of the study.

Number of Publications in Peer-refereed Journals
Number of Research Grants Received
Course Development
Directing Student Research Projects
Classroom Applied Research
Number of Conference Presentations
Number of Books and Monographs Published
Recognized Professional Society Expert
Number of Book Chapters Published.

The remaining eight of the seventeen activities includes the traditional engineering technology faculty scholarly activities such as consulting, holding editorial/reviewer positions, and providing expert testimony. The scholarship expectation has broadened in the direction of Boyer’s (1990) model except relative to the scholarship of integration. None of the nine scholarly activities identified above support that scholarship domain. Junior faculty seeking tenure should focus their scholarship efforts on the above list of nine identified forms of scholarly activity. Administrators can use the nine activities to develop tenure criteria highlighting specific scholarly expectations.
In a benchmark study of engineering technology scholarship-related activities, Aghayere and Buchanan (2006) surveyed 106 engineering technology faculty members on the Engineering Technology Division listserv identifying the scholarly activities in which they were engaged. They concluded that engineering technology scholarship activities were “heavily skewed toward the scholarship of pedagogy and the scholarship of application” (p. 50). Those categories are contained within the four scholarship domains of Boyer’s scholarship model (Boyer, 1990); pedagogy scholarship is part of the scholarship of the teaching domain and application scholarship aligns with the scholarship of application domain.

The findings of the present study show that faculty and administrators view the scholarship domains of discovery and teaching as more important to receiving tenure than the scholarship domains of application and integration. Comparison of the findings of this study with the conclusion of the benchmark study (Aghayere and Buchanan, 2006) has implications for both faculty and administrators within engineering technology. Faculty may be emphasizing scholarship activities that may not be valued as important as other scholarship activities by their institutions. Skewing scholarly activities toward the scholarship of application would not increase the likelihood of obtaining tenure since its perceived importance is below that of the scholarship of discovery and the scholarship of teaching. In addition to not increasing the likelihood of tenure, faculty favoring scholarly activities that support application causes a dilemma for engineering technology faculty.

Engineering technology is an applied and practice orientated engineering field. Application scholarship directly supports that mission and should be considered a
significant factor relative to the receipt of tenure by institutions having engineering
technology programs. The findings of this study indicate that it is not. That is the
dilemma that the engineering technology academe needs to address. Institutions need to
launch initiatives to elevate the importance of application scholarship to that of teaching
and discovery when tenure is a consideration. Considering the scholarship of teaching,
opportunities exist for faculty to expand their teaching scholarly activities to the other
defining dimensions of Boyer’s scholarship of teaching and still maintain the high
importance of that domain.

Administrators need to recognize that there may be a misalignment between their
perceived relative importance of various scholarly activities and those that are actually
being performed by faculty. The examination of the present study findings relative to the
survey results of the Aghayere and Buchanan benchmark study provides impetus for
faculty and administrators to examine the possible misalignment between faculty
scholarship perception and valued importance. The skewing of scholarly activity toward
pedagogy and application by faculty, as identified in the benchmark study, may be
misaligned with what faculty and administrators collectively perceive as important to
tenure indicated by the current study.

Scholarship Domains Across Institution Type

The literature review presented a number of studies indicating that scholarly
activity defined by Boyer’s (1990) four scholarship domains varied in accordance with
the institution mission (Bozyk, 2005; Rueter and Bauer, 2005; Tang and Chamberlain,
2003; and Braxton, Luckey and Helland, 2002). The findings of this study support that
view. The perceived importance of the scholarship of discovery relative to the type of
institution is significant. Each of the institution types has a different educational focus which is assumed to be reflected in its mission. The post hoc analysis revealed that research institutions consider discovery to be more important than comprehensive institutions. Doctoral institutions value discovery similar to research institutions. Carnegie classifications indicate that those institutions categorized as other have a teaching focus. The other institutions considered the importance of discovery scholarship lower than research, doctoral, or comprehensive and considered teaching scholarship to be most important. Indications are that the relative importance of Boyer’s four scholarship domains to being granted tenure does vary by institution type. The institution findings of the current study have implications for faculty, students, institutions, and public policy makers.

Experience and anecdotal evidence indicate that engineering technology faculty do not have a preference for an array of scholarly activities embracing all four of Boyer’s (1990) scholarship domains nor do they develop unique expertise and experience regarding each of the domains. That being the case engineering technology faculty consideration of institution type and their missions is a critical factor when seeking employment or making inter-institution career moves. The orientation of faculty scholarship preference, experience and discipline competency with institution expectations will enhance academic performance, role satisfaction, and opportunities for recognition and reward benefits.

An Institution’s primary mission and direction are key factors in determining campus culture, work environment and education delivery (Green, 2008 and Henderson, 2009). Curriculum philosophy flows directly from those key factors. A university or
college emphasizing research (scholarship of discovery) involving undergraduate students, graduate students, and faculty have a curriculum design supporting that research and course content that is reinforced by the research. Faculty research engagement and productivity is accommodated by reduced teaching obligations. Those reduced teaching obligations are typically offset by the use of teaching assistants for a significant amount of the material delivery in the classroom (Altbach, Berdahl, and Gumport, 2005; Washburn, 2006). Teaching assistants, in effect, become the designated teachers. Faculty research is accomplished at the expense of faculty teaching. Engineering programs tend to have those characteristics and engineering technology programs offered by those institutions operate under heavy influence from that research orientation. Engineering technology programs offered by institutions with a primary mission differing from research tend to emphasize teaching in terms of delivery and teaching scholarship. Emphasis is placed on learning. Prospective students should consider those differences when making enrollment decisions. Engineering technology is a practice, application, hands-on orientated field. Future students need to evaluate how and to what degree their institution selection alternatives satisfies that orientation.

