IMPROVING MECHANICAL ENGINEERING TECHNOLOGY

DEGREE COMPLETION AT

DELAWARE TECHNICAL COMMUNITY COLLEGE

by

Richard Mulski

An executive position paper submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Education in Educational Leadership

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Approved: _____
Ralph P. Ferretti, Ph.D.
Director of the School of Education

Approved: _____
Carol Vukelich, Ph.D.
Interim Dean of the College of Education and Human Development

Approved: _____
Ann L. Ardis, Ph.D.
Interim Vice Provost for Graduate and Professional Education

I certify that I have read this executive position paper and that in my opinion it meets the academic and professional standard required by the University as an executive position paper for the degree of Doctor of Education.

Signed: _____

Fred T. Hofstetter, Ph.D.
Professor in charge of executive position paper

I certify that I have read this executive position paper and that in my opinion it meets the academic and professional standard required by the University as an executive position paper for the degree of Doctor of Education.

Signed: _____

Kathy Friel, Ed.D.
Member of executive position paper committee

I certify that I have read this executive position paper and that in my opinion it meets the academic and professional standard required by the University as an executive position paper for the degree of Doctor of Education.

Signed: _____

Chrystalla Mouza, Ed.D.
Member of executive position paper committee

I certify that I have read this executive position paper and that in my opinion it meets the academic and professional standard required by the University as an executive position paper for the degree of Doctor of Education.

Signed: _____

Douglas Archbald, Ph.D.
Member of executive position paper committee

DEDICATION

I would like to dedicate this dissertation to my wife Marie and my children

Nicole and Michael for their support and encouragement. The inspiration for this

dissertation was my late father, Dr. John H. Mulski who instilled in me an

appreciation for learning that remains with me today.

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ABSTRACT

Delaware Technical Community College (Delaware Tech) is a statewide institution of higher education, providing career, general and continuing education, and industrial training both on-site and through electronic media. The Associate in Applied Science (AAS) is granted upon successful completion of specific curriculum requirements, including general and technology-specific education. Mechanical Engineering Technology (MET) department enrollment statistics from the last six years show that only twenty-seven (27) percent of students complete the MET degree in three years or less. Delaware Tech needs to increase this percentage because a low completion rate negatively impacts the school and the student's future.

The purpose of this study is to develop a recommendation for departmental and course changes in the MET program to increase the percentage of students completing the MET degree in three years or less without negatively impacting the quality of the curriculum and courses.

The key questions of this study are:

1. How are other educational institutions improving their completion rates?
2. How can students at risk of not finishing be identified earlier?
3. What do students believe are the major contributing factors affecting how long it takes them to complete the degree?
4. What do instructors believe are the major contributing factors keeping students from completing the degree in a timely fashion?
5. How do faculty believe they can help students complete their degree on time?

The literature reviewed the major contributing factors that research experts think will help improve student retention and persistence to graduation in a

community college setting. The research indicates that there are important components to address at the community college to increase graduation rates; these components include quality instruction, peer mentoring, faculty student interaction and advisement, institution attributes, minority student success, part-time faculty, project based learning (PBL), and 21st century skills.

The investigator used interviews and surveys to learn the perceptions of students and faculty. The student survey contains 15 questions. Students were solicited from first year as well as advanced classes in the MET degree program. Faculties for those same courses were selected for participation.

There are several recommendations for Delaware Tech administration as a result of this investigation:

- Create a more interactive advisement model.
- Educate students on the pitfalls of working too many hours.
- Offer more convenient classes and use alternate formats.
- Create an analysis of the characteristics of students in the program.
- Increase student support through learning communities.
- Appoint a retention team leader for the department and/or the college.
- Incorporate project based learning and 21st century skills.
- Implement a peer mentoring program.
- Increase the use of full-time vs part-time faculty in the department.

The number of Mechanical Engineering Technology (MET) students completing their associate degree requirements in three years or less can be increased while not lowering the high standards of the program. The MET program graduation goal going forward should be forty percent (40%) for students completing the program in three years or less. The six-year average for 2009-2014 was twenty-seven percent (27%) for the MET program. This target goal represents an increase of 13%.

Chapter 1

INTRODUCTION

This Executive Position Paper is comprised of three chapters. Chapter 1

contains an introduction to the purpose of the study; Chapter 2 includes the

methodology and analysis used in this study; and Chapter 3 provides conclusions and

recommendations for Delaware Technical Community College (Delaware Tech)

administration.

Delaware Tech is a statewide institution of higher education, providing career,

general and continuing education, and industrial training both on-site and through

electronic media. The College provides educational opportunities to every resident of

Delaware and the surrounding areas at four locations: Stanton, Dover, Georgetown

and Wilmington. Numerous programs are offered leading to a certificate, diploma or

the Associate in Applied Science degree. The Associates degree in Applied Science

(AAS) is granted upon successful completion of specific curriculum requirements,

including general and technology-specific education.

The Mechanical Engineering Technology (MET) department consists of three

full-time instructors, a department chair, four adjunct instructors, an administrative

technician, and an educational lab specialist. There are approximately 135 full-time or

part-time students enrolled in the MET major. According to the federal government's

accountability standard, students should complete the two-year associate degree in

three years. However, not all students who start the MET major finish their associate

degree requirements in this three-year time frame. The problem in the MET department is that the number of students graduating in three years or less is only twenty-seven percent, based on the last six years of data. Some students transfer to other educational institutions; some join the workforce for financial reasons; and others drop out due to the academic rigor of the program or loss of interest.

Recently, President Obama established a *2020 College Completion Goal* for Community Colleges to increase completion of college degrees from forty (40) to sixty (60) percent (Duncan, 2010). This would mean 10 million additional Americans between the ages of 25-34 with an associate or baccalaureate degree. By achieving this goal, America would have the highest proportion of college graduates in the world. Currently, only fifty (50) percent of all college students graduate with a degree (Murray & Ullman, 2010), decreasing global competitiveness.

When students do not complete their degrees it not only impacts them, but also the workforce, the economy, and the institutions they attended (Hefling, 2012, Schneider & Yin, 2011). By postponing graduation into the future, students lose potential earnings that could be realized during the delay. Estimates indicate that an associate degree can increase an individual's earnings between fifteen (15) and thirty (30) percent (Marcotte, 2010).

<div align="center">Purpose of the Study</div>

MET enrollment statistics from the last six years show that only twenty-seven (27) percent of students complete the MET degree in three years or less (Figure 1). Delaware Tech needs to increase this percentage because a low completion rate negatively impacts the school and the student's future. Delaware Tech administration

has set a very obtainable goal to increase this completion rate from twenty-seven (27) to forty (40) percent. Understanding that organizational change takes time, the college plans to complete this goal over the next five years.
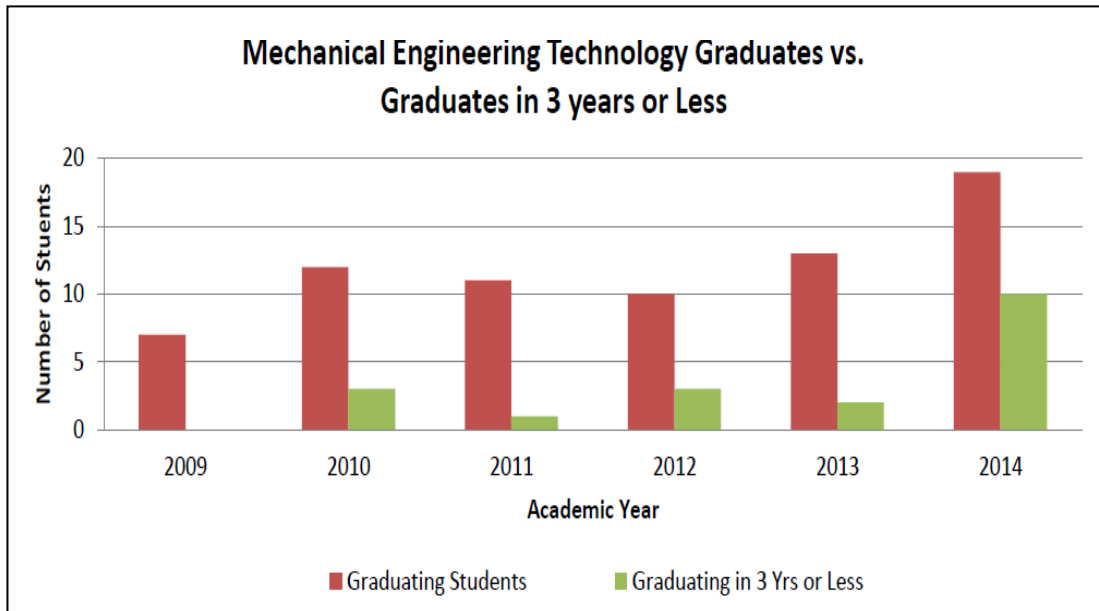
Figure 1. MET Graduation Rates

The purpose of this study is to develop a recommendation for departmental and course changes in the MET program to increase the percentage of students completing the MET degree in three years or less without negatively impacting the quality of the curriculum and courses. While the problem investigated here is specific to the MET program, this is a college-wide issue. The recommendation presented in this study could be used by Delaware Tech to improve the graduation rates in other departments.

The key questions of this study are:

1. How are other educational institutions improving their completion rates?
2. How can students at risk of not finishing be identified earlier?
3. What do students believe are the major contributing factors affecting how long it takes them to complete the degree?
4. What do instructors believe are the major contributing factors keeping students from completing the degree in a timely fashion?
5. How do faculty believe they can help students complete their degree on time?

In order to understand what can be done to increase the number of students in the MET program who graduate in three years or less, a review of the reasons why students decide not to continue taking classes at community colleges is required. There may be a correlation between slower completion time and dropout rates. Johnson & Rochkind (2009) provide some eye-opening statistics about the lives of community college students that can have a great impact on their ability to maintain the work required for degree completion. They find the dropout rate to be twenty (20) percent, but admit the figure could be as high as forty (40) percent. Therefore, those who drop out and those who take more than the prescribed amount of time to complete the degree have a lot in common. Based on this information the investigator reviewed the literature that pertains to community college dropout rates to get a better understanding of the challenges that students face.

Delaware Tech is not the only educational institution experiencing slower completion rates. The investigator reviewed the literature and identified resources to study how other institutions, faced with similar situations, have addressed these issues. The Community College Completion Challenge web site

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(http://www.cccompletionchallenge.org/) is one such resource. The website is devoted to sharing action plans and strategies designed to help students complete their degrees.

<div align="center">Review of the Literature</div>

Many community colleges have been investigating ways to improve their graduation rates. They have been trying to increase student performance and persistence to graduation while maintaining open access; this translates to more students who graduate with a degree. However, many community college students decide to stop attending after their first year. Recent focus has been on students getting access to the college, but not on program completion once they begin attending classes. President Obama's American Graduation Initiative (Kanter, Ochoa, Nassif, & Chong, 2011) has refocused higher education from access to completion, emphasizing the latter as the definitive measure of success for community colleges. Community colleges are now in the precarious situation of providing access to underserved students that include learners who are under prepared for college-level coursework and struggle to finish while also increasing graduation rates. Bragg & Durham (2012) found that access and success cannot be seen separately. Community colleges cannot focus on success without also focusing on overall access for students.

The challenge faced by all community colleges is how to increase student success, whether success is defined in terms of graduating with a degree or certificate, transferring, or retaining a job. With approximately 40% of the nation's undergraduates pursuing higher education through the community college (52% when

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one considers public institutions only; Bragg & Durham, 2012); this problem is a crucial one.

The review of the literature was focused on improving the graduation rate at community colleges, especially those programs with an engineering technology focus. The literature reviewed the major contributing factors that research experts think will help improve student retention and persistence to graduation in a community college setting. The research indicates that there are important components to address at the community college to increase graduation rates: these components include quality instruction, peer mentoring, faculty student interaction and advisement, institution attributes, minority student success, part-time faculty, project based learning (PBL), and 21st century skills.

Quality Instruction

Good quality instruction can be a major contributor to student success and persistence to graduation at the community college. In Agrawal and Kahn's (2008) literature review they found that the "instructor's contribution to the student knowledge-gain is considered the most important source of learning" (p. 86). However, they also found evidence that "a student's learning is not always proportional to the instructor's teaching performance" (ibid, p. 86). Ramaley, et al. (2012) sees completion rates as important but not the essential indicator of quality when stating, "completion rates are important, but measurable and comparable evidence of student learning will be essential if completion is to be ultimately accepted as a legitimate measure of college quality, as it should be" (para. 18).

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From the quality of education viewpoint, most of the research has been conducted on educational outcomes, like graduation rates rather than the processes that generate such outcomes. In addition, most of the data have been collected at the end of the semester or year and aggregated at the department level for a community college. Therefore, to obtain a better quality of education along with better outcomes, the main focus should be on the way teachers teach and students learn in the classroom. Frick, Chadha, Watson, Wang, & Green (2009) support this notion by stating, "we also strongly recommend that learners be assessed both before and after instruction with respect to their mastery of instructional objectives. Designers can confirm whether learning a lot is learning enough. If students are not learning enough, then it is likely that parts of the instruction can be improved" (p. 716). Providing course assessments to the student before a particular class and after can more positively indicate the quality of the educational outcomes.

The effectiveness of instructions in terms of the learning outcomes depends on a number of factors such as how well the instructor can teach, and how well and the way students can learn including personal motivation. Ramaley, et al. (2012) sees the way that the student is challenged to learn as a key component when he states that "the student effort is a major component of educational quality" (p. 21). However, student learning takes place when students are challenged to use knowledge in meaningful ways, learning to apply this knowledge in the future. Frick, et al., (2009) defines five principles of learning to guide the discussion:

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(1)   learning is promoted when learners are engaged in solving real-world problems;

(2)   learning is promoted when existing knowledge is activated as a foundation for new knowledge;

(3)   learning is promoted when new knowledge is demonstrated to the learner;

(4)   learning is promoted when new knowledge is applied by the learner;

(5)   learning is promoted when new knowledge is integrated into the learner's world. (p. 706)

Instructors who engage their students in innovative ways, using real-world tasks, will see the quality of the educational experience increase at their institution. Community colleges need to focus on student learning and the instructional methods that lead in that direction.

