Students' Perceptions of the Importance of the Faculty Technical Currency in Their Learning/Success in a Technology-Based Baccalaureate Program

Ahmed S. Khan
Department of EET
DeVry University, Addison, IL 60101

Gene Gloeckner
George Morgan
School of Education, Colorado State University, Fort Collins, CO 80523

Abstract

During the last two decades, the pace of technological change has transformed the global economy into a knowledge-based or innovation-based economy, in which organizations are no longer valued on the basis on their physical assets but rather on the knowledge base of their employees. In this day and age, a knowledge-based and innovation-based economy is playing a pivotal role in the development of nations around the globe. For nations to acquire or to maintain the technological edge, the technical competency of graduates has become of paramount importance. Rapid technological growth puts new demands on educators. The global marketplace seeks manpower with an up-to-date technical knowledge-base. The pace of technological change also imposes new challenges for faculty development and the technical currency of academic programs. Faculty professional development activities and technical currency play an important role in promoting student learning and success.

Especially for non-research (purely teaching) institutions that offer technology driven programs, one of the most important factors determining student success is the technical currency of faculty members. The Accreditation Board for Engineering and Technology (ABET) and regional accreditation bodies place strong emphasis on the technical currency of faculty, and require institutions to provide opportunities for faculty to keep abreast of technological advances. ABET's new criteria for accrediting engineering technology programs, Technology Criteria 2000 (TC2k), also emphasize the importance of faculty technical currency. Thus, the rapid pace of technological change, and accreditation agencies' strong emphasis on faculty development, mandate that faculty remain current in their areas of specialization in order to help students acquire an up-to-date technological knowledge base.

This paper presents the findings of a student survey conducted at 13 campuses of a private university. The main area of inquiry dealt with exploring the students' perceptions about the importance of faculty technical currency (expressed in terms of technical competency /up-to-date technological knowledge/skills in the subject matter, computer hardware and software skills, publications and technical presentations, and participation in technical seminars, workshops and conferences) for their self-reported learning/success. The paper also presents recommendations for enhancing student learning by enhancing faculty technical currency.

I. Introduction

Purpose of the Study

This paper presents the results of the second phase of a two part research project. The purpose of project was to explore faculty and students' perceptions of the importance of faculty technical currency for their self-reported learning/success. The first phase of project explored the faculty perceptions of the importance of faculty technical currency for student learning/success. A faculty survey was conducted through the ASEE ETD listserv (representing a membership of more than 3000 faculty members and professionals belonging to more than 677 institutions). The intent of the survey was to gauge the status of professional development activities vis-à-vis faculty technical currency at personal, departmental and institutional levels in the domains of engineering technology. The survey also explored faculty input regarding the importance of technical currency and its relationship to student learning and success. The results were presented at 2004 ASEE annual conference.[1]

The purpose of present study, representing the second phase of research project, was to explore students' perceptions of the importance of faculty technical currency for their self-reported learning/success in a technology-based baccalaureate electronics engineering technology (EET) program at a teaching university.

Definitions of Terms

Faculty Technical Currency (FTC): Technical currency of faculty is expressed in terms of technical competency /up-to-date technical knowledge of the subject matter, computer hardware and software skills, publication of technical papers and textbooks, participation in technical seminars, workshops, conferences, and professional organization activities.

Student learning/success: It is expressed in terms of self-reported technical competency, GPA, number of job offers, highest starting salary, and membership in professional and honor societies.

Delimitations

This study is delimited to faculty members who teach technical courses in the electrical and electronics technology (EET) program at DeVry University, a private, for profit, teaching institution. Thus the results of the study are limited to purely teaching institutions and may not generalize to research universities.

Significance of Study

A body of research has been emerging in recent years, reporting intellectual and non-intellectual factors as predictors of student success in higher education. These predictors include high school grade point average (HSGPA), school rank, admission scores,[2] and entrance exam math and English scores, ACT scores, [3-5] retention rates,[5] high school grades, and SAT scores. [6]

Non-academic predictors dealing with the motivational and demographic characteristics of students have also been studied in relation to the issues of retention, persistence, attrition, and dropout.[7-10]

Post-secondary educators often try to devise methods that will reliably predict student success. These methods are important to both the educational institution and the student. For institutions, predictive information is helpful for future institutional planning and budgets. For students, reliable predictive methods would greatly aid in counseling and advising new admissions to enter either into developmental or other programs commensurate with their abilities and aptitude.[11]

Faculty professional development activities and technical currency play an important role in promoting student learning and success. Especially for non-research (purely teaching) institutions that offer technology driven programs, one of the most important factors determining student success is the technical currency of faculty members.[1]

The accreditation bodies such as Accreditation Board for Engineering and Technology (ABET) place high emphasis on the technical currency of faculty, and require institutions to provide opportunities for faculty to keep abreast of the pace of technological advances. ABET's 2003-2004 criteria for accrediting engineering technology programs state: [12]

> In engineering technology programs, technical currency is important and must be assured by such means as a competent and inquisitive faculty, an active industrial advisory committee, and an adequately funded budget which encourages continuing faculty development, and a modern library collection with an adequately funded program for continuous renewal. Positive procedures must be established and closely monitored to safeguard against technical obsolescence. (p. 5)

Accreditation bodies have placed high emphasis on technical currency of faculty in the technology based programs, but the subject has received little attention in the literature. Further, no studies have been conducted to investigate the associations between the faculty technical currency and student learning and success. Therefore, an investigation is warranted to explore the relationship between student learning/success with faculty technical currency.