The literature and the findings of the current study for research and doctoral institutions indicate that scholarship of discovery is perceived as the most important form of academic scholarship. That view has persisted since the beginning of the space race with the launch of the Sputnik satellite in the late 1950’s. The availability of significant amounts of government funding throughout the years supporting engineering and science research and development was a reaction to that event. Successful engagement in the scholarship of discovery represents a source of revenue for the research oriented
universities and colleges. Carnegie classified comprehensive institutions, those with primarily a teaching mission and representative of engineering technology programs, have been modifying their missions placing more emphasis on the scholarship of discovery (research) to gain access to that available funding (Henderson, 2009). That direction is at the expense of teaching and teaching scholarship (Fairweather as cited in Youn and Price, 2009). Considering overall resource availability, with priority given to research, Fairweather’s conclusion could also indicate at the expense of application and integration scholarship as well.

The educational demands on United States higher education have changed significantly since post-World War Two. Present and future engineering graduates need to possess an array of that enable them to operate in a global environment, lead innovation, manage entrepreneurial efforts, and be familiar with the economic, political, ethical, and social constraints that limit their solution of problems (National Academy of Engineering, 2005). Their individual successes as practicing engineers will contribute to national success in preserving and enhancing U. S. technological leadership. That will take more than the scholarship of discovery. Boyer’s (1990) other three domains (teaching, application, and integration) will be required as well. Modifying institution and engineering technology program missions to increase research as a means of attracting funding is detrimental to developing the skills required of future engineers.

Public policy makers need to realize that it will take all of the types of institutions engaged in all of the scholarship domains represented by Boyer’s model (1990) to equip future engineering graduates with the necessary set of skills and competencies. Institution leadership needs to band together and educate policy makers regarding the
value of financial support across all institution types, leverage them to reconsider research as the prime driver for institution funding, and convince them that in addition to the research model an alternative model is needed to provide funding across higher education institutions.

*Receipt of Patents Relative to Publication of Refereed Journal Article*

Chapter III offers an argument indicating parity between the United States Patent and Trademark Office (USPTO) patent prosecution process and peer reviewed journal article publication. An experiment was conducted to examine that argument and yielded findings supporting the argument. The lack of significant difference between patents received and article publication in refereed journals for both faculty and administrators should minimize any concern that engineering technology faculty may have regarding the output of their research generating patents or published articles relative to being granted tenure. Parity between the receipt of patents and publication in peer-refereed journals rejects hypothesis three of the study.

Regardless of tenure status faculty should engage in a balance of scholarly activities to meet their scholarship expectations. That balance does not imply engagement in all accepted forms of scholarly activity, but does imply that excessive engagement in any one type or form of scholarly activity should be avoided. Excessive engagement in a singular form of scholarly activity demonstrates a lack of scholarship breadth when being considered for tenure. That narrow focus also fails to meet the engineering technology program accreditation criterion for evaluating faculty competence which requires scholarly activity supportive of all specified program objectives (ABET, Inc., 2009). Patents and publishing articles should be considered equivalent as faculty
pursue balance within their overall scholarship. Faculty and administrators should assure that the expectation of scholarship balance and patent-article equivalency is reflected in institution policies, procedures, and guidelines governing tenure and the system of recognition and rewards.

Historically engineering technology has had an academic identity issue relative to engineering (Kelnhofer, Strangeway, Chandler, and Petersen, 2010). That identity issue is primarily based on the perception that engineering technology has a lesser emphasis on engineering theory and less mathematical rigor in its curriculums. That view does a disservice to engineering technology by implying that engineering technology is inferior to engineering. The identity issue has blurred the differentiation between engineering and engineering technology regarding career paths and the educational preparation for them (Keinhofer, Strandeway, Chandler, and Petersen). There is a perceived familiarity with the term engineering and its academic preparation, but a complete lack of understanding of the term engineering technology and its preparation (McHenry and Munukutla, 2006). Revising institution governing documents for tenure to reflect expectations of scholarly activity balance and patent-article equivalency for engineering technology would begin to add clarity to the overall engineering technology academic definition by identifying unique scholarship expectations for engineering technology faculty further differentiating engineering technology from engineering. Focusing on the caliber of faculty would begin to offset the misperception regarding engineering technology academic preparation.

The mission of engineering technology education and practice in the United States has evolved historically as discussed in Chapter I. Although experiencing rapid
evolution, engineering technology as a professional field traditionally has been reasonably well defined and the differentiation from the engineering field fairly well understood. Engineering technology represents the application of engineering and science principles to the solution of problems as compared to the field of engineering that focuses on engineering science theory. The traditional approach to engineering technology scholarship centered on pedagogical research, applied research, and industrial engagement while that of engineering focused on theoretical research (Rennels, 2003). Changing engineering technology faculty scholarship expectations for tenure and promotion at many universities including funded research is creating more commonality between engineering and engineering technology pedagogies (Rennels). The differentiation between engineering and engineering technology is becoming more difficult to maintain. Having perceived parity between receipt of patents and refereed article publication offers an opportunity to increase that differentiation.

The incentive and driving forces for institutions to pursue the research university model for scholarship is the potential of attracting large amounts of research funding and the prestige, status, and visibility that the research environment commands. Those ends can be accomplished by non-theoretical research. The engineering technology academe should unite and create a vision and launch an initiative focused on the acquisition of applied patents offering unique solutions to technical problems as the engineering technology research objective. Applied research would support that vision and the traditional approach to engineering technology scholarship. Furthermore, that vision should promote a balance of faculty scholarship across all four of Boyer’s (1990) scholarship domains, which would also support the educational mission of engineering
technology creating graduates that are practice and application orientated. Implementing that vision would further distinguish engineering technology from engineering and offer great potential, as time passes, to attract ever increasing amounts of applied research funding and the associated discipline recognition and prestige. Engineering technology would no longer be within the shadow of engineering.

It is important to recognize that not all applied research will result in patent acquisition. Some innovative discoveries will be made that do not approach patentability, but warrant sharing with others for mutual benefit. For those situations article publication is suggested as the alternative. Article publication in academia is further definition as peer review and dissemination, with the term peer referring to academic peers (Paulsen and Feldman, 1995). Engineering technology, as discussed earlier, is a practice-oriented discipline focused on extensive industry engagement. As such, industrial peers would be equally valuable as peer reviewers of engineering published articles. A combination of industrial and academic reviewers would offer the optimum review. The academic reviewers would provide validation of the engineering and science framework underlying the article focus with the industrial reviewers validating the practice orientation.