Peer Mentoring

It is clear that peer influence in academic settings can have significant positive effects on student learners. Latino & Unite (2012) concluded "the best answer to the question of what is the most effective method of teaching is that it depends on the goal, the student, the content, and the teachers…but the next best answer is students teaching other students" (p. 31). Students can also help to tutor other students, assisting them to learn material and ask questions. "Examples of peer support of academic endeavors, most notably tutoring, date back to the colonial period of U.S. higher education and persist today" (ibid, p. 31). Having students who mentor other students has changed over the years, becoming more common place today. "Peer education has evolved from being a marginal endeavor in which academic support educators were employed to help 'at-risk students' to a mainstream enterprise that improves teaching and learning experiences for all students" (ibid, p. 31).

The peer mentor's role can be more collaborative than the one the student may have with their teacher. In addition, peers can model good learning strategies to the

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student. "As a coach, the peer educator plays a less authoritative role than other academic peer educators. Rather, he or she is seen as a mentor whom students can trust. Much like in a peer mentoring role, academic coaches model appropriate behavior for their peers" (Latino & Unite, 2012, p. 37). This relationship can be very positive and empower students to understand how to improve their own academic experience.

First year seminar programs and learning communities can be made available for students at the community college to help with student success. "Beyond their roles as instructional, counseling, and referral agents, peer educators play an important role in shaping the reputation and culture of a first-year seminar program" (Latino & Unite, 2012, p. 33). First-year seminar programs, using peer educators, can help to motivate and engage students. These programs can also help the student to be more interested in other activities at the community college.

Many community colleges already use first-year seminar experiences for students, however, they can be offered in many different formats. "First-year seminars are offered in a variety of formats that include extended orientation seminars, academic seminars, professional or discipline based seminars, seminars focused on basic study skills, and those that draw from all approaches to create a hybrid approach" (Latino & Unite, 2012, p. 32). Many innovative and successful models have been created at institutions to help with student retention and persistence to graduation that could be implemented at the community college. Latino & Unite's (2012) research uses the LSU–HHMI Professors Program mentoring model (Figure 1) that incorporates mentoring, research and education. This model issued within

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Science, Technology, Engineering, and Mathematics (STEM) education and focuses on: (a) undergraduate academic performance, (b) self-image, (c) background before college, (d) academic advising, (e) financial support, and (f) social integration (Latino & Unite 2012). The LSU–HHMI Professors Program Mentor Model links important retention triggers at the middle and high school levels with students transitioning to the community college environment and beyond (Wilson, et al., 2012).
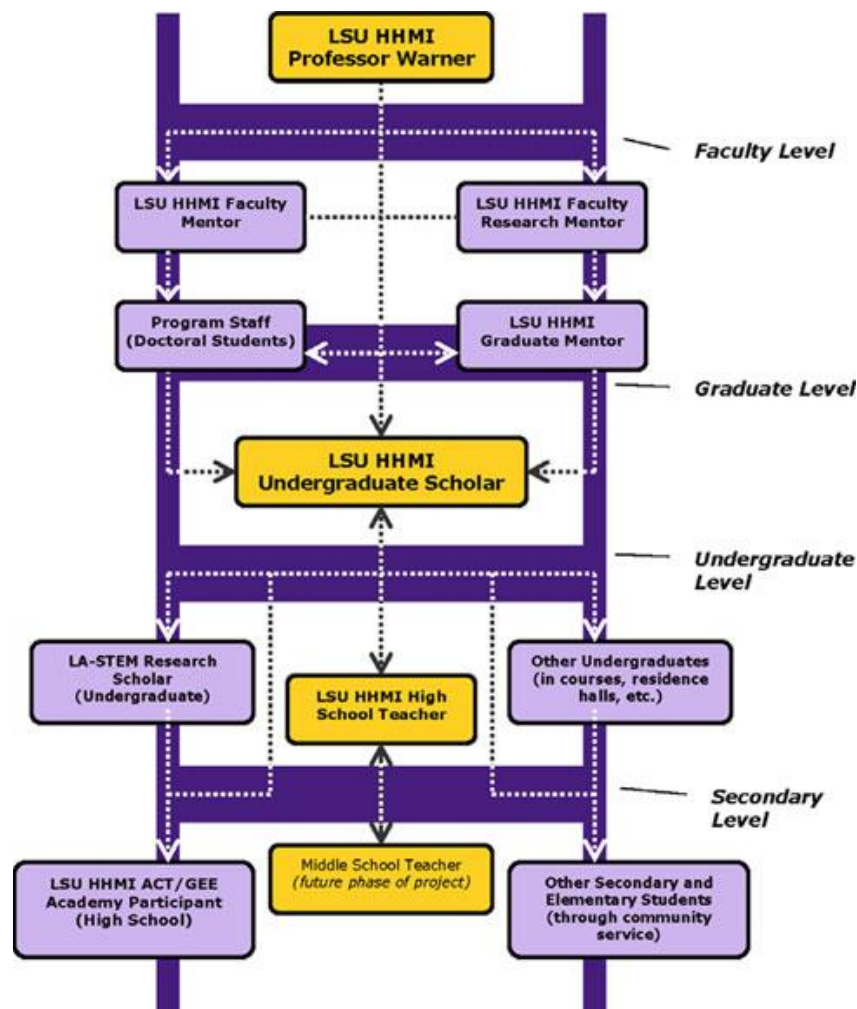
Figure 2. LSU-HHMI Professor Program Mentor Model (Wilson, et al., 2012)

Student retention can increase when students interact well with the faculty at the community college they are attending. Shinde's (2012) review of literature

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supported the idea that faculty-student contact enhanced student learning. Based on the data, relationships between faculty and students can help students to learn and potentially persist to finish their education.

Faculty who engage their students in the classroom with creative learning strategies can benefit students. Umbach's (2005) study findings "suggest that students report higher levels of engagement and learning at institutions where faculty members use active and collaborative learning techniques, engage students in experiences, emphasize higher-order cognitive activities in the classrooms, interact with students, challenge students academically, and value enriching educational experiences" (p.153). The role of faculty in the lives of community college students can help them to learn, persist and complete their courses. As Umbach found, "on campuses where faculty report frequent course-related interactions, both first-year and senior students were more challenged and engaged in active and collaborative learning activities" (Umbach, 2005, p. 163). Shinde (2010) looked for reasons students leave the college programs and found that the "significant variables were dissatisfaction with their institution, followed by a lack of emotional preparedness and emotional stability' (p. 56). Lloyd & Eckhardt (2010) supports this notion when stating, "it is also necessary to consider the realities of community college students' lives, because these realities affect student utilization of support methods and student response to format of instruction" (p. 34).

Student advising and counseling are key components of student retention and persistence to graduation from community colleges. Lloyd & Eckhardt's (2010) review of the literature found that institutional policies can affect success rates and

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many recommendations exists for "institutional changes that affect the methods used to fund community colleges and improving counseling and advising services" (p. 34). If community colleges embrace more robust student advisement services, there should be more students who persist and graduate from the institution. Faculty who advise students understand the nature of the school they teach in and how students typically engage themselves at the community college.

In the past 20 years, the need for quality academic advising has been emphasized as a way to increase student retention (Gansemer-Topf & Schuh, 2006). Assuming that academic advising provides students with an opportunity to become engaged academically, it is not surprising that academic support expenditures positively contributed to retention and graduation rates (Latino & Unite, 2012).

The role of student services professionals is to complement students' in-class educational experience by getting them involved in their institution through a variety of experiences (e.g., residence halls, student activities, recreation, etc.). As students become more connected to their institution, their involvement would increase, and therefore increase their chances of persistence (Latino & Unite, 2012).

While counseling, advising, and developmental education have been identified as *crucial* to community college students, current studies have not identified an effective design or organization for these services (Bailey, Alfonso, Calcagno, Jenkins, Kienzl, & Leinbach, 2005). Faculty at community colleges typically assume greater responsibilities for these services than do those at four-year institutions where research expectations are greater. Research that connects the separate literatures on part-time faculty to the extensive literature on student persistence is scarce. Bailey, et

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al., (2005) have pointed out that research on persistence has not been particularly effective in identifying programs and policies that improve student outcomes at community colleges.

Institution Attributes

The institutional structure and organization of community colleges can help or hinder student success and persistence to graduation. "Although American society has made great gains in the numbers and proportion of high school students attending community college over the last several decades, actual completion rates have remained low" (Goble, Rosenbaum, & Stephan, 2008, p. 63). Once community colleges understand and quantify the institutional attributes that are important for students to graduate with a degree, they can target those attributes to improve graduation rates.

Leaders at community colleges need to take a hard look at the factors specific to their own institutions, and evaluate what can reasonably be done to improve their graduation rates. A large number of research studies have focused on attributes such as socioeconomic status, race, and prior achievement (Goble, Rosenbaum, & Stephan, 2008). Institutional and student differences both tend to influence student persistence to graduation. Institutional leaders should look at both variables and make strategic decisions based on the unique interaction of these variables at their own institution (Titus, 2004). Goble, Rosenbaum, & Stephan (2008) found that "the idea that certain institutional attributes can have a systemic influence on student success at two-year colleges is emerging in recent studies" (p. 63). The conceptual model shown in figure 2 helps to quantify the student and institutional factors that influence a student's

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persistence to graduate from the community college. While some of factors may seem intuitive, others may be specific to the culture and climate of the institution and they need to be looked at objectively for school leaders to make meaningful changes.

Student Level

Bean (1990)

Student background	Student experiences	Student attitudes	Environmental pull
Gender, race, socioeconomic status, first-generation, educational aspiration	Academic performance (high school GPA, SAT score as a proxy), Living on campus	Dropout intention Stopout intention Transfer intention	Financial concern

Individual probability of persistence to degree completion

Institutional Level

Berger-Milem (2000)	Hurtado et al. (1999), Bonous-Hammarth (2000), Weidman (1989)

| **Student peer characteristics**: high school GPA, financial concern, degree aspiration, socioeconomic status, gender, first-generation

Structural demographic characteristics: private, four-year, institutional size, selectivity, racial diversity | Student peer climate

Learning climate: From faculty perspective | **Psychological dimension of institutional retention climates**: dropout, stopout, transfer

Faculty perceived campus environment: teaching & learning, multicultural environment, active learning |

(Institutional Climate)

Average institutional probability of persistence

Figure 3. Institutional Factors That Influence a Student's Persistence to Degree Completion (Titus, 2004, p. 676)

Goble, Rosenbaum, & Stephan (2008) focused on three categories to review effects on graduation rates: compositional, institutional, and organizational, described as "compositional variables reflect the student-body composition and include total fall undergraduate enrollment, percent of fall undergraduates enrolled part-time, and the percent of students who are members of a racial or ethnic minority group.

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Institutional variables include dummy variables for private (versus public) status at colleges" (p. 66). Gansemer-Topf & Schuh (2006) supports the theory that colleges need academic and social integration for their students. Gansemer-Topf & Schuh's (ibid) review of Tinto's work is used to support this approach. Social integration and engagement of students at the community college will help them to persist to graduation.

Reisberg (1999) stated that the "real reason students leave their institutions is that they have not significantly engaged in the campus community" (para. 8). Students are likely to remain with the institution if they feel connected to it. Learning communities have become quite popular at community colleges recently to help with student success. "Many institutions are also creating 'learning communities,' in which small groups of freshmen can bond over their books" (ibid, para. 7). There is strong evidence on the use of learning communities and their positive impact at community colleges. "*Learning communities*, which organize instruction around themes and allow students to go through a program as cohorts, constitute a particularly interesting model for community colleges since it is one way that these commuter institutions can engage with their students in a more intensive way than normally occurs in classrooms" (Bailey, et al., 2005, p. 6). The use of learning communities can help with retention and help students to persist to graduation.

Students who have friends and close relationships in their first year of college are more likely to persist to graduation. Skahill (2002) examined the role of social support networks in student persistence among residential and commuter students at

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an urban technical arts college. The findings indicate that commuter students are less likely to persist in their college studies. Commuter students do not make the number of friends that students who live on campus do. Skahill (ibid) found that "institutions with higher percentages of students over age 25 tended to have lower graduation rates. Some more structural characteristics, such as expenditures per student, smaller total enrollment, and the availability of on-campus housing, were also related to higher graduation rates" (p. 45).

The total level of social support was a significant predictor of academic achievement, which confirmed their hypotheses and supports the previous literature relating to social support and college academic achievement. Pascarella (1986) pointed out that peer support was an important factor in student persistence in school. If students have close and meaningful relationships with friends at college, they can develop a support system and feel a level of belonging that helps them stay enrolled in school. Learning communities for students can also be used by the community college to increase student retention (Stebleton & Nownes, 2011).

Minority Student Success

The success of minority students is important to improve the graduation rate at community colleges. Important independent variables for minority students can fall into two broad categories, individual and institutional characteristics. These were selected according to which prominent models of post-secondary persistence were identified as important to student success and also with an eye toward some of the central concerns in today's college choice discussions (Tinto, 1993). Individual-level variables include demographic characteristics such as gender, race or ethnicity, and

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family socioeconomic status, as well as high school achievement. For African Americans and other underrepresented students of color, poor retention rates reflect a lack of student-college fit (Aragon, 2000).

For minority students whose mentor is also a minority, that relationship can serve as a powerful reminder that the prevailing stereotypes of minorities in the sciences can be overcome. Faculty mentors can fulfill multiple roles for students not just as teachers and research advisors, but also as role models and career motivators. Based on previous research, community colleges should attempt to restructure their institutional environments in order to encourage self-actualization and matriculation for students of color. In addressing the needs of culturally diverse learners, college educators must continue their internal evaluation of existing structures and become more cognizant of the restructuring necessary to create optimal learning conditions for students of color (Aragon, 2000).