Khan, Karim, Gloeckner, and Morgan [1] conducted a national survey to: (a) gauge the status of professional development activities vis-à-vis faculty technical currency at personal, departmental and institutional levels in the domains of engineering technology, and (b) determine predictor variables for maintaining faculty technical currency. The survey was conducted through the ASEE ETD (American Society of Engineering Education, Electronics Technology Division) listserv which (in November 2003 when the survey was conducted) had a membership of more than 3,000 faculty members and professionals belonging to more than 677 institutions. The following is a summary of the findings reported by Khan, Karim, Gloeckner, and Morgan.[1]

1. Because of the application orientation of engineering technology programs, technical currency of faculty is essential to make student learning more relevant.
2. There is a strong relationship between faculty technical currency and student learning.

3. The institutional support and encouragement for maintaining technical currency, and allocation of funds for professional development are the most significant predictors of faculty technical currency.
4. There is a need to revise institutional/developmental polices in order to encourage faculty to maintain technical currency.
5. There is a need for the allocation of appropriate funds for professional development activities for faculty.
6. ABET's TC2k accreditation criteria will not necessarily encourage institutions to (a) revise policies to promote faculty development activities, or (b) allocate adequate financial resources for faculty development activities.

Role/Importance of Faculty Technical Currency in New Internet Economy

During the past decade, the phenomenal growth of the personal computer (PC) industry has led to emergence of a new form of economy called the "Internet economy," which is rapidly becoming an integral part of the overall U.S. economy. The magnitude of the growth in the Internet economy is evident by the following indicators released by the Center for Electronics Commerce, Graduate School of Business, University of Texas at Austin (Center for Electronics Commerce, http://www.internetindicators.com/ overview.html, 2004).[13]

1. The Internet economy now directly supports more than 3 million workers.
2. Employment in the Internet economy companies is growing much faster than in the overall economy.
3. The Internet economy generated an estimated $830 billion in revenues in 2000, a 58 percent increase over 1999. The $830 billion in revenues is a 156 percent increase from 1998, when the Internet accounted for $323 billion in revenues.

The emergence of the Internet economy (knowledge-based economy/digital economy) due to the growth of PC/networking technologies has also led to an increase in enrollment in distance education programs in public and private institutions. The scale of this increase can be gauged by the following facts and figures published by the National Center for Education Statistics in its report titled "*Distance Education at Degree Granting Postsecondary Institutions: 2000-2001*" (NCES 2003):[14]

> Fifty-six percent (2,320) of all 2-year and 4-year degree granting institutions offered distance education courses for any level or audience…Ninety percent of public 2-year and 89 percent of public 4-year institutions offered distance education courses, compared with 16 percent of private 2-year and 40 percent of private 4-year institutions…(Distance education was defined for this study as education or training courses delivered to remote [off-campus] sites via audio, video [live or prerecorded], or computer technologies, including both synchronous [i.e., simultaneous] and asynchronous [i.e., not simultaneous] instruction) (p. iii).
>
> There were an estimated 3,077,000 enrollments in all distance education courses offered by all 2-year and 4-year institutions…Public 2-year institutions had the greatest number of enrollments in distance education courses, with 1,472,000 out of 3,077,000 or 48

percent of the total enrollments in distance education. Public 4-year institutions had 945,000 enrollments (31 percent), and private 4-year institutions had 589,000 enrollments (10 percent of the total) (p. iv)

The Internet and two video technologies were most used as primary modes of instructional delivery for distance education courses during the 12- month 2000-2001 academic year (p. v)

With this mushrooming growth of distance education programs (online asynchronous/ synchronous and mixed/hybrid) in private and public institutions, faculty technical currency thus becomes a pivotal factor for the design, implementation and delivery of effective online programs that can promote student learning/success.

Faculty in purely teaching institutions (non-research environment), especially those teaching in technology-based and career-oriented programs, generally lag behind the pace of technological change in terms of their professional development activities due to their non-association with research activities. They face two major challenges: how to incorporate and teach new applications of new technologies in the curriculums they teach and how to maintain their professional currency.[1]

II. Research Design

Research Questions

The present study explored the student-perceived value of faculty technical currency as predictor variables for student learning and student success. The study answered the following research questions:

1. How do students perceive the importance of three faculty technical currency for their learning and success?
2. Are there associations between the importance of faculty technical currency (FTC) [in terms of up-to-date technical knowledge of subject matter, computer hardware and software skills, knowledge of new and emerging technologies, publications of technical papers and textbooks, and participation in technical seminars, workshops and conferences] and student's learning/success (expressed in terms of self-reported technical competency and GPA), as perceived by seniors in the EET program?