Formally having industrial and academic publication reviewers has implications to the engineering technology academe. Implied is the creation of a new journal having industrial and academic representation on its editorial board and dedicated to engineering applied research. The new journal would be accepted and embraced by the engineering technology academe as the premier publication venue for applied research and recognized as such by the engineering academe. Having a comparable engineering
applied research journal to the engineering journals would further distinguish engineering technology from engineering and contribute to enhancing the prestige and recognition of engineering technology.

Study Limitations

This study had several potential limitations. The overall response rate for the study was low. The low response rate makes generalizing the study across all engineering technology programs challenging at best. The faculty response rate was seven percent (84/1262) and the administrator response rate was nineteen percent (48/254). The small sample size may have resulted in lack of power for the study. This may especially be the case for the experiment that had a power of approximately 0.5 as compared to the desired 0.8. A key element of the study was tenure which generally involves faculty with less than six years of service. Only eight of the sixty-nine faculty participating in the study had less than six years of service. Low representation of that faculty segment may have limited capturing their complete perception.

Recommendations

Replication of this study is recommended with the addition of non-scholarship faculty activities related to tenure as variables. Those activities in conjunction with the performance of scholarship constitute the total faculty member’s performance description considered in granting tenure. Consideration of the non-scholarship activities such as student evaluations, institute service, and peer evaluation in conjunction with the scholarship activities may influence the relative importance given to scholarship when considered in light of the total portfolio of academic activity expected for receiving tenure. Comparison of the future study importance findings with the findings of this
study will provide a basis for determining the effect of non-scholarship activities on the perceived importance of the accepted forms of scholarly activity.

This study identified the existence of parity between the receipt of patents and publication in peer-refereed journals. It was suggested that the engineering technology academe support the acquisition of applied patents as the premier scholarship direction. The experiment contained in this study should be repeated and additional research conducted in the future (within three to five years) to determine whether patent/publication parity still exists and change has occurred establishing patents as a preferred engineering technology direction.

Leslie, et al. (as cited in Aghayere and Buchanan, 2006) states that some educators “believe that faculty scholarship improves student learning, but it does not occur automatically, and must be engineered or purposely created” (p.50). Future research should examine the linkage between the types of faculty scholarship and student learning including the quality of that learning. The findings may provide an understanding of how the type of faculty scholarly activity affects the degree and quality of student learning. Insight may also be obtained regarding how to purposefully structure the linkage for optimum learning, and apply individual scholarly activity to the classroom.

As discussed a number of times throughout this study, engineering technology is a part of the broad engineering field representing practice and application as opposed to the emphasis of theory represented by engineering as we know it today. Graduates of engineering technology programs currently pursue career paths that strongly overlap those of engineering program graduates except for research-based careers (Keinhofer,
In essence engineering technology is the ‘other half’ of the engineering field as presented by Grinter (1955) when he presented his description of engineering technology and described the broad field of engineering. Academia should recognize that the time may have arrived to establish engineering technology as a distinct segment of engineering education and combine them universally under one organizational engineering structure within institutions. Future research should be directed at assessing the climate and identifying the issues and barriers for such a structural change.

**Conclusion**

This study examined the accepted forms of scholarly activity and their relative importance to granting tenure. Additionally, the importance of obtaining patents and the publication of refereed articles were compared regarding tenure. The findings of this study add to the engineering technology (ET) literature by suggesting that there is a rank order of importance for ET scholarly activities, and that there is parity between the number of patents held and the number of articles published in refereed journals. The review of the literature indicated that the scholarly activity that defines scholarship for engineering technology faculty was not well studied.

Engineering technology faculty has the influence to define ET scholarship for their programs and leverage acceptance at their institutions. Exerting that influence, ET faculty can affect the scholarship culture in a direction supportive of the practice and application needs of students and industry. An example would be exerting influence to increase the level of importance of Boyer’s (1990) scholarship of integration relative to granting tenure.
The future of engineering technology is an orientation towards applied research. That orientation will create a need for a different kind of faculty and a closer collaboration and alliance with industry. Faculty members seeking patents, interested in creating startup businesses, and engaging in wide-scale consulting with credentials to support those efforts will be the key to engineering technology education. Faculty uniqueness will further delineate engineering technology from engineering and establish engineering technology as separate, but equal, to engineering. The engineering technology academe needs to provide the leadership and support to make that vision reality.

The ultimate future for the engineering profession and the educational path leading to it is to be defined by two distinct career arenas supported by two distinct educational paths—practice and application supported by engineering technology and theoretical analysis supported by engineering. The closeness and in some cases overlap of both disciplines offers an opportunity for increased effectiveness in education delivery by combining the disciplines. The engineering technology academe should provide the leadership for achieving that new definition of engineering.
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Appendix A

Definition of Terms

The following definitions were used for the purposes of this study:

**Engineering Technology Faculty** comprises full-time, tenure and tenure track faculty members who are a part of an engineering technology program or department.

**Program** is defined as an established sequence of courses and experiences that prepare students to practice in an engineering technology discipline.

**TAC of ABET** refers to the Technology Accreditation Commission of ABET, Inc. (Formerly called the Accreditation Board for Engineering and Technology)

**TAC of ABET Accredited Programs** are those listed in the 2008 ABET Annual Report.

**Institution** is defined as a 4-year American college, university, or technical institute.

**Importance** refers to the emphasis placed in the tenure process on various forms of scholarly activity to determine a faculty member’s eligibility for tenure.

**Tenure** is a contractual arrangement for employment until retirement, with dismissal occurring only for appropriate cause or other institution circumstances, but only after a faculty committee hearing.

**Tenure-track-position** is a faculty position whose occupant is eligible for tenure after serving a probationary period.
Carnegie Classification Level refers to the institute grouping as listed in the Carnegie Foundation for the Advancement of Teaching 2005 report.

Research is defined as the acquisition of new knowledge through empirical inquiry.