Providing peer mentoring to minority students may help the graduation rate for this cohort of students. These results raise concerns about whether community college students attending institutions with high proportions of minorities may be structurally shortchanged in ways that seriously harm students' degree completion. More research is needed to understand and improve student success dynamics at these institutions. For example, studies need to examine how students receive information and make decisions about delaying college, attending part-time, and interrupting or changing colleges because all of these choices have been shown to have strong negative effects on completion (Goble, Rosenbaum, & Stephan, 2008). Similarly, more research is needed to assess whether graduation rates at community colleges are

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partially determined by the number of students enrolling in majors with high completion rates because it is likely that individuals' completion rates are strongly related to the labor market payoffs they anticipate for completing a degree in that major (Goble, Rosenbaum, & Stephan, 2008).

Part-Time Faculty

Most community colleges typically employ adjunct staff (part-time) to teach their students. In most cases over half of instruction is done using part-time employees. While many students do not know if their instructor is full or part-time, the research suggests this can have an influence on graduation rates (Jacoby, 2006). Relying on part-time faculty can have a negative impact on student success. As Jacoby (2006) found that, "poor institutional assimilation by part-time faculty adversely affects student learning. The effects included reduced instructional quality, lack of curricular cohesion, and weak advising" (p. 1083). If the number of part-time faculty is high at the community college, it could lead to student retention and graduation problems.

Part-time faculty can have a difficult time getting acclimated to the college environment and a specific institution. Community colleges that employ a large number of adjunct instructors need to be mindful that it could lead to problems with instructional quality. While successfully raising questions about the instructional effectiveness of part-time faculty, the quantitative evidence in that volume did not address the central question of whether heavy reliance on part-time faculty significantly alters student outcomes. One finding of this study was that community college graduation rates decrease as the proportion of part-time faculty increases. The

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finding was corroborated using three different measures of graduation rates. It is important to note that there appears to be a limited tendency among community colleges to substitute part-time for full time faculty and this increases faculty-student ratios. This increase in faculty-student ratios partially offsets the decreases in graduation rates arising from reliance on part-time faculty, but preliminary analyses strongly suggest the net effect is still negative.

Full-Time and Part-Time Students

There can be a dramatic difference in retention for full-time versus part-time students at the community college. Almost two-thirds of community college students nationally enroll on a part-time basis. The Community College Survey of Student Engagement (CCSSE) results indicate these students have an educational experience that is qualitatively different from their full-time classmates. For example, part-time students are significantly less likely to work with other students on projects either in or outside of class; interact with instructors via e-mail or have conversations about grades, assignments, or career plans, or make a class presentation (Shinde, 2010). Although these data may in part be unsurprising, colleges should contemplate why even the in-classroom experience of part-timers appears to be systematically less engaging. Given the large numbers of these students, attention to strategies for engaging and retaining them more effectively may provide an overall boost to the rates of successful student outcomes. The number of hours students are working contributes to their part-time status and retention.

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Project Based Learning (PBL)

For the most part, current engineering education in many colleges and institutes still follows the traditional instruction and knowledge delivery approach generally referred to as the *instruction paradigm* (Barr & Tagg, 1995). An alternative approach referred to as a *learning paradigm* or 'constructive paradigm' has been under development mainly based on the pragmatic philosophy of education formulated by John Dewey in the early 20th century (Vega & Brown, 2013). Constructivism offers some practical instructional strategies that have much to contribute to the new paradigm of education for the current information age. Some of its strategies are uniformly applicable to most kinds of learning, but others are only applicable to higher-level learning in ill-structured domains. At the heart of constructivism is the belief that each learner must construct his⁄her own knowledge and therefore, the instruction must create an active role for the learner. Thus, according to the new paradigm, the center of education is learning, not instruction.

Active learning encompasses instructional methods like problem based and project-organized learning environments, which are characterized by the following features: (a) problem-orientation, which relates learning contents to a broader perspective and context, (b) participant-direction, which provides learning opportunities derived from interests and experiences, (c) interdisciplinary learning, which encourages students to go beyond traditional subject-related boundaries and methods in order to solve real-life problems, and (d) project and group-work organization, which provides a chance to practice work in life.

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Agrawal & Khan (2008) see that "by taking both cognitive and affective learning into consideration, the Project Based Learning model is designed to create an active learning context and to provide a chance for the development of collaboration, communication, co-operation and management of the learners" (p. 87). In addition, "traditional lecturing-receiving approach puts the instructor at the centre of the learning environment, but the subjects of learning, that is, students play a passive role" (ibid, p. 87).

Previous studies have found students prefer courses that include application-based work and projects where problem-solving skills, design skills, and creativity can be applied. Courses that include learning activities appear to motivate students in their studies (Mahendran 1995, Baillie and Fitzgerald 2000). Furthermore, Baillie and Fitzgerald (2000) found students who dropped out of engineering programs often perceived engineering classes were not challenging and were uninteresting. This appeared to be especially true when memorization was one of the primary learning skills required for academic success. Courses requiring a high level of memorization were evaluated, by students, as not forcing students to 'think for themselves'. Based on these findings, lectures and rote assignments (common teaching methods) may not motivate students to continue in their engineering studies. Supplementing traditional lectures and textbook assignments with learning activities, however, requires time in planning and assessment. In some cases, learning activities also require additional resources (space, technology, materials, equipment) that may not be readily available to faculty.

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The MET curriculum could benefit if a greater emphasis is placed on project-based learning (PBL). This approach is being implemented increasingly by schools and educational leaders to equip students with 21st century skills. Vega & Brown (2013) defines that as a "systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks, PBL fosters and develops the aforementioned skills" (p. 5). Project-Based Learning (PBL) can help students to succeed in the classroom by providing an active learning environment for important skills helping students to succeed in college and also later in the workforce.

PBL is one of the most effective tools used in engineering education. It increases student motivation toward the subject being presented in the course, improves their communication skills, and develops their self-learning abilities (Mokhtar, 2008). "Project-based learning (PBL), as related to STEM curriculum design, is a newly developing field. PBL is mainly based on constructivism and is supported by concepts of cognitive psychology and situational learning" (Lou, Liu, Shih, & Tseng, 2011, p. 163). Students in technology programs at a community college can benefit from this kind of learning. "The advocacy of learner-centered learning and the emergence of digital classrooms lead to the demand for transformation of pedagogical design that supports the development of 21st century skills through domain knowledge learning" (Siu Cheung, et al., 2014, p. 70). This new innovative method of learning will help with student success and potentially increase college graduation rates.

21st Century Skills

A PBL theoretical framework can be applied to the MET curriculum at Delaware Tech. This new framework is the "Framework for 21st Century Learning" (Figure 3). Using this framework, the MET curriculum elements can be applied to classes in the program.
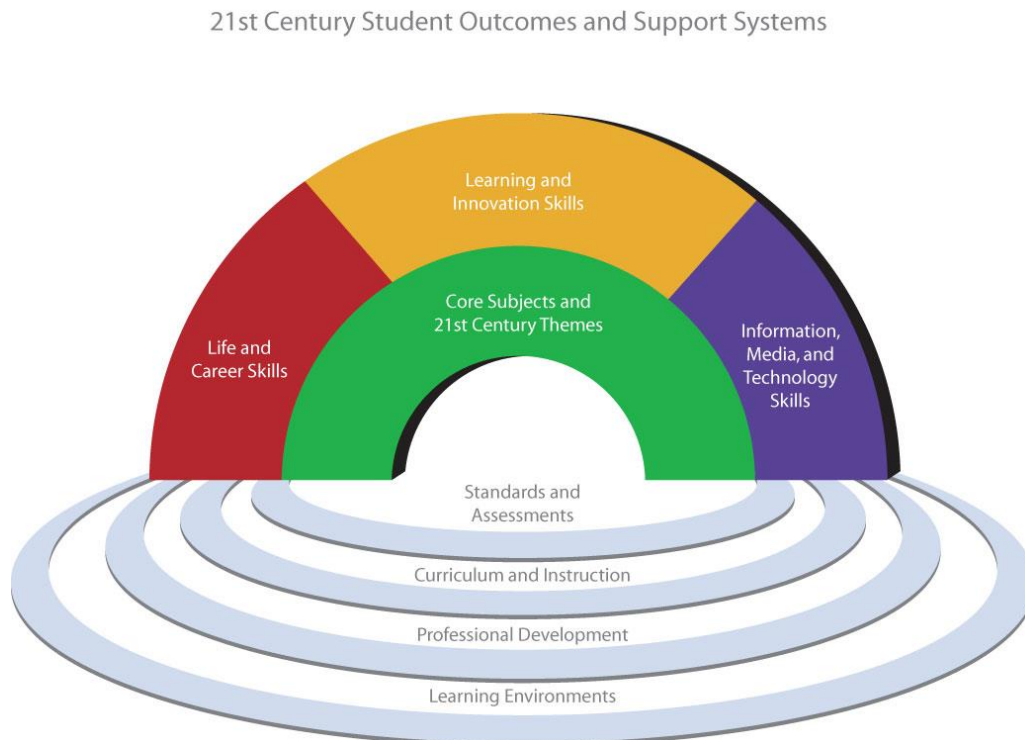
Figure 4. Framework for 21st Century Learning (Partnership for 21st Century Schools, 2010)

Kereluik, Mishra, Fahnoe, & Terry (2013) support the framework by stating, "the issue of what our students need to know has been receiving a great deal of recent attention—mostly under the auspices of 21st century learning. There is a feeling of distinct disjuncture between centuries past and the one into which we are now emerging, and that the educational demands of this new century require new ways of

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thinking and learning" (p. 127). Innovation at community colleges can increase with the implementation of 21st century learning and skills. New technology is part of this approach; however, it is more than just technology. The world has changed and is smaller in many ways, students are now competing in a world economy, and we must stay competitive. Community colleges should embrace this framework for 21st century learning.

Instructors at the community college need to stay current and understand the importance of changes taking place in the world, how changes impact information, and the ways we give this knowledge to our students. "As teacher educators, we are particularly sensitive to what 21st century learning means in terms of the knowledge teachers must possess and how to best facilitate that knowledge. Consider, for instance, a report on the 21st centuryschools.com website suggesting that today's students, due to their immersion in technology, is fundamentally different from students in the past—and thus change has to have different learning goals and necessitate different teaching approaches" (Kereluik, et al., 2013, p. 127). New technology and how instructors choose to implement information and learning into the classroom can be a win for the community college.

Great changes in education can be exciting, innovative, and transformative, all elements of 21st century schools. "Schooling practices are designed to prepare citizens for the industrial age rather than the needs and demands of the new millennium. Parallel to this are individuals and groups who offer a range of suggestions for what are broadly labeled 21st century skill" (Kereluik, et al., 2013, p.

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127). These skills can help students to compete globally and in the new economy in the United States.

The MET program at Delaware Tech does have a curriculum that emphasizes a PBL format. Student discovery and hands-on learning are benefits of laboratory activities in post-secondary technology programs. "Both domain knowledge and 21st century skills are the learning outcomes for developing 21st century skills. As like domain knowledge, learners' competency in 21st century skills is also needed to be assessed in the process of classroom learning" (Siu Cheung, et al., 2014, p. 71).

Assessment is currently part of the culture at many community colleges because it has become commonplace to measure student outcomes. Measuring the outcomes for 21st century skills and domain knowledge is important for students to learn. "The assessment of 21st century skills should therefore be linked with the assessment of domain knowledge, so that teachers can better understand the interrelationship between learners' gains in these two types of learning outcomes. The related assessment should target at evidence of improvement and awareness of progress, in order to reveal both positive and negative features of learning process" (Siu Cheung, et al., 2014, p. 71).

Research has shown PBL is an instructional model to produce 21st century skills. PBL is a "systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks" (Vega & Brown, 2013, p. 5). Students at community colleges that utilize PBL learn in ways that will help them to succeed in the workplace and throughout their careers.

Many PBL skills can be measured by assessment methods using quality skills rubrics. Bell supports the rubric approach by stating, "we must shift our thinking about assessment when teaching twenty first-century skills. With PBL, assessment is authentic. We measure a child's performance via rubrics, but a critical aspect of this model includes self-evaluation and reflection. Children learn from their processes. They reflect on how well they worked in a collaborative group and how well they contributed, negotiated, listened, and welcomed other group members' ideas. Students also self-evaluate their own projects, efforts, motivations, interests, and productivity levels" (Bell, 2010, p. 43). This method of self-assessment will help students when they enter the world of work, helping them to collaborate and to work well with others. "In the future, children must enter a workforce in which they will be judged on their performance. They will be evaluated not only on their outcomes, but also on their collaborative, negotiating, planning, and organizational skills" (Bell, 2010). Technology, and innovative ways in which to use it, is also part of the 21st century skills that community colleges need to embrace; specifically those with engineering technology programs.

Vega & Brown's (2013) support of the 21st Century framework is comprehensive:

> If public schools are to remain viable options for parents and students in the 21st century, they must remain relevant. Like other institutions that have undergone drastic change at the start of the 21st century, schools must do the same. In order for change to occur, educational leaders must have a clear understanding of the change process itself. Ultimately, one's approach to school leadership is built upon his or her philosophical approach to education. Whether or not school leaders will meet the challenges of the 21st century depends greatly upon their philosophical approach to change and leadership. (p. 9)

This technology can help record and retrieve information on the learning outcomes in a digital classroom. It is forecast that in the next 10 years, school sectors the world over must prepare for the creation of digital classrooms that support learners to effectively develop 21st century skills through the day-to-day learning process. "The introduction of digital resources, digital ways of communication and digital platforms for learning and teaching brings about many opportunities to enhance the learning process in school education in the 21st century. It is foreseen that such learning process is supported by resources in digital and non-digital forms seamlessly inside and outside of digital classrooms, in which learners typically use portable computing devices and social learning networks for the retrieval, selection, and sharing of authentic information from multiple sources" (Siu Cheung, et al., 2014, p. 71). These tools can help educators explore new ways of integrating technology in the classroom to help students learn valuable life skills.