Participants

Data were collected from seniors belonging to the electronics engineering technology (EET) program at 13 DeVry campuses.

Description of Sample and Sampling Design

Sampling

Considering the time and cost limitations, a convenience sampling approach was employed.

Data Collection Procedures

A survey packet was sent to all deans of the EET program at the 13 selected DeVry University campuses to solicit students' response.

Instrument

The data were collected using a questionnaire (see appendix A) The Survey questionnaire allowed the participant to check a box, circle a number or provide a short written response. The instrument used twenty 7-point Likert scales to collect data about student perceptions of their faculty. The questionnaire was designed to seek the following data from the participants:

1. Student's perception about the effect of professors' technical currency, in terms of knowledge of subject matter, on student learning/success.
2. Student's perception about the effect of professors' technical currency, in terms of computer hardware skills, on student learning/success.
3. Student's perception about the effect of professors' technical currency, in terms of computer software skills, on student learning/success.
4. Student's perception about the effect of professors' technical currency, in terms of being current in new and emerging technologies, on student learning/success.
5. Student's perception about the effect of professors' technical currency, in terms of technical publication of papers and text books, on student learning/success.
6. Student's perception about the effect of professors' technical currency, in term of participation in the technical seminars, workshops and conferences, on student learning/success.

Statistical Analysis

The study research questions were descriptive and correlational in nature. In a correlational study, data are collected from a group of participants with an objective to determine the relationship between two sets of data. Creswell [15] defines a correlation as a statistical test to determine the tendency or relationship for two or more variables (or two sets of data) to vary consistently. The statistic that expresses a correlation statistic as a linear relationship is called the Pearson product-moment correlation coefficient, r.

The statistical software package, SPSS, was employed to analyze the data collected from the respondents of the survey. Table 1 presents the description of independent and dependent variables.

Table 1: Description of Variables

Variable Type	Variable Description
Independent Variable Student perceptions of the importance of: - Faculty Technical Currency (FTC)	*Faculty technical currency is expressed in terms of the following:* • Technical competency/technological knowledge/skills in the subject matter (up-to-date technical knowledge) [FTC1] • Computer hardware skills (HW) [FTC2] • Computer software skills (SW) [FTC3] • Knowledge of new and emerging technologies [FTC4] • Publications of technical papers and textbooks [FTC5] • Participation in technical seminars, workshops & conferences, and professional organization activities [FTC6]
Dependent Variables Students' perception of their learning / success in terms of: 1. GPA 2. Self-reported technical competency (SRTC1) [Critical Thinking] 3. Self-reported technical competency (SRTC2) [Job Preparation] 4. Self-reported technical competency (SRTC3) [Construction of a Prototype]	*Student learning/success is measured terms of:* • GPA • Self-reported technical competency (SRTC) [in terms of analytical and critical thinking, knowledge of EET, and design and implementation of a system] • Given a technical challenge, a student can analyze a problem by thinking critically (SRTC1 [Critical Thinking]) • Student has confidence in his/her technical knowledge to be successful as an electronics engineering technology (EET) job (SRTC2) [Job Preparation] • Given a technical problem or specification for a system design, a student can propose a solution by designing the necessary sub-system/circuits and by constructing a prototype of the system (SRTC3) [Construction of a prototype]

III. Findings

Data Analysis

Importance of Faculty Technical Currency to Student learning/Success

Question 1: How do students perceive the importance of faculty technical currency for their learning and success?

The main area of the inquiry in this research question dealt with exploring the students' perceptions about the importance of faculty technical currency for their self-reported learning/success. Descriptive statistics were performed using the SPSS software to characterize the students' perceptions. Table 2 presents the summary of students' perceptions of the importance of faculty technical currency to their learning/success. Out of 225 respondents, 85 percent or more agreed that faculty's up-to-date technical knowledge, computer hardware and software skills, and knowledge of new and emerging technologies, are important to their learning and success. And, for the importance of publications/technical papers/textbooks and participation in technical seminars/professional societies activities in student learning/success, more than 50 percent of EET seniors agreed.