Chief Administrative Officers is defined as the deans, provosts, and chancellors of higher education academic institutions.
Appendix B

TAC of ABET Accredited Programs*
As of October 1, 2009

The University of Akron – Summit College, OH
Alabama A&M University, AL
Alfred State College, NY
Alfred, Wellesville Campus, NY
Arizona State University Polytechnic, AZ
University of Arkansas at Little Rock, AR
Austin Peay State University, TN
Ball State University, IN
Bloomsburg University of Pennsylvania, PA
Bluefield State College, WV
Bradley University, IL
Brigham Young University, UT
Brigham Young University - Idaho, ID
California Maritime Academy, CA
California State Polytechnic University, Pomona, CA
California State University, Sacramento, CA
California University of Pennsylvania, PA
Capitol College, MD
Central Connecticut State University, CT
University of Central Florida, FL
Central Washington University, WA
Chattahoochee Technical College, GA
University of Cincinnati, OMI College of Applied Science, OH
Cleveland State University, OH
Colorado State University – Pueblo, CO
University of Dayton, OH
University of Delaware, DE
DeVry University, Chicago, IL
University of the District of Columbia, DC
Drexel University, PA
East Tennessee State University, TN
Eastern Washington University, WA
Excelsior College, NY
Fairleigh Dickinson University (Metropolitan Campus), NJ
Fairmont State University, WV
Ferris State University, MI
Florida A&M University, FL
Fort Valley State University, GA
Georgia Southern University, GA
Grambling State University, LA
University of Hartford, CT
University of Houston, College of Technology, TX
University of Houston-Downtown, TX
Idaho State University, ID
Indiana University-Perdue University Fort Wayne, IN
Indiana University-Perdue University Indianapolis, IN
Kansas State University – Salina, College of Technology & Aviation, KS
Kent State University, Tuscarawas Campus, OH
Lake Superior State University, MI
LeTourneau University, TX
Louisiana Tech University, LA
Marine Maritime Academy, ME
University of Maine, ME
University of Massachusetts Lowell, MA
McNeese State University, LA
The University of Memphis, TN
Metropolitan State College of Denver, CO
Miami University, OH
Michigan Technological University, MI
Middle Tennessee State University, TN
Midlands Technical College, SC
Midwestern State University, TX
Milwaukee School of Engineering, WI
Minnesota State University, Mankato, MN
Missouri Southern State University, MO
Missouri Western State University, MO
Montana State University – Brozeman, MT
Montana State University – Northern, MT
Murray State University, KY
University of Nebraska-Lincoln at Omaha, NE
University of New Hampshire, NH
New Jersey Institute of Technology, MY
New Mexico State University, NM
State University of New York at Canton, NY
State University of New York College at Buffalo, NY
New York Institute of Technology, NY
State University of New York of Technology at Utica/Rome, NY
University of North Carolina at Charlotte, NY
University of North Texas, TX
Northeastern University, MA
Northern Illinois University, IL
Northern Kentucky University, KY
Northwestern State University of Louisiana, IA
Oklahoma State University, OK
Old Dominion University, VA
Oregon Institute of Technology, OR
Paul Smith’s College, NY
Pennsylvania College of Technology, PA
Pennsylvania State University, Altoona Campus, PA
Pennsylvania State University, Behrend College, PA
Pennsylvania State University, Berks Campus, Berks-Lehigh Valley College, PA
Pennsylvania State University, DuBois Campus, Commonwealth College, PA
Pennsylvania State University, Fayette Campus, Commonwealth College, PA
Pennsylvania State University, Harrisburg, The Capital College, PA
Pennsylvania State University, Hazleton Campus, Commonwealth College, PA
Pennsylvania State University, New Kensington Campus, Commonwealth College, PA
Pennsylvania State University, Shenango Campus, Commonwealth College, PA
Pennsylvania State University, Wilkes-Barre, PA
Pennsylvania State University, Worthington Scranton Campus, Commonwealth College, PA
Purdue University at New Albany, IN
Purdue University at West Lafayette, IN
Purdue University Calumet, IN
Purdue University Kokomo, IN
Purdue University North Central, IN
Purdue University South Bend, IN
James A Rhodes State College, OH
Savannah State University, GA
Savannah Technical College, GA
South Carolina State University, SC
University of South Carolina Upstate, SC
South Dakota State University, SD
Southeast Missouri State University, MO
Southern Illinois University at Carbondale, IL
University of Southern Mississippi, MS
Southern Polytechnic State University, GA
Southern University and Agricultural & Mechanical College, IA
State University of New York, College of Technology at Farmingdale, NY
Temple University, PA
Texas A & M University, TX
Texas A & M University at Corpus Christi, TX
Texas A & M University at Galveston, TX
Texas Southern University, TX
Texas Tech University, TX
The University of Toledo, OH
Vaughn College of Aeronautics and Technology, NY
Vermont Technical College, VT
Virginia State University, VA
Wayne State University, MI
Weber State University, UT
Wentworth Institute of Technology, MA
West Virginia University Institute of Technology, WV
Western Carolina University, NY
Western Michigan University, MI
Western Washington University, WA
Youngstown State University, OH

*www.abet.org, retrieved 7/17/2010
Appendix C

Bachelor Engineering Technology Programs Visited by TAC of ABET*
2008-2009 Accreditation Cycle

Architectural
Bioengineering and Biomedical
Chemical
Civil
Computer
Construction
Electrical
Electromechanical
Physics and Engineering Science
Industrial
Instrumentation and Control Systems
Manufacturing
Mechanical
Nuclear and Radiological
Surveying and Geomatics
Telecommunications

* 2009 ABET Annual Report (p. 39)
Appendix D

Baseline Tenure Questionnaire

This research is concerned with the criteria used in making tenure decisions and with the relative weights given to different criteria. This study investigates the perceived importance of teaching and research/scholarship when evaluating faculty members for purposes of awarding tenure at research universities. Although the area of service is important for faculty, this area is not included in the present study. This questionnaire consists of three parts, and the average time to complete the questionnaire in a pilot study was **12 - 15 minutes**. **Part One** consists of demographic information; **Part Two** contains several criteria commonly used in tenure decisions and asks you to rate their importance in tenure decisions at your institution, and in **Part Three**, hypothetical scenarios are provided that illustrate the credentials of a possible candidate being evaluated for tenure. Based on the information in each scenario, please indicate the percent likelihood that the candidate described would be awarded tenure at your institution. Please complete this form as honestly as you can.