Therefore, it would be good to apply the design principles of 21st century learning in technology programs at community colleges. "There is a general consensus among educators, business, and other interested parties that a significant gap exists between the knowledge and skills needed for success in life and the current state of education in primary and secondary education schools throughout the world" (Moylan, 2008, p. 287).

The following are important skill sets needed by our students, identified by Moylan (2008), as being critical for the 21st century.

1. Critical thinking and problem-solving
2. Creativity and innovation
3. Collaboration, teamwork and leadership
4. Cross-cultural understanding
5. Communications and information fluency
6. Computing and Information & Communication Technology fluency
7. Career and learning self-reliance. (p. 287)

The implementation of PBL is important in developing these 21st century skills in students. "Project-Based Learning has been identified as a key methodology for closing this gap between current student learning and developing the necessary 21st century knowledge and skills. These '*7-Cs*' are the skills students gain from Project-Based Learning activities; i.e., learning by project" (Moylan, 2008, p. 287). The 21st Century Learning Framework includes critical thinking, collaboration, communication and creativity.

Critical thinking is an important 21st century skill for students in the MET program at Delaware Tech. Problem solving and critical thinking are important skills students need to learn. "Critical thinking frequently involves the ability to interpret information and make informed decisions based on such information. Problem solving is often conceptualized as the use of critical thinking skills toward the effective resolution of a specific problem or toward a specific end goal. Problem solving and critical thinking most often involve the cognitive skills necessary for success in emerging economic and social domains" (Kereluik, et al., 2013, p. 130). The rubric in figure 4 helps to quantify the traits that can be measured for an assignment when assessing critical thinking.

Critical Thinking Rubric

Date: _____

Rater: _____   Course: _____   Student: _____

TRAIT	Unacceptable	Acceptable	Exemplary	Score
Identifies and Summarizes problem at issue	Does not identify and summarize the problem, is confused or identifies a different or inappropriate problem	Identifies the main problem and subsidiary, embedded, or implicit aspects of the problem	Identifies not only the basics of the issue, but recognizes nuances of the issue	
Personal perspective and position	Addresses a single source or view of the argument and fails to clarify presented position relative to one's own	Identifies, appropriately, one's own position on the issue	Draws support from experience and information not available from assigned sources	
Other salient perspectives and positions	Deals only with a single perspective and fails to discuss other salient perspectives	Identifies other salient perspectives drawn from outside information	Addresses and analyzes salient perspectives drawn from outside information	
Key assumptions	Does not surface the assumptions and ethical issues that underlie the issue	Identifies some of the key assumptions and ethical issues	Identifies and questions the validity of the key assumptions and addresses the ethical dimensions that underlie the issue	
Quality of evidence	Merely repeats information provided, taking it as truth or denies evidence without adequate justification	Examines the evidence and source of evidence, questions its accuracy, precision, relevance, and completeness	Observes cause and effect and addresses existing or potential consequences. Clearly distinguishes between fact, opinion, and acknowledges value judgments	
Conclusions, implications, and consequences	Fails to identify conclusions, implications, and consequences of the issue	Identifies and discusses conclusions, implications, and consequences	Objectively reflects upon own assertions	

Figure 5. Critical Thinking Rubric, Teacher Planet (2011)

Communication and collaboration skills are important for students in engineering technology programs at community colleges to become well rounded members of society. "Communication most frequently involves the ability to clearly articulate oneself through all media of communication—oral, written, nonverbal, and digital—as well as the skills necessary to be an active and respectful listener to diverse audiences. Collaboration includes similar dimensions as communication but also includes important individual contributions, such as flexibility, willingness to participate, and recognition of group and individual efforts and success" (Kereluik, et al., 2013, p. 130). Communication and collaboration are cited as essential to success in the 21st century as working with diverse groups becomes of the utmost importance in our increasingly globalized culture and economy (ibid). Students need to

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collaborate in class and ask questions exhibiting traits of professionalism and leadership.

Working and collaborating in groups is a valuable skill for students to develop. Some individualistic students may be hesitant to work in groups, but they should be encouraged to work collaboratively by being reminded that in "real life" they need to know how to work well with others (Prabhakar, 2012). "STEM PBL offers new learning strategies to replace traditional learning styles. Students can be grouped into teams to learn and complete all kinds of tasks, including those in science, technology, engineering, and mathematics. Also, students will learn to integrate investigation, experiments, evidence, inference, assembly, and manufacture to cultivate their STEM knowledge and skills, along with other abilities, such as teamwork, communication, the use of Internet applications, and reporting" (Lou, Liu, Shih, & Tseng, 2011, p. 182). Incorporating collaborative exercises is important to any STEM based PBL model. Community colleges should work to include aspects of this framework in their technology programs.

Creativity is a 21st century skill that would greatly benefit community college students by developing a thinking process that will help them succeed in life. Kereluik, et al. (2013) noted this in their study by stating, "creativity is one of the skills that was most cited as necessary for success in the 21st century. Creativity and innovation involve applying a wide range of knowledge and skills to the generation of novel and worthwhile products (tangible or intangible) as well as the ability to evaluate, elaborate, and refine ideas and products. It is often reasoned that the highly

complex problems facing society in the 21st century necessitate new and creative solutions" (p. 131).

Creativity in engineering education should be practiced through immersive learning, using a learner-centered approach through activities as well as learning from peers. Immersive learning has been used with gaming technologies to provide structure for the learning process. Game-based learning programs have provided students with context-specific learning tasks, which are completed with assistance from an instructor. The instructor helps to facilitate the students' learning using a student-centered approach. Through partnering with a well-established engineering firm, graduate students completed a project where they generated ideas, selected from idea alternatives, and developed a strategic plan for their chosen idea (Charyton, 2011). These are creative skills that if developed with students, can help them to be more competitive and internalize their strengths. This will lead to students who are motivated to succeed and graduate in a timely manner.

Case study assignments require students to research information and then think critically to articulate a written response. The case study method promotes the development of group-working and critical-thinking skills in students. The case study approach is likely to bring about a positive change among students as it improves their communication and interpersonal skills. (Chakrabarti & Balaji, 2007) Students need to develop their critical-thinking abilities because they have been identified as an important 21st century skill. The development of critical thinking and problem-solving skills will definitely add value to any technology curriculum. Case study assignments provide excellent learning opportunities for engineering technology

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students, and to build communications skills, students can do an oral presentation of

their findings. Table 1 helps to define higher-level thinking skills and how they can

be applied using case studies.

Table 1. Bloom's Taxonomy and Case Study Activities, Rochford & Borchert (2011)

Bloom's Taxonomy and Case Activities			
Level	Definitions	Illustrative verbs	Examples of case study analysis that could be assessed
Knowledge	Ability to recognize and recall previously learned facts.	Defines, labels, identifies, recalls, selects.	Identify issues in the external environment that affect the case situation.
Comprehension	Ability to explain the meaning of and make sense of the material.	Interprets, explains, discusses, gives examples.	Describe how the issues in the external environment might affect the firm in the case.
Application	Ability to select and apply knowledge in new situations.	Calculates, practices, resolves, relates.	Apply course concepts to the case to predict possible outcomes to current actions.
Analysis	Ability to break complex concepts into component parts to better understand the whole.	Distinguishes, deduces, discriminates, chooses, contrasts.	Categorize the problems identified in the case, based on severity and urgency.
Synthesis	Ability to put pats together to form a new plan or idea.	Combines, designs, composes, conceives.	Develop multiple courses of action available to the firm in the case.
Evaluation	Ability to judge the value of something in terms of internal and external criteria and standards.	Appraises, assesses, evaluates, judges, critiques.	Critique the multiple courses of action and recommend one, justifying why that course is the most appropriate.

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Chapter 2

METHODOLOGY AND ANALYSIS

This project used quantitative (surveys) and qualitative methods (interviews) to understand the problem from both the student and faculty points of view. Key questions three and four will be addressed using these methods.

Methodology

The investigator used three primary types of data: student surveys, student interviews, and faculty interviews. Surveys are one of the most commonly used tools to evaluate programs (Backer, Bleeg, & Groves, 2010). Surveys help determine the personal views of faculty and students; however, crafting good questions is the key to achieving valid results. Survey questions must be worded to obtain an honest response rather than a desired response.

Interviews provide an opportunity to ask follow-up questions where a survey cannot. The order in which the interviewer asks the questions can affect the answers given by the interviewee. The sequencing of questions can lead to more meaningful collaboration between the two parties (Cornell, Johnson, & Schwartz, 2013). A personal connection can be made during the interview that leads to open dialog and honest discussion. The student interviews were used to provide a better understanding of the students' feelings and experiences while enrolled in the MET program.

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The protocol for each instrument was submitted to the Human Subjects Review Board for compliance and approval (Appendix A, B and C). The questions used in the student survey, student interviews, and faculty interviews (Appendix D, E & F) and interview protocols were submitted to the investigator's doctoral committee for review and feedback on validity and reliability. The investigator followed all Institutional Review Board guidelines concerning the treatment of human subjects and the storage of data. The investigator used a purposeful sample of students and faculty.

Selection of Student Participants

Students were selected for the survey and interviews based on enrollment in MET courses in the prior semester. Students were in their first-year, second-year of the program or about to graduate. Each student received a consent letter for the survey. The letter of consent explained the time commitment of approximately 20 minutes. The consent letter informed the students that participation was strictly voluntary and confidential.

Student Surveys

The student survey data was administered using Qualtrics software and the survey questions used a Likert-type scale. This made the collection of the data efficient. Storage and retrieval of the survey information is currently maintained by the Qualtrics software. Survey start time and end times, as well as duration, were tracked by the software. This made the cross tabulation of different survey responses easy. The student survey contained 15 questions. The questions focused on the perceived factors contributing to slow completion of the degree program.

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The environment for the survey was in a room with 12 computers. Students were escorted from one of their MET classes in the room to take the survey. The surveys were conducted in the morning, afternoon and evening on Thursday, April 23, 2015 and in the afternoon and evening on Monday, April 27th. Additional surveys were conducted on Tuesday, April 28th in the afternoon and Wednesday, April 29th in the morning and evening. Further surveys were conducted May 3rd and May 15th for any students that did not participate earlier.

Student Interviews

There were four student interview questions. Responses were recorded with handwritten notes. Care was taken to ensure accurate transcription. In addition, the investigator took journal notes to help summarize key data during the interview to use later for analysis.

Students were first asked to complete the survey. When they completed the survey they were walked over to the interview room by one of the full-time MET instructors or the investigator. At that time the investigator explained to the students that their feedback will help improve the MET program in the future.

Fifty-three MET students were interviewed; most were in their first or second semester, however, the graduating students were also included. The investigator felt it was important to interview first-year, second-year, and students about to graduate to obtain a holistic view of the student experience in the MET program. During the interviews, if the conversation began to reveal unanticipated responses, the investigator followed up with additional questions.

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Interviews were conducted in the morning, afternoon and evening on Thursday, April 23, 2015 and in the afternoon and evening on Monday, April 27th. Additional interviews were conducted on Tuesday, April 28th in the afternoon and Wednesday, April 29th in the morning and evening. Further interviews were conducted May, 4th, 5th and 6th for any students that did not participate earlier.

Selection of Faculty Participants

Faculty members were selected if they taught a course in the MET program in the last three semesters.

Faculty Interviews

The faculty interviews were individual discussions with the investigator in a private conference room. The faculty interviews were scheduled with each faculty member in advance. They were conducted in the afternoon and evening on Monday, May 4th and Tuesday, May 5th at the end of the spring 2015 semester. There were seven faculty interview questions. The questions were open-ended and can be seen in Appendix F. Responses were recorded with handwritten notes. Care was taken to ensure accurate transcription. Faculty interviews were conducted with four full-time MET faculty members and three adjunct faculties. The response rate for the faculty was 100%. The interviews were performed individually with each faculty member.

<div align="center">Data Analysis</div>

The data consisted of student interviews, student surveys and faculty interviews. The methods used to conduct the fieldwork were agreed to in advance by a committee of educators who gave input and recommendations on how the data should be obtained.

Demographic Information Based on Student Survey

The student survey responses were tabulated using the Qualitrics software. Number and percentage of responses were calculated to provide the demographics of the student group in this study. The survey responses allowed this investigator to create a profile of the students in the study. The response rate for the student survey is shown in Table 2. The survey allows the investigator to collect demographic information. Understanding the demographic characteristics of students in the MET program can help to answer the key question: How can students at risk of not finishing be identified earlier?

Student Interviews

The student interview responses were grouped by topic. The frequency of each topic was tabulated. The data was later reviewed holistically to understand the richness of the information and was then coded to interpret themes and patterns.

The student interview transcripts were reviewed and themes identified using comparison analysis. The student responses were coded deductively. The number of times that a coded response occurred was noted. Chunks of words, phrases, and sentences were categorized by their intended meaning to obtain the coded response. The themes and patterns that emerged from the frequency of the coded data are shown in Table 17. Notable patterns and themes were discovered after analyzing the coded responses and their frequency.

Faculty Interviews

The faculty interview transcripts were read to identify themes using constant comparison analysis. The responses were coded looking for meaning in the sentences

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and individual words. The number of times that the coded responses occurred was recorded. Chunks of words, phrases, and sentences were categorized by their intended meaning to obtain the coded response as seen in Table 19.

Themes and patterns emerged from the frequency of the coded data as seen in Table 20. The insight of the faculty was an excellent source of qualitative information to better understand their perspective on the students in the MET program.