Table 2: Students' Perceptions of the Importance of Faculty Technical Currency (FTC) to Student Learning/Success (N=225)

Faculty Technical Currency (FTC) Sub-construct	Agree	No Opinion	Disagree	Mean	Standard Deviation
Up-to-date technical knowledge (FTC1)	91.40%	4.00%	4.60%	5.90	1.16
Computer hardware skills (FTC2)	87.40%	7.60%	6.00%	5.62	1.30
Computer software skills (FTC3)	84.50%	7.40%	8.10%	5.49	1.36
Knowledge of new and emerging technologies (FTC4)	85.70%	7.60%	6.70%	5.58	1.28
Publications/ technical papers/textbooks (FTC5)	51.10%	25.80%	23.10%	4.44	1.66
Participation in technical seminars /professional societies activities (FTC6)	57.40%	24.90%	17.70%	4.75	1.48
Average				5.30	1.37

Association Between Students' Perceptions of the Importance of Faculty Technical Currency (FTC) and Student Self-reported Learning/Success

Question 2: Are there associations between students' perceptions of the importance of faculty members' technical currency (in terms of up-to-date technical knowledge of subject matter, computer hardware and software skills, knowledge of new and emerging technologies, publication of technical papers and textbooks, and, participation in technical seminars, workshops and conferences, and professional organization activities) and student's self-reported learning/success (expressed in terms of self-reported technical competency and GPA) as perceived by seniors in the EET program?

Table 3 presents a correlational matrix relating the components of the technical currency construct and students' self-reported learning/success expressed in terms of self-reported technical competency, and GPA.

For the relationships between faculty technical currency and the first indicator of student learning/success (students' self-reported technical competency variable, SRTC1 Critical thinking]), all Pearson coefficient (r) values are statistically significant and positive (direct relationship) but show small-to-medium effect sizes ($r = .19 – .25$) according to Cohen, [16] except for the "summated FTC construct" where the correlation coefficient value (.29) reveals a medium effect size.

For the relationship between faculty technical currency and the second indicator of student learning/success (students' self-reported technical competency variable, SRTC2 [Job preparation]), Pearson coefficient values are significant and positive (direct relationship) but mostly indicate small effect sizes (r = .11 – .23).

For the relationship between faculty technical currency and the third indicator of student learning/success (students' self-reported technical competency variable, SRTC3 [Construction of a prototype]), all correlation coefficient values are also significant and positive but fall in the small effect size range, except for computer software skills, and the summated faculty technical currency (FTC) where the values (.31 & .29) are in the medium effect size range (r = .25 - .35).

For relationships between summated self-reported technical competency (SRTC) and up-to-date technical knowledge, computer software skills, and summated technical currency, the correlation coefficients exhibit a medium effect size. For relationships between summated self-reported technical competency (SRTC) and computer hardware skills, knowledge of new and emerging technologies, and participation in technical seminars/professional societies activities, the effect sizes are in small-to-medium range.

For the relationship between faculty technical currency and the fourth indicator of student learning and success, GPA, most Pearson coefficient (r) values are negative (inverse relationship) but are not significant, except for the relationship between faculty publications and student GPA, for which the effect size falls in the small-to-medium range ($r = - .21$). This indicates that students perceive that faculty technical currency, in terms of publications, is inversely related to their learning/success measured in terms of GPA. The students who rated faculty publications as an important factor for their learning/success had relatively low GPAs and vice versa.

Likewise, there is an inverse relationship between the summated faculty technical currency (FTC) and GPA, and the effect size is small. This indicates that students perceive that faculty technical currency, in general, is inversely related to their learning/success measured in terms of GPA. The students who rated faculty technical currency as an important factor for their learning/success had relatively low GPAs and vice versa.

Table 3: Pearson Correlation Coefficients for the Relationship Between Students' Perceptions of the Importance of Faculty Technical Currency and Students' Perceptions of Learning/Success Expressed in Terms of Their Self-reported Technical Competency and GPA (N = 225)

	Self-reported technical competency (SRTC1) [Critical Thinking]	Self-reported technical competency (SRTC2) [Job Preparation]	Self-reported technical competency (SRTC3) [Construction of a Prototype]	Summated SRTC	GPA
Up-to-date technical knowledge (FTC1)	0.19**$^{(sm)}$	0.21**$^{(sm)}$	0.28***$^{(m)}$	0.27***$^{(m)}$	- 0.01
Computer hardware skills (FTC2)	0.25***$^{(m)}$	0.13*$^{(s)}$	0.19**$^{(sm)}$	0.21**$^{(sm)}$	- 0.01
Computer software skills (FTC3)	0.24***$^{(sm)}$	0.23***$^{(sm)}$	0.31***$^{(m)}$	0.30***$^{(m)}$	- 0.03
Knowledge of new and emerging technologies (FTC4)	0.19**$^{(sm)}$	0.11*$^{(s)}$	0.19**$^{(sm)}$	0.19***$^{(sm)}$	- 0.07
Publications/technical papers/text books (FTC5)	0.22 **$^{(sm)}$	0.20**$^{(sm)}$	0.25***$^{(m)}$	0.25***$^{(m)}$	- 0.21**$^{(sm)}$
Participation in technical seminars / professional societies activities (FTC6)	0.24***$^{(sm)}$	0.12*$^{(s)}$	0.13*$^{(s)}$	0.18**$^{(sm)}$	- 0.10*$^{(s)}$
Summated FTC construct	0.29***$^{(m)}$	0.22**$^{(sm)}$	0.29***$^{(m)}$	0.30***$^{(m)}$	- 0.12*$^{(s)}$

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Note: Effect size scale, small (s) = 0.1 – 0.15, small-medium (sm) = 0.151 – 0.249, medium (m) = 0.25 – 0.35, medium-large (ml) = 0.351 – 0.449, large (l) ≥ 0.45
SRTC1: Given a technical challenge, a student can analyze a problem by thinking critically.
SRTC2: Student has confidence in his/her technical knowledge to be successful as an electronics engineering technology (EET) job.
SRTC3: Given a technical problem or specification for a system design, a student can propose a solution by designing the necessary sub-system/circuits and by constructing a prototype of the system.