**Part One: Please place an X on the line that corresponds with your response**

1. Sector of Institution: 
   - [ ] Public
   - [ ] Private

2. What role do you currently hold for the 2006-07 academic year?
   - [ ] department chair
   - [ ] academic dean
   - [ ] other (please specify) __________________________

3. What is your current academic rank?
   - [ ] distinguished professor
   - [ ] professor
   - [ ] associate professor
   - [ ] assistant professor
   - [ ] other (please indicate) __________________________

4. Years of service in your department at your current institution: _______

5. Which category of academic disciplines best describes your department or academic unit?
   - [ ] social sciences (e.g., anthropology, psychology, philosophy, sociology)
   - [ ] natural sciences (e.g., biology, chemistry, mathematics, engineering, physics)
   - [ ] humanities (e.g., English language and literature, and political science)
6. Have you held, or do you currently hold, a position on a committee responsible for promotion and/or tenure decisions at the:
   a. ...university-wide level?  ______Yes    ______No
      _____n/a
   b. ...school/college level (not university wide)?  ______Yes    ______No
      _____n/a
   c. ...the department level?  ______Yes    ______No
      _____n/a
Part Two: Please rate each of the following specific criteria on how important they are for promotion from assistant to associate professor with tenure at your present institution. Circle the corresponding number (where 1=extremely important in tenure decisions, 3=neutral, and 5=not important at all in tenure decisions).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Extremely Important</th>
<th>Neutral</th>
<th>Not at All Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evaluations of Peers from Within your Institution</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Evaluation of Teaching by Peers</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Number of Books/Monographs Published</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Number of Conference Presentations</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Number of Book Chapters Published</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Written statement from Candidate on his or her Teaching</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Academic Advising</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Evaluations from Peers at Other Institutions</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Number of Publications in Peer-refereed Journals</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. Number of Citations of Candidate’s Publications</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. Thesis &amp; Dissertation Advising</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. Student Test Scores</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. Number of Courses Taught Each Semester</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. Number of Grants Received</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Reminder: How important are each of the following for promotion from assistant to associate professor with tenure at your present institution?
16. Student Evaluations

1 2 3 4 5

17. Other (Please specify)

1 2 3 4 5

Part Three: Based on the information provided in each of the hypothetical scenarios below, please indicate the percent likelihood that the candidate illustrated would be awarded tenure at your institution. Write a whole number between 0 and 100 as your response. Assume for each scenario that the candidate is a junior faculty member who recently completed their doctorate and that this is the first time she/he is being considered for tenure. It may help you to reflect on recent tenure decision cases.

1. Dr. R’s teaching evaluations average 8, where 10 is the best. Dr. R uses modern technology to enhance learning in the classroom. Although interested in research, Dr. R’s research agenda is a short-term plan. Dr. R has 5 publications in well regarded refereed journals, 4 of which are in journals with less than a 30% acceptance rate. Dr. R intends to apply for a grant within the next two years.

What is the percent likelihood Dr. R will be granted tenure in your department? _____%

2. Dr. L’s teaching evaluations are 4 on average (where 10 is the best), and prefers meeting with students only during scheduled office hours. Dr. L has a series of studies that are being conducted in a programmatic fashion. Dr. L is involved in grant writing activities and has 13 articles in top tiered journals; 5 of which are in journals with less than a 10% acceptance rate.

What is the percent likelihood Dr. L will be granted tenure in your department? _____%

3. On a scale of 1-10, Dr. D’s teaching evaluations are 9 on average. Dr. D attempts to use active learning strategies to enhance learning in the classroom. Dr. D is involved in grant writing activities and has a focused research program. Dr. D has 13 articles in leading journals; 4 of which are in journals with less than a 15% acceptance rate.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%
4. On a scale of 1-10, Dr. V’s teaching evaluations are 5 on average. Dr. V prefers to meet with students only during scheduled office hours. Although interested in research, Dr. V program has not yet become focused. Dr. V has obtained information on applying for a grant, and has 6 publications in well regarded refereed journals; 3 of which are in journals with less than a 30% acceptance rate.

What is the percent likelihood Dr. V will be granted tenure in your department? _____%

5. On a scale of 1-10, Dr. X’s teaching evaluations are 9 on average. Dr. X uses innovative methods to enhance learning in the classroom. Dr. X has obtained information on applying for a grant, but Dr. X’s research agenda has not yet become focused. Currently, Dr. X has 6 publications in well regarded refereed journals, 3 of which are in journals with less than a 20% acceptance rate.

What is the percent likelihood Dr. X will be granted tenure in your department? _____%

6. Dr. C’s teaching evaluations are 5 on average (where 10 is the best), and prefers to meet with students only during scheduled office hours. Dr. C’s research agenda is clear and systematic. Dr. C is involved in grant writing activities and has 15 articles in leading journals; 4 of which are in journals with less than a 10% acceptance rate.

What is the percent likelihood Dr. C will be granted tenure in your department? _____%

7. On a scale of 1-10, Dr. J’s teaching evaluations are 8 on average. Dr. J attempts to use modern technology to enhance learning in the classroom. Dr. J is involved in grant writing activities and has a series of studies that are being conducted in a programmatic fashion. Dr. J has 13 articles in leading journals; 5 of which are in journals with less than a 15% acceptance rate.

What is the percent likelihood Dr. J will be granted tenure in your department? _____%
8. Dr. T’s teaching evaluations are 4 on average (on a 10-point scale), and prefers to meet with students only during scheduled office hours. Although interested in research, Dr. T’s research agenda is a short-term plan. Dr. T intends to apply for a grant within the next two years, and has 6 publications in well regarded refereed journals; 3 of which are in journals with less than a 30% acceptance rate.