Data Triangulation

The investigator combined multiple data sources and methods to triangulate the information. The triangulation methods used in the study helped to eliminate bias in the results. The triangulation of the data helped to validate the findings. Since each data collection method by itself may not point to a solution to the problem, multiple methods were used. After patterns and themes were identified with the individual data sources, the investigator compared the themes that were shared between the data sets. These themes and pattern that emerged from the student interviews, student surveys and faculty interviews were triangulated to identify the dominate themes and patterns.
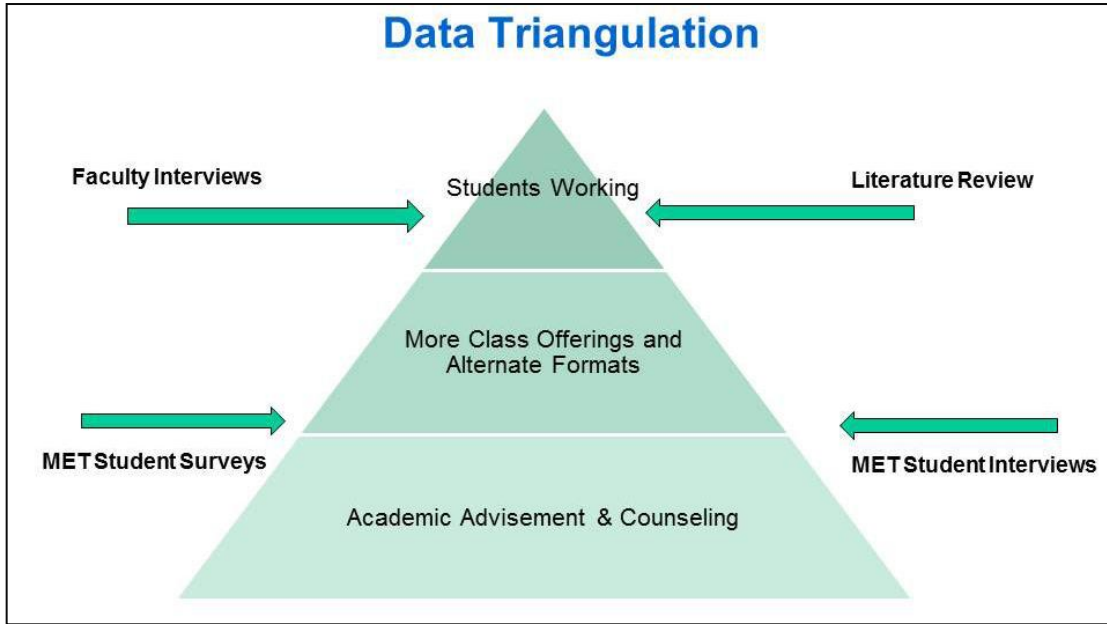
Figure 6. Data Triangulation

Data analysis credibility was increased using triangulation of the instruments. This helped to verify the consistency of the individual data collection methods; what the students felt and are saying, for example, was compared to what the faculty is saying. Examining this data from different perspective added to depth of the triangulated information. In addition, comparing the different perspectives of student interviews, surveys, and faculty interviews helped the investigator to better understand faculty and student perceptions of improving the graduation rate.

The triangulation of the data also involved analyzing the different methods from qualitative and quantitative standpoints. While the majority of this study used qualitative methods, the verification that this is a problem to be solved was first supported by the quantitative information present in this study (see Figure 1). Further, the student surveys contained some quantitative information that complemented and supported the triangulation methods.

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After triangulating the data it appears that student advisement, more class offerings with alternate formats, and students working too many hours were the recurring themes, as illustrated in Tables 18 and 19. These findings will need further review and additional research in future endeavors by the investigator.

Findings

The findings of each instrument informed this investigation of the student and faculty experience and provided insights needed to formulate recommendations for Delaware Tech and the MET program in particular. The following tables describe the overall findings of this investigation.

Student Survey

The percentage of responses to each of the student survey questions was high except for questions 14 and 15, as seen in Table 2. These questions solicited the students' opinions on ways to improve the program and the success rates.

Table 2. Student Survey Response Rate

Student Survey Response Rate (n = 65)		
Survey Question	**Number of Responses**	**Percent Responding**
Q1 Gender	65	100%
Q2 Current student enrollment type	65	100%
Q3 Employment status	65	100%
Q4 Marital Status	65	100%
Q5 Current living arrangement	65	100%
Q6 Family financial situation	65	100%
Q7 Parents education	65	100%
Q8 Indicate how often you worry about each of the following.	65	100%
Q9 Please rate how frequently you have done these things while taking classes at Delaware Tech.	65	100%
Q10 Please rate how frequently you have done these things while taking classes at Delaware Tech.	65	100%
Q11 Please rate the importance of these questions to you now.	65	100%
Q12 Please rate how frequently you have done these things while taking classes at Delaware Tech.	65	100%
Q13 For each of the following, please tell me how much you think this would help someone whose circumstances are similar to yours after high school in getting a college degree.	65	100%
Q14 Is there anything Delaware Tech can do to help students graduate more quickly from the MET Program?	50	76.92%
Q15 Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?	47	72.31%

The majority of the students surveyed were male, as seen in Table 3. It is not

surprising but a statistic of note for further investigations.

Table 3. Gender, Question 3

Response (n = 65)	#	%
1 - Male	52	80%
2 - Female	13	20%

The majority of students are single or never married, as seen in Table 4. The

majority of the students are still living at home, as seen in Table 5, indicating that

most of the students surveyed are not yet independent.

Table 4. Marital Status, Question 4

Response (n = 65)	#	%
1- Married	9	14
2- Living as married	2	3
3- Divorced	0	0
4- Widowed	0	0
5-Never married/single	54	83
6- Separated	0	0

Table 5. Current living arrangement, Question 5

Response (n = 65)	#	%
1- At home with parents	43	66
2- Share a place with friends	8	12
3- Own place	10	15
4- Other	4	6

Table 6. Family Financial Situation, Question 1

Response (n = 65)	#	%
1- Generally have extra money each month	38	58
2- Make ends meet, but do not have money left over each month	17	26
3- Have trouble getting by each month	4	6
4- Do not know/refused	6	9

We gain understanding of the student's home situation in Table 6, which helps

us to understand the family financial situation of the students. The majority of the

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students surveyed (58 percent) believe they have money left over at the end of each month, while 26 percent believe they do have enough money to make ends meet, but do not have money left over at the end of each month. These figures indicate that the majority of the students surveyed (84 percent) seem to have their monetary needs met. One can infer that the lack of funds would not be a factor in not graduating. As seen previously in Table 2, the majority of students work in addition to attending school, and a high percentage of students are only able to attend school part-time (45% compared to 51% full time students, as seen in Table 4. One could infer that if more students could attend full time and work less it would have a positive effect on the graduation rate.

Students were asked to report on the level of education obtained by their parents, as seen in Table 7. The same percentage of parents that obtained high school diplomas that obtained a four-year bachelor's degree (31 percent). However, the majority (45 percent) of the parents obtained some sort of post-secondary degree. Only a small percentage of parents received no education or less than a high school diploma. One can infer that the parents support their children to obtain the same or better educational goals. This could be a topic for further investigation.

Table 7. Parents Education, Question 2

Response (n=65)	#	%
1- A high school diploma or equivalent	20	31
2- A technical or vocational certificate	4	6
3- A Two-year associates degree	5	8
4- A Four-year bachelor's degree	20	31
5- A Graduate degree	12	18
6- None/Both parents have less than a high school diploma	4	6
7- Do not know/ refused	0	0

The number of student work hours is reported in Table 8. Eighty-four percent (84%) of students in the program reported they are working with thirty-five percent (35%) of students working 40 hours or more. Only fifteen percent (15%) of students in the program reported they were not working. Since the majority of students work, either full or part-time, this may be an influence on the graduation rate. In some cases, students need to work; however, much of the time it is to earn money to buy things they would like to have. Regardless, students are working too many hours and this can affect student retention and persistence to graduation.

Table 8. Hours Students Work

Response (n=65)	Responses	%
1 - Full-time, working 40 hours or more	23	35%
2 - Retired	0	0%
3 - Part-time, less than 40 hours	32	49%
4 - Not employed	10	15%

One student survey question was: indicate how often you worry about taking classes while working? The majority of students worry about this with 20 indicating they sometimes worry, 20 indicating they frequently worry, and eight reporting they very frequently worry, as seen in Table 9. This shows seventy-four percent (74%) of students worry about managing classes while working. Another related question asked the students to indicate how often they worry about their workload. The majority of students also worry about this, with 29 indicating they sometimes worry, 16 indicating they frequently worry, and six stating they very frequently worry. This means seventy-eight (78%) of students worry about their workload, which includes homework. As one might imagine, the question asking if students worry about their lack of free time received a large percentage of responses as well. It is clear students

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have apprehension about managing their school and work responsibilities based on

the response rate.

Table 9. What Students Worry About

Response	Homework / workload		Lack of free time		Taking classes while working	
	#	%	#	%	#	%
1 - Never	4	6	3	5	9	14
2 - Rarely	10	15	13	21	8	13
3 - Sometimes	29	45	16	25	20	30
4 - Frequently	6	9	13	21	8	13
5 - Very Frequently	16	25	18	28	20	30
n	65		63		65	
Mean	3.25		3.60		3.28	

As seen in Table 10, there are a large number of part-time students; forty–five

percent (45%). Research has shown that part-time students can have retention issues

and can collaborate less with other students on class projects. Many times the reason

students have part-time status is due to the number of hours they are working; they

can be quantitatively and qualitatively linked.

Table 10. Student Enrollment Status

Response (n=65)	#	%
1 - Full-time student, 12 credits or more	33	51
2 - Part-time student, less than 12 credits	29	45
3 - Just taking a class here and there	4	6
4 - Not taking classes now	0	0

Demographic comparisons are seen in tables 10, 11, and 12. As seen in Table

11, the majority of both full time and part-time students in the MET study are male.

The majority students live at home, regardless of gender as seen in Table 12.

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Table 11. Gender and Student Enrollment Type

		Student Enrollment Type				Total	Mean
		Full-time	Part-time	Here and there	No classes		
Gender	Male	26	24	3	0	52	1.6
	Female	7	5	1	0	13	1.54
	Total	33	29	4	0	65	-
	Mean	1.21	1.17	1.25	0	-	-

Table 12. Gender and Current Living Arrangement

		Current Living Arrangement				Total	Mean
		At home	Share a place	Own place	Other		
Gender	Male	37	5	7	3	52	6.54
	Female	6	3	3	1	13	6.92
	Total	43	8	10	4	-	
	Mean	1.14	1.38	1.3	1.25	-	

Student Beliefs on Factors Affecting Timing of Degree Completion

Academic advisement and counseling were identified in both the student interviews and student surveys as a key driver for students persisting to graduation. Students felt that quality academic advisement is critical for student success. In addition to academic advisement, having a trusted faculty member they can talk to about career decisions or earning future credentials at four-year schools was important to students. Table 13 indicates interesting demographics that could be used for future studies of this type for the MET program. The data indicates that the majority of students with parents who have a high school education attend on a full-time basis while the majority of students with parents with a bachelor degree attend part-time. Could parental education affect the students' focus on their attendance?

Academic advisement and counseling were identified in both the student interviews and student surveys as a key driver for students persisting to graduation. Students felt that quality academic advisement is critical for student success. In addition to academic advisement, having a trusted faculty member they can talk to about career decisions or earning future credentials at four-year schools was important to students.

Table 13. Parent Education and Student Enrollment Type

| | | Student Enrollment Type | | | | | |
		Full-time	Part-time	Here and there	No classes	Total	Mean
Parent Education	High school	11	8	2	0	20	1.65
	Technical/ vocational	2	2	0	0	4	1.5
	Associate degree	2	2	1	0	5	1.8
	Bachelor degree	9	11	0	0	20	1.55
	Graduate degree	6	5	1	0	12	1.58
	Less than high school diploma	3	1	0	0	4	1.25
	Do not know/ refused	0	0	0	0	65	0
	Total	33	29	4	0	64	-

Question 13, item 2 asked the student about the "opportunity to talk with advisers who know all about the different college and job-training programs so you can make a good choice." The majority of students (71%) responded "A lot" which indicates how important talking to advisors is for the students as seen in Table 14.

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Further, the faculty interviews, student interviews and literature review confirmed the importance of quality academic advisement and counseling.

Table 14. Student Survey, Question 13 Item 2

ITEM 2: The opportunity to talk with advisers who know all about the different college and job-training programs so you can make a good choice		
Responses (n=65)	**#**	**%**
1 - A Lot	46	71
2 - A Little	10	15
3 - Not Much	6	9
4 - Not at All	2	3
5 - Don't Know	1	2

Question 13, item 10 asked the student to respond to "offer more courses in the evening, on weekends or in the summer so people can work while attending school." As seen in Table 15, the highest percent of answers were recorded for the choice of "A lot." Based on student interviews, faculty interviews and the student survey it is clear more course availability and even alternate class formats are of interest to the students. Moreover, during the faculty interviews, offering more classes at more convenient times was something the faculty felt was needed to help improve the graduation rate for the MET students.

Table 15. Student Survey, Question 13 Item 10

ITEM 10: Offer More courses in the evening, on weekends or in summer so people can work while attending school		
Responses (n=64)	**#**	**%**
1 - A Lot	42	66
2 - A Little	15	24
3 - Not Much	5	7
4 - Not at All	0	0
5 - Don't Know	2	3

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A comparison between items 2 and 10 for question 13 is reported in Table 16. The responses were numbered on a scale of 1-5 as noted in the table. The percent of students who responded to 1 - A Lot was very high indicating a strong desire for both the opportunity to work with an adviser (71%) and offering courses at more convenient times for students (66%). These items are candidates for recommendations for improvements to meet the goal of this investigation.