IV. Summary of Results

Table 4 presents a summary of results for students' perceptions of the importance of faculty technical currency for their self-reported learning/success. Table 5 presents a summary of strongest relationships ($r \geq .30$) between students' perceptions of the importance of faculty technical currency (FTC), and students' perceptions of learning/success expressed in terms of their self-reported technical competency (SRTC).

Table 4: Summary of Results: Highest and Lowest Levels of Agreement for Students' Perceptions of the Importance of The Faculty Constructs of Technical Currency, Teaching Techniques, and Commitment to Student Success.(N=225)

FTC Sub-construct	**Agree**	**Mean**	**Standard Deviation**
Highest Level of Agreement (≥ 90%)			
Up-to-date technical knowledge (FTC1)	91.4%	5.90	1.16
Lowest level of Agreement (≤ 60)			
Participation in technical seminars /professional societies activities (FTC6)	57.4%	4.75	1.48
Publications/ technical papers/textbooks (FTC5)	51.1%	4.44	1.66

Table 5: Summary of Results: Pearson Correlation Coefficients for the Relationship Between Students' Perceptions of the Importance of Faculty Technical Currency (FTC), and Students' Perceptions of Learning/Success Expressed in Terms of Their Self-reported Technical Competency (N = 225)

FTC Sub-Construct	**Self-reported technical competency (SRTC1) [Critical Thinking]**	**Self-reported technical competency (SRTC2) [Job Preparation]**	**Self-reported technical competency (SRTC3) [Construction of a Prototype]**	**Summated SRTC**
Statistically Most Significant Relationships ($r \geq .30$)				
Computer software skills (FTC3)	-	-	0.31	0.30
Summated FTC construct	-	-	-	0.30

Note: For all listed correlations $p < 0.001$ and the effect size is medium.
SRTC1: Given a technical challenge, a student can analyze a problem by thinking critically.
SRTC2: Student has confidence in his/her technical knowledge to be successful at an electronics engineering technology (EET) job.
SRTC3: Given a technical problem or specification for a system design, a student can propose a solution by designing the necessary sub-system/circuits and by constructing a prototype of the system.

V. Discussion of the Findings

Question 1: How do students perceive the importance of three faculty dimensions – technical currency, teaching techniques, commitment to student success for their learning and success?

The analyses revealed that EET seniors perceive that the technical currency of faculty is important for their learning and success, as more than 80 percent of 225 EET seniors agreed that up-to-date technical knowledge, computer hardware and computer software skills, and knowledge of new and emerging technologies are important for their learning and success.

These results are significant when looked in light of the faculty technical currency study conducted by Khan et al.[1] The study reported that more then 95 percent of faculty members surveyed agreed that technical currency of faculty is essential to make student learning more relevant. Further, 78 percent agreed that there exists a strong relationship between technical currency and student learning. The survey also revealed that only 26 percent of faculty members said that they have high-level skills in computer competency /IT/hardware area, and 49 percent reported that they have medium level skills in the software area. So there is a need for faculty to enhance their computer hardware and software skills, as the seniors perceive them to be important for their learning and success.

But only half of the EET seniors agreed that the faculty publications of technical papers and textbooks, and participation in technical seminar/professional societies activities are important to their learning/success. This low rate of agreement compared to other faculty technical constructs may be due to the fact that most students may not be aware of the role and process of publications and attending technical seminars/conferences and participating in the professional organization activities in the overall professional development of the faculty.

Question 2: Are there associations between students' perceptions of the importance of faculty members' technical currency (in terms of up-to-date technical knowledge of subject matter, computer hardware and software skills, knowledge of new and emerging technologies, publication of technical papers and textbooks, and, participation in technical seminars, workshops and conferences, and professional organization activities) and student's self-reported learning/success (expressed in terms of self-reported technical competency and GPA) as perceived by seniors in the EET program?

The results indicate that the EET seniors perceive that there is a direct relationship between the faculty technical currency and the first indicator of student learning/success (students' self-reported technical competency variable, SRTC1 [Critical thinking]); all Pearson coefficient (r) values show small-to-medium effect sizes ($r = .19 - .25$), except for the summated FTC construct, where the correlation coefficient value (.29) reveals a medium effect size.

For the relationship between faculty technical currency and the second indicator of student learning/success (students' self-reported technical competency variable, SRTC2 [Job preparation]), Pearson coefficient values are positive (direct relationship) but mostly indicate small to medium effect sizes ($r = .11 - .23$).