What is the percent likelihood Dr. T will be granted tenure in your department? ____%

******************************************************************************
******

Please indicate any additional comments/thoughts you would like to share:


Thank you for your time and participation in this study!
Appendix E

Research Study Questionnaire Outline
ET Faculty Scholarship and Tenure

Part One: Demographic Information

(a) Type of Institution (4-year/2-year)
(b) Carnegie Classification
(c) Gender
(d) Ethnicity/Race
(e) Individual’s Role (2010-2011 academic year)
(f) Academic Rank
(g) Years of service (department or institution)
(h) Tenure Status
(i) Academic Unit Category (engineering or engineering technology college)
(j) Current or Past Tenure Committee Position

Part Two: Scholarship/Importance Questions

(a) Additional Questions Associated with Boyer’s Domains

Part Three: Hypothetical Tenure Vignettes (Revised)

Part Four: Open-ended question based on Part Three
Appendix F

Pilot Tenure Questionnaire

This research is concerned with the criteria used in making tenure decisions and the relative weights given to different criteria. This study investigates the perceived importance of application and research scholarship when evaluating engineering technology (ET) faculty members for purposes of awarding tenure. The survey should take about 12 – 15 minutes to complete. Please complete this form as completely and honestly as you can.

Completion of the questionnaire indicates approval to participate in the focus group.

Part One: (Demographic Information) Please place an X on the line that corresponds with your response

1. Sector of Institution: _____Public _____Private

2. Type of Institution: _____4-year _____2-year

3. Carnegie Classification: _____Research _____Doctoral
   _____Comprehensive
   _____Other

4. Gender: _____Male _____Female

5. Ethnicity/Race:
   _____Hispanic or Latino
   _____American Indian
   _____Alaska Native
   _____Black or African American
   _____Native Hawaiian or Native Islander
   _____White

6. What role do you currently hold for the 2010-11 academic year?
   _____department chair
   _____academic dean
   _____Provost/Chancellor
   _____other (please specify) _______________________________
7. What is your current academic rank?
   _____ distinguished professor
   _____ professor
   _____ associate professor
   _____ assistant professor
   _____ other (please indicate) ____________________________

8. Years of service in your department at your current institution: _______

9. Are you tenured?  _____ Yes  _____ No

10. Academic Unit Responsible for ET Programs:  _____ Engineering College
     _____ Technology College
     _____ Other (please specify) ______________

11. Have you held, or do you currently hold, a position on a committee responsible for tenure decisions?  _____ Yes  _____ No

   If answer is yes, please indicate most recent level:

   a. University-wide level?  _____
   b. School/college level (not university wide)?  _____
   c. Department level?  _____

**Part Two:** (Tenure Criteria/ Importance) *Please rate each of the following specific criteria on how important they are for receiving tenure at your present institution. Circle the corresponding number (where 1=extremely important in tenure decisions, 3=neutral, and 5=not important at all in tenure decisions).*

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Extremely Important</th>
<th>Neutral</th>
<th>Not at All Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evaluations of Peers from Within your Institution</td>
<td>1  2  3  4  5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Evaluation of Teaching by Peers</td>
<td>1  2  3  4  5</td>
<td></td>
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</tr>
<tr>
<td>3. Number of Books/Monographs Published</td>
<td>1  2  3  4  5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Number of Conference Presentations</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>5. Number of Book Chapters Published</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Number of Patents and Copyrights Held</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Community Consulting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Evaluations from Peers at Other Institutions</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</table>

**Reminder:** How important are each of the following for receiving tenure at your present institution?

<table>
<thead>
<tr>
<th>9. Number of Publications in Peer-refereed Journals</th>
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<th>5</th>
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<td>10. Number of Citations of Candidate’s Publications</td>
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<td>5</td>
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<td>11. Recognized Professional Society Expert</td>
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<td>3</td>
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<td>12. Classroom applied research</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>13. Article publishing crossing Crossing Disciplines</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
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<td>14. Course Development</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>15. Number of Editorial, Moderator, Reviewer Positions Held</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
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</tbody>
</table>

**Reminder:** How important are each of the following for receiving tenure at your present institution?

| 16. Number of Non-refereed Articles | 1 | 2 | 3 | 4 | 5 |
Part Three:  (Hypothetical Scenarios) Based on the information provided in the hypothetical scenario below; please indicate the percent likelihood that the candidate illustrated would be awarded tenure at your institution. Write a whole number between 0 and 100 as your response. Assume that the candidate is a junior faculty member who recently completed their doctorate and that this is the first time she/he is being considered for tenure. It may help you to reflect on recent tenure decision cases.

1. Dr. D’s teaching evaluations average 4.8 on a scale of 1-5. Dr. D attempts to use active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in grant writing activities and has a focused research program. Dr. D has 4 articles in leading journals; 1 of which are in journals with less than a 15% acceptance rate. Dr. D. has been granted 3 patents.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%
2. Dr. D’s teaching evaluations average 4.8 on a scale of 1-5. Dr. D attempts to use active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in grant writing activities and has a focused research program. Dr. D has 8 articles in leading journals; 3 of which are in journals with less than a 15% acceptance rate. Dr. D has been granted 3 patents.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%

************************************************************************

3. Dr. D’s teaching evaluations average 4.8 on a scale of 1-5. Dr. D attempts to use active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in grant writing activities and has a focused research program. Dr. D has 4 articles in leading journals; 1 of which are in journals with less than a 15% acceptance rate. Dr. D has been granted 7 patents.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%

************************************************************************

4. Dr. D’s teaching evaluations average 4.8 on a scale of 1-5. Dr. D attempts to use active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in grant writing activities and has a focused research program. Dr. D has 8 articles in leading journals; 3 of which are in journals with less than a 15% acceptance rate. Dr. D has been granted 7 patents.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%
**Part Four:** Please provide the basis for your answers to the hypothetical scenarios in Part Three above.

*Thank you for your time and participation in this study!*
Good afternoon James,

Attached you will find the word document version of the questionnaire by itself as you requested. As I had mentioned in my earlier email, you have my permission to modify the questionnaire as your dissertation committee sees fit based on your focus. I do ask that acknowledgement or credit be given where appropriate in your final work as you are basing your study from my efforts. Thank you in advance for your efforts in this regard.

Good luck with your project, and enjoy your weekend!