Table 16. Student Survey, Comparison of Question 13 Items 2 and 10

Responses	…opportunity to talk with advisers (n=64)	Offer more courses in the evening… (n-65)
1 - A Lot	71%	66%
2 - A Little	15%	24%
3 - Not Much	9%	7%
4 - Not at All	3%	0%
5 - Don't Know	2%	3%

While the student survey was valuable to obtain data for students currently in the MET program, further studies should be conducted to gain more data and to reinforce the validity of the recommendations in this investigation. The sample size of n = 65 was adequate to establish recommendations for action, however, surveys of future students entering the MET program will offer an opportunity to gain more information that can be analyzed for further recommendations.

As seen in tables 17 and 18, Question 1 revealed that students in the program are most interested in obtaining their associate degree due to the hands-on nature of the class. The students reported that they have a mechanical aptitude for program and this should help them to complete the degree. These emerging themes are important

to understand in order to discern meaning on how students see themselves in the program and completing the degree.

Question 2 revealed student perceptions on barriers or factors that may slow their degree attainment. Students felt that more classes offered in the night, in the summer, and alternate format classes will help them to graduate from the program. Students also felt that they may be working too many hours and that they should also meet regularly with their advisor.

Question 3 uncovered some student perspectives on the financial effects of not completing the degree in a timely manner. The patterns and themes that emerged were that students will need more money for additional tuition payments. Other student financial concerns were the need for more financial aid and that the time delay to complete the degree will reduce their employment opportunities. These patterns and themes helped to me to understand the phenomena from the student's perspective.

Table 17. Student Interview Responses on Factors Affecting Degree Completion

Coding Student Interview Responses		
Student Interview Questions	**Coded Responses**	**Frequency**
Question 1: Tell me why you enrolled in the program and how you see yourself completing the degree?	Hands-on program	14
	Wants associates degree	10
	Mechanical aptitude	8
	Interest in program	5
	Wants to get BS degree	5
	Started in 4 year program	4
	Counselor recommended	3
	Interested in math/science	3
	Tuition assistance program	2
	Do not want a desk job	1
Question 2: Some of our students find that it can take longer than the	No night/summer classes	11
	Student work many hours	9

Coding Student Interview Responses		
Student Interview Questions	**Coded Responses**	**Frequency**
prescribed three years to attain the AAS degree. Can you tell me what barriers or factors you feel may slow the time needed for some of our students to complete the degree?	Not meeting with advisor	9
	Lack of alternate format classes, 8 week, hybrid, etc.	7
	Prerequisite classes	5
	Combine classes	4
	Need to take more credits	3
	Hard classes, math, etc.	3
	Placement test scores	3
	Poor planning	2
	No night/summer classes	11
Question 3: It costs substantial money to go to school and that can be a burden. What do you think might be some financial effects of not completing the degree?	Tuition for another year	12
	Need more financial aid	9
	You do not have a job	8
	Lost opportunities	7
	Cannot take many classes	4
	Hard on the family	4
	Financial burden	3
	Increase cost of books	2
	Companies want a degree	2
	No effect	2
Question 4: What do you think Delaware Tech could do differently that would help students finish in the three-year time frame?	Offer night/summer classes	13
	Meet with advisor	13
	Offer alternate formats	12
	Combine classes	6
	Change prerequisites	4
	Help students with math	4
	Financial help	3
	Offer incentives	3
	Have an internship	2
	Do well on Accuplacer	2
	Cost of books	1
	Have guest speakers	1

Question 4 helped to further understand the students' perception of what

Delaware Tech could do to differently to help them. The themes and patterns that

emerged were very interesting. The students felt that the college could provide classes

at night, in the summer, and use alternative format classes, on-line and hybrid for

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example. These themes have strengthened the richness of this qualitative information

and are shown in Table 18.

Table 18. Student Interview Responses on How to Address Barriers to Degree
Completion

Student Interview Themes and Patterns	
Student Interview Questions	**Emerging Themes and Patterns**
Question 1: Tell me why you enrolled in the program and how you see yourself completing the degree?	• Students most interested in the hands-on nature of the program • Students want to earn their • associates degree • Students feel they have a mechanical aptitude
Question 2: Some of our students find that it can take longer than the prescribed three years to attain the AAS degree. Can you tell me what barriers or factors you feel may slow the time needed for some of our students to complete the degree?	• Students work many hours • Students want more classes offered at night, in summer and using alternative formats • Students feel that it is important to meet with their advisor
Question 3: It costs substantial money to go to school and that can be a burden. What do you think might be some financial effects of not completing the degree?	• Students need more money for tuition • Students need more financial aid • Students feel they will not have a job and have no opportunities
Question 4: What do you think Delaware Tech could do differently that would help students finish in the three-year time frame?	• Students feel more classes at night and in summer would help • Students feel more on-line and hybrid format would help • Students feel it is important that they meet with their advisor

Faculty Views on Barriers to Student Degree Completion

Interviews of the MET faculty helped to provide qualitative findings in

regards to their perceptions of improving the graduation rate. The responses to

Questions 1, 2 and 5, as seen in tables 19 and 20, indicate that the faculty feels that it

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is difficulty for students to always register for the classes they need and that this could be improved by offering more classes at more convenient times, such as night and summer classes, and alternate formats. In addition, the faculty feels that many students are not college ready and will need pre-tech classes to help them persist to graduation.

The faculty believes that the students in the MET program do not see the graduation rate as something that is a concern to them and that, from a student's perspective this is not a problem that needs to be improved. Lastly, the faculty believes that students are already comfortable with the number of classes they are taking and their current graduation rate.

The use of learning communities as an improvement strategy was mentioned for Question 1. Since learning communities are already being used in the program's first year, perhaps offering learning communities in the second year of the MET program could provide a benefit.

Student regular meetings with their program advisors was frequently mentioned by the faculty as a suggested improvement item to increase the graduation rate. Faculty mentoring was mentioned, however, not as frequently as faculty advisement. The faculty responses seem to indicate that quality student advisement is an important way to increase the graduation rate.

Table 19. Faculty Responses on Student Barriers to Degree Completion

Coding Faculty Interview Responses		
Faculty Interview Questions	Coded Responses	Frequency
Question 1: It appears that in our institution some students take longer to graduate from the MET program. What is your view on this issue? What recommendations do you have for Del Tech as an institution, if any, that could help students graduate during the designated time period for our program. Can you provide some concrete suggestions for how to implement these recommendations?	Difficulty getting the classes they need/ availability of classes	4
	Offer more night classes	3
	Students not college ready, need pre-tech classes and learning communities	3
	Offer summer classes	2
	Tutoring can help the students pass classes and graduate more quickly	2
	No opinion on the time frame /no recommendations	1
	Provide feedback to high school on lack of college readiness	1
	Unfair expecting students to graduate in 3 years or less due to their lives and hours working	1
Question 2:What suggestions do you have, if any, that can you provide specifically for the MET department that could directly improve our students' graduation rate?	Much of this is out of our control	2
	Change student incentive system to finish sooner or have a penalty if you don't	2
	More student mentoring and student advisement help	3
	Have the students more involved with the program	2
	Prerequisite classes could be changed	1
	Increase the number of class offerings	3
	Encourage use of math lab and other school resources	1

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Coding Faculty Interview Responses		
Faculty Interview Questions	**Coded Responses**	**Frequency**
Question 3: What suggestions do you have, if any, that can help MET faculty communicate to MET students the benefits of graduating on time?	Meet with advisor often to discuss progress and classes	4
	Have successful students talk to other students in the program/ peer mentoring	3
	4. Students do not have the time due to work, only take 1 or 2 classes a semester	2
	We are already communicating the way we should	1
	Layout a plan for students to succeed in the program	1
	Encourage students to take a good work load to finish on time	1
Question 4: Having had contact with the MET students, what are the major factors that prevent students from graduating in three years or less in your opinion?	Students working	4
	Not college ready/ pre-tech status	4
	Having a balance with work, school and life	2
	Class availability	2
	Difficulty with class material	2
	Not willing to delay gratification	1
	Financial resources	1
Question 5:Do you have any suggestions for how to help accelerate student graduation from the MET program?	Offer more classes at more convenient times/ class availability	4
	Set goals with a time frame for completion during advisement sessions	3
	Start the clock when pre-tech class are over	2
	Have speakers to discuss the benefits of accelerating completion	1
	No suggestions	1

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Coding Faculty Interview Responses		
Faculty Interview Questions	**Coded Responses**	**Frequency**
Question 6: In your opinion, how do you think students perceive the MET graduation rate? Do you think they view the time it takes them to graduate as something that can be improved?	Most students do not see it as a concern, they are already taking classes at the rate they want	6
	Many students plan on being here more than three years and do not see it changing	3
	The better students are concerned about the time to graduate since they or their parents are paying	2
	No comment or opinion	1

Table 20. Faculty Responses on Supporting Student Degree Completion

Faculty Interview Themes and Pattern	
Faculty Interview Questions	**Emerging Themes and Patterns**
Question 1: It appears that in our institution some students take longer to graduate from the MET program. What is your view on this issue? What recommendations do you have for Del Tech as an institution, if any, that could help students graduate during the designated time period for our program. Can you provide some concrete suggestions for how to implement these recommendations?	• Due to class availability students find it hard to get the classes they need • Students are not ready for college, learning communities may help • Offer more classes in the night and during the summer
Question 2:What suggestions do you have, if any, that can you provide specifically for the MET department that could directly improve our students graduation rate?	• Offer assistance to students with mentoring and student advisement in the MET department • Students want more classes offered at night and in summer • Student involvement in the program and department could help them persist

Faculty Interview Themes and Pattern	
Faculty Interview Questions	**Emerging Themes and Patterns**
Question 3: What suggestions do you have, if any, that can help MET faculty communicate to MET students the benefits of graduating on time?	• It is important for students to meet regularly with their advisor • Have student teach and collaborate with other student • Students work too much and can only take a couple of classes each semester
Question 4: Having had contact with the MET students, what are the major factors that prevent students from graduating in three years or less in your opinion?	• Students working prevents them from graduating in three years or less • Students are not prepared for college level work and this delays the time needed to complete the degree
Question 5:Do you have any suggestions for how to help accelerate student graduation from the MET program?	• Student advisement offers an opportunity for the student to set goals and accelerate the time needed to graduate • Offering classes at more times, day and night would help accelerate some students
Question 6: In your opinion, how do you think students perceive the MET graduation rate? Do you think they view the time it takes them to graduate as something that can be improved?	• Students do not perceive the time needed to complete the MET degree as something that needs to improve • Students do not have any goals to complete the degree more quickly

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Chapter 3

RECOMMENDATIONS AND CONCLUSIONS

The recommendations for improving the graduation rate in the MET
department at Delaware Tech are discussed in this chapter. These are important
considerations to increase retention and eventually the number of students to graduate
from the program. These recommendations are supported by information received
from student surveys, student interviews, faculty interviews and the review of the
scholarly literature.

Recommendations

There are several recommendations for Delaware Tech administration as a
result of this investigation:

Recommendations Informed by the Scholarly Literature

- Create a more interactive advisement model.

- Educate students on the pitfalls of working too many hours.

- Offer more convenient classes and use alternate formats.

- Create an analysis of the characteristics of students in the program.

- Increase second year student support through learning communities.

- Appoint a retention team leader for the department and/or the college.

- Incorporate project based learning and 21st century skills.

- Implement a peer mentoring program.

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- Increase the use of full-time vs part-time faculty in the department.

Recommendations Based on Student Survey and Interviews

- Create a more interactive advisement model.

- Offer more convenient classes and use alternate formats.

- Educate students on the pitfalls of working too many hours.

- Offer more convenient classes and use alternate formats

Recommendations Based on Faculty Interviews

- Create a more interactive advisement model.

- Educate students on the pitfalls of working too many hours.

- Offer more convenient classes and use alternate formats.

- Increase second year student support through learning communities.

How all the recommendations align to each of the qualitative data types and the literature review is displayed in Table 21. The table helps to visualize the relationships, to see commonalities and patterns.

Table 21. How Recommendations Align to Data Types

How Recommendations Align to Data Types				
	Types of Qualitative Data			
Master List of Recommendations	Literature Review	Student Interviews	Student Surveys	Faculty Interviews
Create a more interactive advisement model.	X	X	X	X
Educate students on the pitfalls of working too many hours.	X	X	X	X
Offer more convenient classes and use alternate formats.	X	X	X	X
Create an analysis of the characteristics of students in the program.	X			
Increase student support through learning communities.	X			X
Appoint a retention team leader for the department and/or the college.	X			
Incorporate project based learning and 21st century skills.	X			
Implement a peer mentoring program.	X			X
Increase the use of full-time vs. part-time faculty in the department.	X			

Create a more interactive advisement model.

Quality student advisement is very important if the goal is to increase the graduation rate and student retention (Gansemer-Topf & Schuh, 2006). This includes advisement with certain types and populations of students, particularly in the first year of the program. A planning team should also be created at the department level to focus on the types of strategies that will best impact the needs of students in the MET program. The new advising model should combine academic advising, career

planning and career/life skills planning to help with student success. While some aspects of the new model already exist at Delaware Tech and the MET department, the planning team needs to decide what interventions are appropriate and necessary. Further, these efforts need a leader to guide the planning team in the direction required for significant change to occur. For this organizational change to take place, it is critical that the planning team first exist at the department level. This will require significant program change that will need to be executed by the department, and the faculty will need to agree with the direction, for this initiative to be successful.

Educate students on the pitfalls of working too many hours.

Students work too many hours while taking classes at community colleges. At Delaware Tech in the MET department, thirty-five percent (35%) of the students work 40 hours or more and forty-nine percent (49%) work less than 40 hours. Students who work too many hours can experience academic performance issues leading to retention and/or problems graduating in a timely manner (Johnson, Rochkind, & Public, 2009). Students also worry about managing work and classroom commitments, as shown in Table 3. This data comes directly from the MET student survey.