For the relationship between faculty technical currency and the third indicator of student learning/success (students' self-reported technical competency variable, SRTC3 [Construction of a prototype]), all correlation coefficient values are also positive but fall in the small effect size range, except for computer software skills, and summated faculty technical currency (FTC), where the values (.31 & .29) are in the medium effect size range ($r = .3$).

For relationships between summated self-reported technical competency (SRTC) and computer software skills, and summated technical currency, the correlation coefficients exhibit a medium effect size.

As for the relationship between faculty technical currency and the fourth indicator of student learning and success, GPA, most Pearson coefficient (r) values are negative (inverse relationship) but are not significant, except for the relationship between faculty publications and student GPA, for which effect size falls in the small-to-medium range ($r = -.21$). This result indicates that students perceive that faculty technical currency, in terms of publications, is inversely related to their learning/success measured in terms of GPA. The students who rated faculty publications as an important factor for their learning/success had low GPAs and vice versa. Likewise there is an inverse relationship between the summated faculty technical currency (FTC) and GPA.

As there is little information available in the literature about technical currency and its relationship to student learning/success, no comparisons can be made with the literature. However the results reveal that the EET seniors perceive that each sub-construct of faculty technical currency (in terms of in terms of up-to-date technical knowledge of subject matter, computer hardware and software skills, knowledge of new and emerging technologies, publication of technical papers and textbooks, and, participation in technical seminars, workshops and conferences, and professional organization activities) is important for their learning/success, though effect size varies from small to medium for the sub-constructs. The association between summated faculty technical currency (FTC) and summated student self-reported technical competency is significant and effect size is medium ($r = .30$). This result suggests that students are aware of the pace of technological change and they perceive that faculty who are technically current have more influence on their learning and success.

VI. Recommendations/Implications for Practice

The study revealed that majority of EET senior (90% or more) perceive that "faculty up-to-date technical knowledge" [a dimension of faculty technical currency (FTC)] is the most important factors that contributed to their learning and success . In the engineering technology discipline, one of the key factors for student learning is the hands-on approach. Therefore, a professor has to be technically current in order to teach/advise students about the design, implementation, and testing of systems composed of state-of-the-art components/sub-systems.

In order to optimize teaching/learning, faculty should be provided opportunities to acquire knowledge and skills in the instructional technology (delivery mode of information/ knowledge/teaching techniques) and the content technology (technical currency for a given discipline)

In the domains of engineering technology, to narrow the gap between the state-of-curricula and state-of- technology in the industry, faculty are required to revise curricula frequently and maintain their technical currency. This endeavor is very challenging, and requires institutional vision, planning, and allocation of appropriate resources. The following recommendations need to be implemented at the personal, program/departmental, and institutional levels to improve student learning/success by enhancing faculty technical currency.

1. *At the personal level:* Faculty members should do a yearly self-inventory of their technical currency, and should identify areas of improvement and pursue professional development activities to enhance their technical currency, and do a self-assessment of their skills.

2. *At the program/department level:*
   a. Administrators/chairpersons need to realize the importance of technical currency. Moreover, they should provide training opportunities for faculty to enhance their technical currency in order to improve student learning/ success. Appropriate funds should be allocated.
   b. Curriculum development and revision activities should be synchronized with faculty development and training activities vis a vis technical currency in order to optimize teaching/learning using continuous quality improvement (CQI) [Figure 1] .

3. *At the Institutional/Organizational level:*
   a. Because of the applications orientation of engineering technology programs, faculty technical currency is essential to make student learning more relevant. Therefore, there is a need to formulate/revise institutional polices to encourage faculty to maintain technical currency.
   b. Presently accreditation bodies such as ABET emphasize the importance of technical currency in the accreditation handbook, but no specific definition of the construct of technical currency exits. ABET needs to develop a blueprint for defining and assessing faculty technical currency so that program evaluators, school administrators and faculty can have a better understanding of the construct and its assessment.

VII. Conclusion:

The present study explored the student-perceived value of faculty technical currency as predictor variables for student learning and student success. It underscored the need for faculty development and training, and recommended ways to improve student learning in a non-research, teaching university environment, where the nature of scholarship is different from a traditional university, at which faculty both do research and teach. Student learning/success predictor variables are also directly related to retention. Student success and retention play a key role in the profitability of an institution.