Theresa

Theresa A. Coogan, Ph.D., NCSC, NCC
Assistant Professor of Counselor Education
School Counseling Programs Director
Licensed School Counselor
Bridgewater State University
Bridgewater, MA 02325
Appendix H

Focus Group Questions
-Pilot Survey-

1. Were the questions clearly written?

2. Is the survey measuring what it is intended to measure?

3. Is the survey and associated questions appropriate for the various population groups?

4. Are there any additional survey questions that should be added?

5. Are there any survey questions that should be changed?

6. Is the amount of time to complete the survey a reasonable expectation?

7. Are the variable value differences of Part Three vignettes reasonable and meaningful?
Appendix I

Research Questionnaire

Faculty

This research is concerned with the criteria used in making tenure decisions and the relative weights given to different criteria. This study investigates the perceived importance of application and research scholarship when evaluating engineering technology (ET) faculty members for purposes of awarding tenure. Please complete this form as completely and honestly as you can.

**Part One: (Demographic Information)** Please place an X on the line that corresponds with your response

1. Sector of Institution:
   - _______ Public
   - _______ Private

2. Type of Institution:
   - _______ Research University (20 or more doctoral degrees awarded annually/ high to very high research activity)
   - _______ Doctoral University (20 or more doctoral degrees awarded annually with low research activity)
   - _______ Comprehensive College/University (Greater than 50 master’s degrees awarded annually and less than 20 doctoral degrees awarded annually)
   - _______ Other _________________________

3. Location of Institution:
   - _______ United States
   - _______ Canada
   - _______ Mexico
   - _______ Latin America
   - _______ Europe
   - _______ Middle East
   - _______ Asia
   - _______ Other
4. Gender: _______Male      _______Female

5. Ethnicity/Race:
   ______ American Indian or Alaska Native
   ______ Asian Indian
   ______ Black or African American
   ______ Chinese
   ______ Filipino
   ______ Hispanic or Latino
   ______ Japanese
   ______ Korean
   ______ Native Hawaiian or Pacific Islander
   ______ Vietnamese
   ______ White
   ______ Other Race

6. What primary role do you currently hold for the 2010-11 academic year? (Check One)
   ______ department chair
   ______ academic dean
   ______ Provost/Chancellor
   ______ Faculty
   ______ other

7. What is your current academic rank?
   ______ distinguished professor
   ______ professor
   ______ associate professor
   ______ assistant professor
   ______ other

8. Years of service at your current institution:
   ______ 1-5             ______ 6-10              ______ 11-15              ______ 16-20
   ______ >20
9. Academic Unit Responsible for ET Programs:  
   _______ Engineering College  
   _______ Technology College  
   _______ Engineering and Technology College  
   _______ Other  

10. Have you held or do you currently hold a position on a committee responsible for tenure decisions?  
    _______ Yes  _______ No  

11. What is your academic appointment?  
    _______ Tenured at 4-year college/university  
    _______ Non-tenured (on tenure track) at 4-year college/university  
    _______ Non-tenured (not on tenure track) at 4-year college/university  
    _______ Other  

12. Do you teach in or responsible for a TAC of ABET accredited program?  
    _______ Yes  _______ No  

**Part Two:** (Tenure Criteria/ Importance) please rate each of the following specific criteria on how important they are for receiving tenure at your present institution. Circle the corresponding number (where 1=not important in tenure decisions, 3=neutral, and 5=extremely important at all in tenure decisions).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Not At All Important</th>
<th>Neutral</th>
<th>Extremely Important</th>
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<tbody>
<tr>
<td>1. Evaluations of Peers from Within your Institution</td>
<td>1 2 3 4 5</td>
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<tr>
<td>2. Evaluation of Teaching by Peers</td>
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<td>3. Number of Books/Monographs Published</td>
<td>1 2 3 4 5</td>
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<td>4. Number of Conference Presentations</td>
<td>1 2 3 4 5</td>
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<tr>
<td>Number of Book Chapters Published</td>
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<td>3</td>
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<tr>
<td>Number of Patents and Copyrights Held</td>
<td>1</td>
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<td>3</td>
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<tr>
<td>Consulting Within Discipline</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Evaluations from Peers at Other Institutions</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tbody>
</table>

**Reminder:** How important are each of the following for receiving tenure at your present institution?

| Number of Publications in Peer-refereed Journals | 1 | 2 | 3 | 4 | 5 |
| Number of Citations of Candidate’s Publications | 1 | 2 | 3 | 4 | 5 |
| Recognized Professional Society Expert | 1 | 2 | 3 | 4 | 5 |
| Classroom Applied Research | 1 | 2 | 3 | 4 | 5 |
| Article Publishing Crossing Disciplines | 1 | 2 | 3 | 4 | 5 |
| Course Development | 1 | 2 | 3 | 4 | 5 |
| Number of Editorial, Reviewer Positions Held | 1 | 2 | 3 | 4 | 5 |

**Reminder:** How important are each of the following for receiving tenure at your present institution?

<p>| Number of Non-refereed Articles | 1 | 2 | 3 | 4 | 5 |
| Number of Research Grants Received | 1 | 2 | 3 | 4 | 5 |</p>
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<td>18. Student Evaluations</td>
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<td>19. Providing Expert Testimony</td>
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<td>20. Service Within the Institution</td>
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<td>21. Directing Student Research Projects</td>
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<tr>
<td>22. Publishing a Book Crossing Subject Matter</td>
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</table>

**Part Three:** (Hypothetical Scenarios) based on the information provided in the hypothetical scenario below; please indicate the percent likelihood that the candidate illustrated would be awarded tenure at your institution. Write a whole number between 0 and 100 as your response. Assume that the candidate is a junior faculty member who recently completed their doctorate and that this is the first time she/he is being considered for tenure. The candidate’s activities described in the scenarios occurred while in a tenure-track position. It may help you to reflect on recent tenure decision cases.

1. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in 1 patent. Dr. D has 3 articles in leading journals.

What is the percent likelihood Dr. D will be granted tenure in your department? ____%  

2. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in 4 patents. Dr. D has 3 articles in leading journals.
What is the percent likelihood Dr. D will be granted tenure in your department? _____%

************************************************************************************
******

3. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in 1 patent. Dr. D has 4 articles in leading journals.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%

************************************************************************************
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Thank you for your time and participation in this study!

If you would like to receive an abstract of the final dissertation, please provide your name and e-mail address.