Students do not really understand that if they complete their degree more quickly they will typically be earning much more than they would otherwise. There is an opportunity cost for not graduating in a timely manner, and the students in the MET program need to be educated on this fact. Another potential solution is to provide incentives for students to complete their degree more quickly. In other words, if students finish in the published time frame that the college is measured by,

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provide them a financial incentive. In addition, if the number of students using college work study or college internships were to increase, students will still be able to work, and be more engaged with the college at the same time. In the case of internships, they will also gain valuable work experience. Students need to work closely with their academic advisor to discuss the pros and cons of work while taking classes.

Offer more convenient classes and use alternate formats.

Students and faculty believe students can complete the program more quickly if classes are offered at more times throughout the year (Gurantz, 2015). Offering more classes in the summer could help students complete the required courses. In addition, alternate, hybrid and/or online classes should also be considered for some classes. While certain classes will not lend themselves to these formats, many will and should be offered to help students graduate more quickly from the program. Hybrid formats, including online, could be offered for several mechanical engineering technology classes. Students are demanding more class options, and this was obvious based on the MET student interviews.

Create an analysis of the characteristics of students in the program.

There are many variables for the characteristics of students in the MET program that need to be better understood. This analysis will help the department to understand which students typically stay in the program and which students choose to leave. The planning team can then work with the students most at risk of not persisting and graduating from the program. The data needed for analysis are student perceptions, opinions, career and academic plans, academic performance, personal

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interests and demographics. Once a target set of characteristics (variables) is defined by the data, students who fit into particular target groups can be helped with various strategies (Freeman, Hall, and Bresciani (2007). The department planning team can then take action based on data driven decisions. The institutional fit for students can also be determined by analyzing the variables. For instance, it could be that students will persist to graduation based on the amount of financial aid available to them.

Increase student support through learning communities.

Learning communities should be better utilized by the program. This includes learning assistance for remedial and developmental coursework, reading, and supplemental instruction (Stebleton, M., & Nownes, N. 2011). The MET department at Delaware Tech is already using learning communities; however, new student experiences need to be developed to help with student retention. The MET department needs to create new learning communities for students entering the first and second year of the program. While the majority of students leave the college between the start of the first or second year, a significant number of students do leave after the second year. The planning team, mentioned in recommendation 1, should be involved with the new student advisement model and any new learning communities developed in the department.

Appoint a retention team leader for the department and/or the college.

Because it is critical for the MET department and the institution, Delaware Tech should appoint a retention team leader. Ideally, the person working on this priority initiative at the college should be in a leadership position. If the person selected is at a high enough level in the institution, it will send the message to faculty

and staff that retention is an important metric the college is serious about improving (Roman, 2007). The retention of the MET department needs an intensive focus on the types of students, instruction, class formats, and interactive advisement models that will be more effective. While this is important to individual departments, it is also important as a major college-wide focus. It should be investigated using a college-wide planning team that looks at the institution as a whole and evaluates the changes needed for meaningful improvement.

Incorporate project based learning and 21st century skills.

Project based learning (PBL) and 21st century skills teach knowledge and expertise the students must master to succeed in work and life; these concepts blend content knowledge, specific skills, expertise, and literacies. Using these concepts can help improve critical thinking, collaboration, communication, and creativity. In addition, students learn valuable life and career skills. These include flexibility, adaptability, taking initiative, self-direction, productivity, accountability, leadership, responsibility, socialization, and cross-cultural skills. This project-based approach to learning is an excellent way to keep students on track to graduate in three years (Bell, 2010). Further, this approach encourages integration of community resources beyond school walls. Moreover, problem based approaches integrate the use of technology and emphasize higher order thinking skills. Implementation of PBL using 21st century skills in the MET program at Delaware Tech will help with student retention.

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Implement a peer mentoring program.

Students can learn from other students and feel a better connection to the college, encouraging them to persist to graduation when peer mentors are used. First year students benefit from learning from second or third year students. The peer mentor is a coach and is seen as more like someone they can trust, more than an instructor. The peer mentor can also model behaviors and attitudes that can help students to persist to graduation. Wilson, et al. (2012) found that students being tutored had higher GPAs and that it could increase retention compared to students that did not receive mentoring. This program should be implemented at the department level where all incoming students are assigned a peer mentor for the first year in the program. There should be a level of accountability for the peer mentor. They need to communicate with and help the first year student with academic, social and/or school related questions.

Increase the use of full-time vs part-time faculty in the department.

Research clearly shows that having full-time faculty helps with student success and persistence to graduation. The number of full-time faculty is important to have students engaged and to graduate in three years or less from the MET program (Jacoby, 2006). The use of full-time faculty should be increased to reach the goal for program completion set by the federal government. While there could be an additional cost for more full-time faculty versus part-time faculty it can be justified by this research.

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Improvement Goals

It is this investigator's belief that the number of Mechanical Engineering

Technology (MET) students completing their associate degree requirements in three

years or less can be increased, while not lowering the high standards of the program.

Target improvement goals for the MET and other relevant DTCC programs are listed

in Table 6. In addition, including other technology programs presents an opportunity

to evaluate their performance relative to each other. The MET program graduation

goal going forward should be twenty percent (20%) for students completing the

program in three years or less. The six-year average for 2008-2013 was sixteen

percent (16%) for the MET program. This target goal represents an increase of 20%,

which can be attained by implementing incremental strategies for student success.

Enrollment and retention targets important to the graduation rate are shown in

Table 6.

Table 22. Goal Improvement Targets for DTCC Technology Programs

	Improvement Targets		
Program/Campus	Enrollment	Retention	Graduation
Electrical Eng. Technology Option (ELL/ELT)			
Owens (ELT)	15	60%	22%
Stanton (ELL)	18	57%	18%
Terry (ELL)	3	48%	18%
Computer Engineering Technology Option (COE)			
Stanton	19	51%	18%
Computer Network (CNE)			
Terry	14	69%	18%
Stanton		35%	18%
Wilmington	23	38%	18%
Instrumentation Eng. Technology Option (INE)			
Stanton	4	57%	18%
Math/Science Concentration (MSC)			

	Improvement Targets		
Program/Campus	Enrollment	Retention	Graduation
Owens	5	30%	18%
Terry	7	40%	60%
Stanton	17	76%	24%
Computer Aided Draft/Design (CAD)			
Stanton	8	57%	18%
Design Engineering (Mechanical) (DEM)			
Owens	15	106%	72%
Mechanical Engineering Technology (MET)			
Stanton	32	52%	20%

Conclusions

The number of Mechanical Engineering Technology (MET) students completing their associate degree requirements in three years or less can be increased to meet the 2020 College Completion Goal for Community Colleges. This goal can be achieved while not lowering the high standards of the MET program or the quality of its graduates. This ethnographic study helps to solidify several factors needed for timely degree completion. The American Association of Community Colleges (AACC) supports this kind of effort with the College Completion Challenge by inviting "the nation's 1,200 community colleges to join a call to action to engage community college institutions to advance 'the completion agenda' by pledging to increase student completion rates by 50 percent over the next decade" (2015).

Good quality academic advisement can help students make wise academic decisions while helping the college and the MET department to meet its program completion goals. The role of student advisement was mentioned repeatedly in the student interviews and surveys. When students make connections with a trusted

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advisor the result can be higher retention and degree completion. The research of Gansemer-Topf & Schuh (2006) indicates that higher retention rates can be obtained with quality student advisement as seen in table 5. Students in the survey clearly emphasize the importance of advisement for class selection guidance and career and job placement knowledge.

Students in the MET program at Delaware Tech are working too many hours; this can prevent students from finishing their AAS degree in 3 years. This was supported by the student interviews and surveys. As shown in Table 2. 35% of the MET students surveyed are working over 40 hours a week and over 49% of the students work less than 40 hours. Research from Johnson & Rochkind (2009) indicates similar patterns for community college students. While this is not new information for faculty working at community colleges, it underscores one of the reasons for low graduation rates. Because the Federal government rates community colleges on the number of students completing 2 year programs within in 3 years, educating students and parents on the value of timely degree completion is one way to improve the completion rate. Financial incentives and/or college policies could also be implemented to help meet the completion rates at community colleges.

Offering courses at more convenient times and in alternative formats, like on-line or hybrid classes, could positively impact the MET program retention and completion rate. Looking at the interview and survey data, it is clear that more course availability and alternate class formats are of interest to students. The faculty also indicated that more course availability and alternate class formats could improve the

graduation rate. The research of Gurantz (2015) supports the idea that student retention increases when courses are offered at more times during the year.

The implementation of project based learning and the implementation of 21st century skills can help with student success and lead to the development of the skills that employers seek. The increased use of project based learning concepts can lead to a higher quality MET program, which would lead to an increased retention rate. Mahendran (1995) as well as Baillie and Fitzgerald (2000) also mention that the use of these concepts can help to motivate students to persist and eventually graduate. It is vital for the MET to incorporate project based learning and 21st century skills into the structure of its courses.

There are many factors that can influence the time needed to graduate from the MET program at Delaware Tech. Additional investigation is needed to identify other factors affecting the current graduation rate that were not addressed in this study. Further, students may drop out for multiple reasons that can be difficult to qualitatively and quantitatively understand. Moreover, the MET program will always have a percentage of students who do not complete the program; however, an increase in retention and graduation rates by implementing the recommended strategies is possible. The 2020 College Completion Goal for Community Colleges can be realized in the MET Program at Delaware Tech. This is an important goal for enabling future workers in the United States to remain competitive around the world.

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Appendix A

STUDENT SURVEY PROTOCOL

PRINCIPAL INVESTIGATOR   Richard Mulski
                                                 Doctoral candidate,
                                                 School of Education,
                                                 University of Delaware
                                                 807 Christopher Court
                                                 Hockessin, DE 19707
                                                 rmulski@verizon.net

Dear Student,

My name is Richard Mulski. I am conducting a survey for my doctoral program at the University of Delaware. I am investigating factors related to improving degree completion in the Mechanical Engineering Technology (MET) program at Delaware Technical Community College. My hope is that, with your feedback, I can recommend improvements to increase the graduation rate in the future.

You have been chosen for this survey because you were enrolled in a Mechanical Engineering Technology (MET) course last semester, offered through the MET department at Delaware Technical Community College. As such, I would like your thoughts and opinions on that experience, even if you withdrew from the class. Would you please take a few moments of your time and complete this survey? It should take no more than 10 minutes and will be administered with an email you will be receiving. Your participation is completely voluntary and confidential. Approximately 50 students will be asked to participate in this project effort.

I believe that there are no risks in participation in this study. You already received your final grade class, so there cannot be any academic penalty. Your responses will be confidential and destroyed at the end of this project. The survey responses and transcripts will only be accessible to me. Transcripts of the interviews and responses, which will not list your name, will be stored in a locked file cabinet for the duration of this study and then destroyed at the end of the study. Would you also consider a follow-up interview? Interviews can result in a richer understanding of your classroom experiences. The interview is also voluntary and anonymous. As with the survey, all transcripts will also be destroyed at the end of the study. Transcripts will not include your name. A pseudonym will be used to identify your responses. If you are willing to be interviewed, please indicate that at the end of the survey. You may at any time contact me and request that I withdraw your comments from the study and destroy the interview transcript.

Findings from this study might result in scholarly publications and conference presentations. Pseudonyms will be used in all reports resulting from this study. Results will be aggregately reported, even though individual participants' comments might be used to illustrate a particular theme emerging from the data. In case you would like to receive a summary of the results of the study and/or copies of any publications derived from the study please feel free to contact the investigator using the information provided on the top of this letter.

If you would like more information about the study, or have questions regarding the study, please contact Richard Mulski at (302) 453-3771 or (302) 981-

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0332. If you have any concerns about the manner of conduct of the investigation, please contact Dr. Charles Riordan, Vice Provost for Research, 124 Hullihen Hall, University of Delaware, Newark, DE 19716-1551, (302) 831-4007.

To indicate your willingness to participate in this project study, please complete the on-line survey you will be receiving via email.

Thank you

Richard Mulski

Appendix B

STUDENT INTERVIEW PROTOCOL

PRINCIPAL INVESTIGATOR Richard Mulski
Doctoral candidate, School
of Education, University of
Delaware
807 Christopher Court
Hockessin, DE 19707
rmulski@verizon.net

Dear Student,

My name is Richard Mulski. I am conducting student interviews for my doctoral program at the University of Delaware. I am investigating factors related to improving degree completion in the Mechanical Engineering Technology (MET) program at Delaware Technical Community College. My hope is that, with your feedback, I can recommend improvements to increase the graduation rate in the future.

You have been chosen for this interview because you were enrolled in a Mechanical Engineering Technology (MET) course last semester, offered through the MET department at Delaware Technical Community College. As such, I would like your thoughts and opinions on that experience, even if you withdrew from the class. Would you please consider being part of these interviews? It should take no more than 15 minutes and will be done at a time and place that is convenient for you. Your participation is completely voluntary and confidential. Approximately 30 students will be asked to participate in this project effort.

I believe that there are no risks in participation in this study. You already received your final grade class, so there cannot be any academic penalty. Your responses will be confidential and destroyed at the end of this project. The interview responses and transcripts will only be accessible to me. Transcripts of the interviews and responses, which will not list your name, will be stored in a locked file cabinet for the duration of this study and then destroyed at the end of the study. The interview is voluntary and anonymous. Transcripts will not include your name. A pseudonym will be used to identify your responses. You may at any time contact me and request that I withdraw your comments from the study and destroy the interview transcript.

Findings from this study might result in scholarly publications and conference presentations. Pseudonyms will be used in all reports resulting from this study. Results will be aggregately reported, even though individual participants' comments might be used to illustrate a particular theme emerging from the data. In case you would like to receive a summary of the results of the study and/or copies of any publications derived from the study please feel free to contact the investigator using the information provided on the top of this letter.