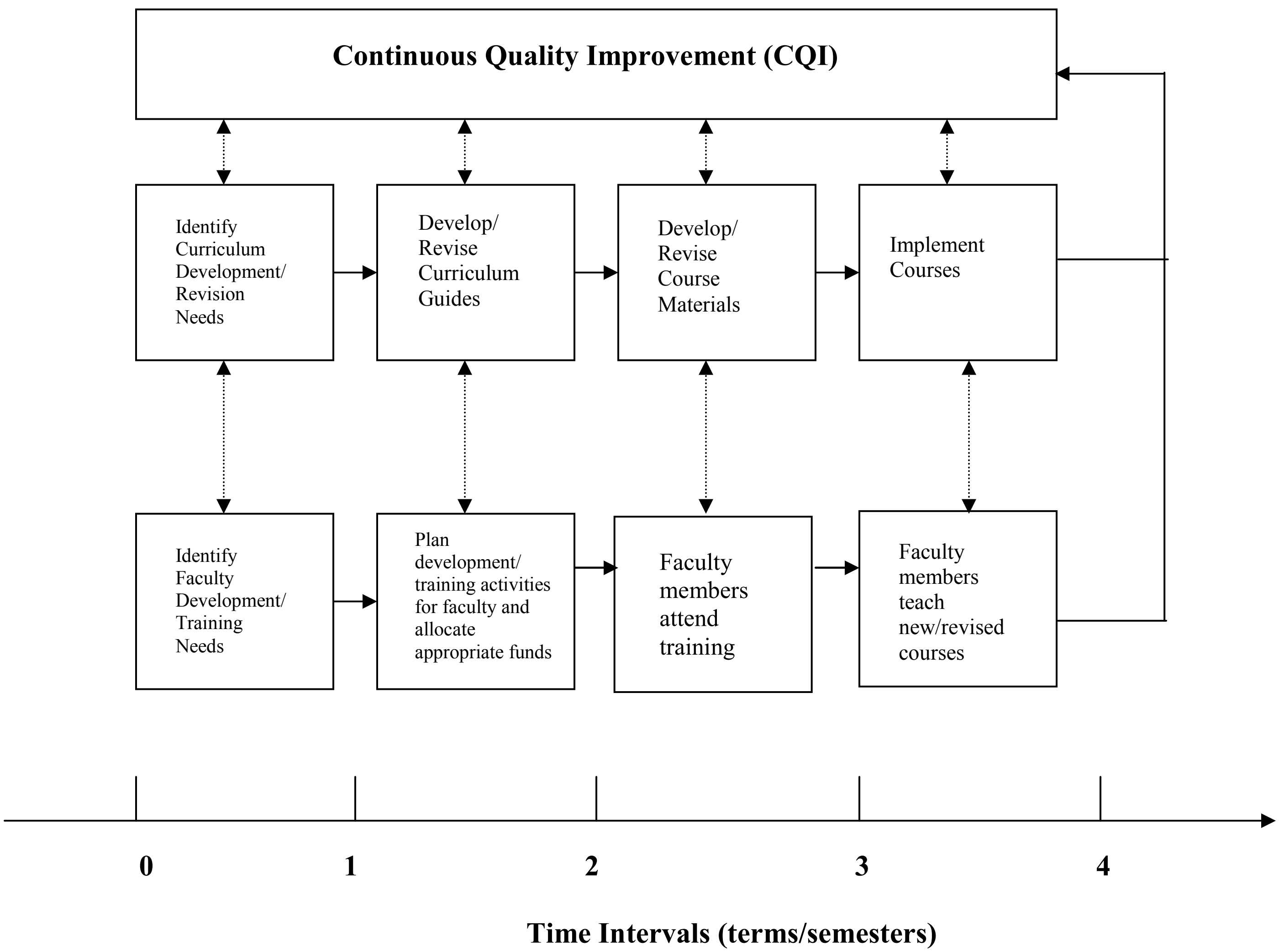

Figure 1. Synchronization of curriculum development/revision process and faculty development/training process to optimize teaching/learning with continuous quality improvement (CQI).

APPENDIX A

Student Survey Instrument

Consider your **technical professors'** influence on your learning and success. Your input is needed regarding these **professors**' **technical currency**, and how various factors related to technical currency influenced **your learning** and **success**. Please indicate the extent to which you agree or disagree with the following statements (Questions 1- 9) about your professors' influence on your learning and success using the following rating scale.

1 = This was not at all important for my learning/success, I strongly disagree (SD)
2 = I disagree with this statement (D)
3 = I moderately disagree with this statement (MD)
4 = I neither agree nor disagree with this statement (N)
5 = I moderately agree with this statement (MA)
6 = I agree with this statement (A)
7 = This was very important for my learning/success, I strongly agree (SA)

Please circle the appropriate number.