Name: __________________________________________
e-mail ___________________________________________
Appendix J

Research Questionnaire

Chief Academic Administrators

This research is concerned with the criteria used in making tenure decisions and the relative weights given to different criteria. This study investigates the perceived importance of application and research scholarship when evaluating engineering technology (ET) faculty members for purposes of awarding tenure. Please complete this form as completely and honestly as you can.

Part One: (Demographic Information) Please place an X on the line that corresponds with your response

1. Sector of Institution:
   _____ Public  _____ Private

2. Type of Institution:
   _____ Research University (20 or more doctoral degrees awarded annually/ high to very high research activity)
   _____ Doctoral University (20 or more doctoral degrees awarded annually with low research activity)
   _____ Comprehensive College/University (Greater than 50 master’s degrees awarded annually and less than 20 doctoral degrees awarded annually)
   _____ Other

3. Gender: _____ Male  _____ Female
4. Ethnicity/Race:
   ____ American Indian or Alaska Native
   ____ Asian Indian
   ____ Black or African American
   ____ Chinese
   ____ Filipino
   ____ Hispanic or Latino
   ____ Japanese
   ____ Korean
   ____ Native Hawaiian or Pacific Islander
   ____ Vietnamese
   ____ White
   ____ Other Race

5. What primary role do you currently hold for the 2010-11 academic year? (Check One)
   ____ Director
   ____ Academic Dean
   ____ Provost/Chancellor
   ____ other

6. Years of service at your current institution:
   ____ 1-5       ____ 6-10       ____ 11-15       ____ 16-20
   ____ >20

7. Academic Unit Responsible for ET Programs: _____ Engineering College
   _____ Technology College
   _____ Engineering and Technology College
   _____ Other

**Part Two:** (Tenure Criteria/Importance) please rate each of the following specific criteria on how important they are for receiving tenure at your present institution. Circle the corresponding number (where 1=not important in tenure decisions, 3=neutral, and 5=extremely important at all in tenure decisions).
<table>
<thead>
<tr>
<th>1. Evaluations of Peers from Within your Institution</th>
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<th>Extremely Important</th>
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<tr>
<td>2. Evaluation of Teaching by Peers</td>
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<tr>
<td>3. Number of Books/Monographs Published</td>
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<td>4. Number of Conference Presentations</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>5. Number of Book Chapters Published</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Number of Patents and Copyrights Held</td>
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<td>7. Consulting Within Discipline</td>
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<td>8. Evaluations from Peers at Other Institutions</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tbody>
</table>

**Reminder:** How important are each of the following for receiving tenure at your present institution?

<table>
<thead>
<tr>
<th>9. Number of Publications in Peer-refereed Journals</th>
<th>Not At All Important</th>
<th>Neutral</th>
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<tr>
<td>1</td>
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<tr>
<td>10. Number of Citations of Candidate’s Publications</td>
<td>1</td>
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15. Number of Editorial, Reviewer Positions Held
   
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**Reminder:** How important are each of the following for receiving tenure at your present institution?

16. Number of Non-refereed Articles
   
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17. Number of Research Grants Received
   
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18. Student Evaluations
   
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19. Providing Expert Testimony
   
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20. Service within the Institution
   
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21. Directing Student research Projects
   
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22. Publishing a Book Crossing Subject Matter
   
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**Part Three:** (Hypothetical Scenarios) based on the information provided in the hypothetical scenario below; please indicate the percent likelihood that the candidate illustrated would be awarded tenure at your institution. Write a whole number between 0 and 100 as your response. Assume that the candidate is a junior faculty member who recently completed their doctorate and that this is the first time she/he is being considered for tenure. The candidate’s activities described in the scenarios occurred while in a tenure-track position. It may help you to reflect on recent tenure decision cases.

1. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in 1 patent. Dr. D has 3 articles in leading journals.

What is the percent likelihood Dr. D will be granted tenure in your department? ____%
2. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in 5 patents. Dr. D has 3 articles in leading journals.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%

3. Dr. D’s teaching evaluations are average. Dr. D uses active learning strategies to enhance learning in the classroom. Dr. D routinely participates and leads department activities and projects. Dr. D on the average serves on two institutional committees a year. Dr. D is involved in research grant activities and received an approval for one grant which resulted in 1 patent. Dr. D has 5 articles in leading journals.

What is the percent likelihood Dr. D will be granted tenure in your department? _____%

Thank you for your time and participation in this study!

If you would like to receive an abstract of the final dissertation, please provide your name and e-mail address.

Name: __________________________________________
e-mail _________________________________________
Appendix L

Institution Review Board Approval

February 28, 2011

File No: 2067-021711-05

James Hurney
26 Kerry Hill
Fairport, NY 14450

Dear Mr. Hurney:

Thank you for submitting your research proposal to the Institutional Review Board.

I am pleased to inform you that the Board has approved your Expedited Review project, "Faculty Scholarship: A Study of the Accepted Forms of Scholarly Activity and the Perceived Importance in Granting Faculty Tenure in TAC of ABET Accredited Baccalaureate Engineering Technology Programs."

Following federal guidelines, research related records should be maintained in a secure area for three years following the completion of the project at which time they may be destroyed.

Should you have any questions about this process or your responsibilities, please contact me at 385-5262 or by e-mail to emerges@sjfc.edu, or if unable to reach me, please contact the IRB Administrator, Jamie Mosca, at 385-8318, e-mail jmosca@sjfc.edu.

Sincerely,

Eileen M. Merges, Ph.D.
Chair, Institutional Review Board

EMJM

Copy: OAA IRB
IRB: Approve expedited.doc
All student applications and applicants from outside the College must have a College sponsor.

Date & Signature – Researcher

Decision of Institutional Review Board

Reviewed by: 

Subcommittee Member #1 

Subcommittee Member #2 

Date

Comments:

No Research The proposed project has not research component and does not need be in further compliance with Article 24-A.

Minimal Risk The proposed project has a research component but does not place subjects at Risk and need not be in further compliance with Article 24-A.

Research & Risk The proposed project has a research component and places subjects at risk. The proposal must be in compliance with Article 24-A.

Chairperson, Institutional Review Board

Rev. 12/10 jm.