Faculty Technical Currency	SD	D	MD	N	MA	A	SA
1. My learning/success is due to my professors being current in terms of subject matter (up-to-date technical knowledge).	1	2	3	4	5	6	7
2. My learning/success is due to my professors being current in terms of computer hardware skills.	1	2	3	4	5	6	7
3. My learning/success is due to my professors being current in terms of computer software skills.	1	2	3	4	5	6	7
4. My learning/success is due to my professors being current in new and emerging technologies.	1	2	3	4	5	6	7
5. My success/learning is due to my professors being current in terms of publishing technical papers and textbooks.	1	2	3	4	5	6	7
6. My learning/success is due to my professors being current in terms of participating in technical seminars, workshops, conferences, and professional organization activities.	1	2	3	4	5	6	7
Students self-perception of competency	SD	D	MD	N	MA	A	SA
7. Given a technical challenge, I can analyze a problem by thinking critically.	1	2	3	4	5	6	7
8. I have confidence in my knowledge of electronics engineering technology (EET).	1	2	3	4	5	6	7
9. Given a technical problem or specifications for a system design, I can propose a solution by designing the necessary sub-system/circuits and by constructing a prototype of the system.	1	2	3	4	5	6	7
10. What is your GPA? My GPA = ___________ out of 4.00							

REFERENCES

1. Khan, A., Karim, A., Gloeckner, G., & Morgan, G. (2004). Faculty technical currency: Status report on a national survey of engineering technology faculty. Paper presented at *2004 ASEE Annual Conference*, June 20-23, Salt Lake City, UT, and published in the conference proceedings.

2. Rodriguez, N. (1996). Predicting the academic success of Mexican American and White college students. *Hispanic Journal of Behavioral Sciences*, *18 (3)*, 329-342.

3. Cambino, R. L., Denny, G. S., & DeVore, J. B. (2000). College student retention at a midwestern university. *Journal of College Admission,* 22-29.

4. Lam, P., Doverspike, D., & Mawasha, R. (July, 1999). Predicting success in a minority engineering program. *Journal of Engineering Education,* 265-267.

5. Dyer, J. E., & Breja, L., M. (1999). Predictors of student retention in colleges of agriculture. *Proceedings of the 53rd Annual Central Region Research Conference in Agricultural Education,* 93-100. St. Louis, MO.

6. Camara, W. J., & Echternacht, G. (2000). The SAT and high school grades in predicting success in college. The College Board: Office of Research and Development, New York: 9.

7. Bean, J. (1980). Dropout and turnover: The synthesis and test of a causal model of student attrition. *Review of Educational Research*, *12*, 485-540.

8. Pascarella, E. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research, 50,* 545-595.

9. Spady, W. (1971). Dropouts from higher education: Toward an empirical model. *Interchange, 2*(3), 38-62.

10. Tinto, V. (1982). Defining dropout: A matter of perspective. In Ernest T. Pascarella (Ed.) S*tudying student attrition* (pp. 3-15). San Francisco, CA: Jossey-Bass.

11. Berlin, H. (1998). Prediction of Student Performance in the Engineering Technologies at an Open-Admission Community College. A report presented to Engineering Technology Division of American Society of Engineering Education in fulfillment of the terms of an ETD mini-grant award. *Engineering Technology Division, American Society of Engineering Education,* 1.

12. Accreditation Board for Engineering and Technology (ABET). (2002). *2003-2004 Criteria for accrediting engineering technology programs*. Baltimore, MD.

13. Center for Electronics Commerce, Graduate School of Business, University of Texas at Austin. *The Internet Economy Indicators*. Available online: http://www.internetindicators.com/overview.html. Retrieved March 14, 2004.

14. U.S. Department of Education, National Center for Education Statistics. (2003). *Distance education at degree granting postsecondary institutions: 2000-2001*. NCES 2003-017, Washington, DC.

15. Creswell, J.W. (2002). *Educational research planning, conducting and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Merrill Prentice-Hall.

16. Cohen, J. (1988). *Statistical power and analysis for the behavioral sciences (2^{nd} edition)*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Authors Biographical Information

Dr. AHMED S. KHAN is a senior Professor in the EET dept. at DeVry University, Addison, Illinois. He received his M.Sc (applied physics) from University of Karachi, an MSEE from Michigan Technological University, and an MBA from Keller Graduate School of Management. He received his Ph.D. from Colorado State University. His research interests are in the areas of Fiber Optics Communications, faculty development, outcomes assessment, and, Internet and distance education. He is author of "The Telecommunications Fact Book" and co-author of "Technology and Society: Crossroads to the 21st Century" and "Technology and Society: A Bridge to the 21st Century." He is a member of IEEE, ASEE, ASQ, and LIA.

Dr. GENE GLOECKNER is an associate professor of education and human resource studies, in School of Education, Colorado State University. He received his Ph.D. from the Ohio state university. He has authored a number of research articles and books. During his 30 years of professional career, he has taught electronics, research design and statistics, and has held various teaching, research and administrative positions at Colorado State University, Montana State University, Ohio State University, and Illinois State University. In addition to writing textbooks, he currently advises students on their dissertations.

Dr. GEORGE MORGAN is a professor emeritus in School of Education, Colorado State University. He received his Ph.D. in child development and psychology from Cornell University. During his 40 years of professional career, he has conducted programs of research on children's motivation to master challenging tasks, and has held various teaching, research and administrative positions at Colorado State University, Stanford University and University of Colorado. Dr. Morgan has taught methods and applied statistics to graduate students in education at Colorado State University. In addition to writing textbooks on SPSS and research methods, he currently advises students on their dissertation.