If you would like more information about the study, or have questions regarding the study, please contact Richard Mulski at (302) 453-3771 or (302) 981-0332. If you have any concerns about the manner of conduct of the investigation, please contact Dr. Charles Riordan, Vice Provost for Research, 124 Hullihen Hall, University of Delaware, Newark, DE 19716-1551, (302) 831-4007.

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To indicate your willingness to participate in this project study, please complete the on-line survey you will be receiving via email. The last question in the survey will inquire if you are voluntarily interested in participating.

Thank you

Richard Mulski

Appendix C

FACULTY INTERVIEW PROTOCOL

PRINCIPAL INVESTIGATOR   Richard Mulski
                                                 Doctoral candidate, School of
                                                 Education, University of
                                                 Delaware
                                                 807 Christopher Court
                                                 Hockessin, DE 19707
                                                 rmulski@verizon.net

Dear Faculty Member:

I am conducting a group interview for my doctoral program at the University of Delaware. I am investigating factors related to improving degree completion in the Mechanical Engineering Technology (MET) program at Delaware Technical Community College. My hope is that, with your feedback, I can recommend improvements to increase the graduation rate in the future. All active students and 7 faculty members will be asked to participate in this project effort.

You have been chosen for this interview because you have taught a course in the MET program in the last three semesters. To compensate for some of the flaws related to self-reporting by the students, I would like to include your experiences with them. Your participation is completely voluntary and confidential. I believe that there are no risks to you in participation in this study. All responses will be confidential. Steps will be taken to prevent indirect disclosure of the faculty member's identity by association or a combination of information. The interview responses will only be accessible to me. The responses will receive a code assignment and your name and course will be removed to maintain confidentiality. The responses will be stored in a locked file cabinet for the duration of this study and then destroyed at the end of the study.

Would you please consider taking part in this interview? It should take no more than 20 minutes of your time. Findings from this study might result in scholarly publications and conference presentations. Pseudonyms will be used in all reports resulting from this study. Results will be aggregately reported, even though individual participants' comments might be used to illustrate a particular theme emerging from the data. In case you would like to receive a summary of the results of the study and/or copies of any publications derived from the study please feel free to contact the investigator using the information provided on the top of this letter.

If you would like more information about the study, or have questions regarding the study, please contact Richard Mulski at (302) 453-3771 or (302) 981-0332. If you have any concerns about the manner of conduct of the investigation, please contact Dr. Charles Riordan, Vice Provost for Research, 124 Hullihen Hall, University of Delaware, Newark, DE 19716-1551, (302) 831-4007.

To indicate your willingness to participate in this project study, please complete the on-line survey you will be receiving via email.

Thank you

Richard Mulski

Appendix D

STUDENT SURVEY QUESTIONS

Q1 Gender

- ❑ Male (1)
- ❑ Female (2)

Q2 Current student enrollment type

- ❑ Full-time student, 12 credits or more (1)
- ❑ Part-time student, less than 12 credits (2)
- ❑ Just taking a class here and there (3)
- ❑ Not taking classes now (4)

Q3 Employment status

- ○ Full-time, working 40 hours or more (1)
- ○ Part-time, less than 40 hours (2)
- ○ Retired (3)
- ○ Not employed (4)

Q4 Marital Status

- ○ Married (1)
- ○ Living as married (2)
- ○ Divorced (3)
- ○ Separated (4)
- ○ Widowed (5)
- ○ Never married/single (6)

Q5 Current living arrangement

- ○ At home with my parents (1)
- ○ Share a place with friends (2)
- ○ Own place (3)
- ○ Other (4)

Q6 Family financial situation

- ○ Generally have extra money each month (1)
- ○ Make ends meet, but do not have money left over each month (2)
- ○ Have trouble getting by each month (3)
- ○ Do not know/ refused (4)

Q7 Parents education

- ○ A high school diploma or equivalent (1)
- ○ A technical or vocational certificate (2)
- ○ A Two-year associates degree (3)
- ○ A Four-year bachelor's degree (4)
- ○ A Graduate degree (5)
- ○ None/Both parents have less than high school diploma (6)
- ○ Do not know/ refused (7)

Q8 Indicate how often you worry about each of the following.

	Never (1)	Rarely (2)	Sometimes (3)	Frequently (4)	Very Frequently (5)
Hard classes like physics (1)	○	○	○	○	○
Not grasping concepts (2)	○	○	○	○	○
Homework / workload (3)	○	○	○	○	○
Lack of free time (4)	○	○	○	○	○
Taking classes while working (5)	○	○	○	○	○
Completing mechanical engineering technology classes (6)	○	○	○	○	○
Financial costs (7)	○	○	○	○	○
Public speaking (8)	○	○	○	○	○
Writing (9)	○	○	○	○	○

Not knowing what I will be doing in a job as a mechanical technician (10)	○	○	○	○	○

Q9 Please rate how frequently you have done these things while taking classes at

Delaware Tech

	Never (1)	Rarely (2)	Sometimes (3)	Frequently (4)	Very Frequently (5)
Discussed grades or assignments with an instructor (1)	❍	❍	❍	❍	❍
Discussed ideas from your readings or classes with faculty members outside of class (2)	❍	❍	❍	❍	❍
Worked with faculty members on activities other than coursework (committees, orientation, student life activities, clubs, etc.) (3)	❍	❍	❍	❍	❍
Talked about career plans with a faculty member or advisor (4)	❍	❍	❍	❍	❍
Worked with a faculty member or advisor to help you cope with your non-academic responsibilities (work, family, etc. (5)	❍	❍	❍	❍	❍

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Q10 Please rate how frequently you have done these things while taking classes at

Delaware Tech.

	Never (1)	Rarely (2)	Sometime (3)	Frequently (4)	Very Frequently (5)
Worked with other students on projects during class (1)	❍	❍	❍	❍	❍
Worked with classmates outside of class to prepare class assignments (2)	❍	❍	❍	❍	❍
Participated in a learning community or some other formal program where groups of students take two or more classes together (3)	❍	❍	❍	❍	❍
Worked effectively with other students(4)	❍	❍	❍	❍	❍
Developed close relationships while working with other students (5)	❍	❍	❍	❍	❍

Q11 Please rate the importance of these questions to you now.

	Not Important (1)	Somewhat Important (2)	Very Important (3)	Extremely Important (4)
How important is it that you register for classes at Delaware Tech next fall? (1)	❑	❑	❑	❑
How important is it for you to get good grades? (2)	❑	❑	❑	❑
How important is it for you to graduate from college? (3)	❑	❑	❑	❑
How important is it for you graduate from Delaware Tech? (4)	❑	❑	❑	❑

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	Not Important (1)	Somewhat Important (2)	Very Important (3)	Extremely Important (4)
How important will the mechanical engineering technology major be in reaching your career goals? (5)	❏	❏	❏	❏

Q12 Please rate how frequently you have done these things while taking classes at Delaware Tech

	Never (1)	Rarely (2)	Sometimes (3)	Frequently (4)	Very Frequently (5)
Worked on a paper or project that required integrating ideas or information from various sources (1)	❍	❍	❍	❍	❍
Thinking critically and analytically (2)	❍	❍	❍	❍	❍
Solving complex real-world problems (3)	❍	❍	❍	❍	❍
Come to class without completing readings or assignments (4)	❍	❍	❍	❍	❍
Worked harder than you thought you could to meet an instructor's standards or expectations (5)	❍	❍	❍	❍	❍
Working for pay on campus (6)	❍	❍	❍	❍	❍
Working for pay off campus (7)	❍	❍	❍	❍	❍
Relaxing and socializing (watching TV, partying, etc. (8)	❍	❍	❍	❍	❍
Providing care for dependents living with you (parents, children, spouse, etc.) (9)	❍	❍	❍	❍	❍

Q13 For each of the following, please tell me how much you think this would help someone whose circumstances are similar to yours after high school in getting a college degree.

	A lot (1)	A little (2)	Not Much (3)	Not at all (4)	Don't know (5)
More government loans for college (1)	○	○	○	○	○
The opportunity to talk with advisers who know all about the different college and job-training programs so you can make a good choice (2)	○	○	○	○	○
Cut the cost of attending college by 25 percent (3)	○	○	○	○	○
Allow part-time students to qualify for financial aid (4)	○	○	○	○	○
Make the college application process easier (5)	○	○	○	○	○
Put more classes online (6)	○	○	○	○	○
Provide health insurance to all students, even those taking classes part-time (7)	○	○	○	○	○
Provide day care for students that need it (8)	○	○	○	○	○
Make sure students learn good study habits in high school so they're prepared for college work (9)	○	○	○	○	○
Offer more courses in the evening, on weekends or in the summer so people can work while attending school (10)	○	○	○	○	○
Improve teaching so the classes are more interesting and relevant (11)	○	○	○	○	○
Have more programs for students who are interested in hand-on learning, apprenticeships and non-classroom work (12)	○	○	○	○	○

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Q14 Is there anything Delaware Tech can do to help students graduate more quickly from the MET Program?

Q15 Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?

Appendix E

STUDENT INTERVIEW QUESTIONS

1. Tell me why you enrolled in the program and how you see yourself completing the degree.

2. Some of our students find that it can take longer than the prescribed three years to attain the AAS degree. Can you tell me what barriers or factors you feel may slow the time needed for some of our students to complete the degree?

3. It costs substantial money to go to school and that can be a burden. What do you think might be some financial effects of not completing the degree?

4. What do you think Delaware Tech could do differently that would help students finish in the three-year time frame?

Appendix F

FACULTY INTERVIEW QUESTIONS

1. It appears that in our institution some students take longer to graduate from the MET program. What is your view on this issue? What recommendations do you have for Del Tech as an institution, if any, that could help students graduate during the designated time period for our program. Can you provide some concrete suggestions for how to implement these recommendations?

2. What suggestions do you have, if any, that can you provide specifically for the MET department that could directly improve our students' graduation rate?

3. What suggestions do you have, if any, that can help MET faculty communicate to MET students the benefits of graduating on time?

5. Having had contact with the MET students, what are the major factors that prevent students from graduating in three years or less in your opinion?

6. Do you have any suggestions for how to help accelerate student graduation from the MET program?

7. In your opinion, how do you think students perceive the MET graduation rate? Do you think they view the time it takes them to graduate as something that can be improved?

Appendix G

STUDENT RESPONSES TO OPEN-ENDED QUESTIONS

Q14. Is there anything Delaware Tech can do to help students graduate more quickly from the MET Program?
Text Response
A better scheduling layout around the MET degree.
reduce the number of classes that have a lot of prerequisites
send the matrix forms for prerequisite classes that need to be taken prior to the program in the mail (for example, student would be well prepared for MET if they took honors physics and up to algebra II prior to the program)
Merge Fluid mechanics and fluid power into one class. Make another class that involves electronics
integrate the required physics class with dynamics and statics. The statics and dynamics classes have industry terms and scenarios and if the physics class taught us using similar terms it might make transition easier. also fluid mechanics and fluid power should be combined to help accelerate the program. If the first two years of classes (prerequisites) were offered year round could help accelerate students through the program.
Offer more classes during all semesters, not just fall or spring.
Yes, Condense Fluid Power and Fluid Mechanics. The other classes are fine. Require one social science elective instead of two. Replace Algebra & Trig 181 & 182 with Calculus I. Offer Night Classes so students can take more credit hours
Make the classes more clear and concise.
High quality, frequent career and course counseling is very important.
Helping students with family obligations to be able to attend class could help. i.e. a daycare for students with children.
Honestly, Del tech cannot do much. In order to graduate that student must meet the criteria set by del tech and the department head and the only way to graduate would be to cut a course or requirement. This however would not be beneficial as the courses provide crucial knowledge that is necessary for the degree.
Offer more times for MET classes. Create a specific math class for MET students that will have MET relevant problems, and only an MET relevant

Q14. Is there anything Delaware Tech can do to help students graduate more quickly from the MET Program?
curriculum.
Do not combine the math classes... Math is learned by repetition, not by speeding through courses, having a break, then adding more new information on top of it. By condensing math, yes, theoretically, students can go through courses faster. The question will be if they are actually learning or not.
A way Delaware Tech can help students graduate more quickly from the MET program or any program in general is by advisors giving you a guideline of what classes you need to take and setting a path for a student to follow to complete their degree. Also, every student is different, so the advisor better understanding where the student is coming from is also important. Examples include the student working a full time job, having a family at home to care for, and anything else that might take time away from concentrating on school work.
Cut down on some classes (make them shorter)
OFFER ALL MET CLASSES YEAR ROUND NOT EVERY OTHER SEMESTER OFFER ALL MET CLASSES DURING DAY AND ALL MET CLASSES AT NIGHT
Offer more evening class or weekend class for students who have full-time jobs. Main reason why I'm here and not at a 4-year University is due to my workload. Also allow students to flex classes and not force certain pre-requisites.
combine [Faculty member1 name]'s courses or choose an instructor that can teach it.
let [Faculty member name] teach less classes so he can focus on teaching and do a better job of that. combine classes like fluid mechanics and fluid power, over them in the spring and fall semesters so students aren't waiting a semester to take classes.
Offer more classes at more times so it's easier to be able to work full time while balancing school work.
Merge certain classes like fluid power and fluid mechanics or make them 8 week courses. Move teachers around to classes that they would do better in. Like for example, let [Faculty member2 name] teach Project since he has actual technical knowledge on engineering projects. Make [Faculty member3 name] teach Dynamics. Also get a better teacher than [Faculty member1 name] as he doesn't really teach that well. There is a lot of self-study in the class and he repeatedly does not manage his time well in any of the classes he teaches, as he rushes the first couple of weeks of class and then we do nothing in the last 4 weeks. Also the department can offer the same courses in spring and summer instead of one semester per academic year.
Have more classes or seating available that way a student doesn't have trouble registering for a class. Put emphasis on registering on time for all the students in the program. When giving an assignment to a student, make sure

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Q14. Is there anything Delaware Tech can do to help students graduate more quickly from the MET Program?
an example on how to format (lab report) it is provided. Should also provide sufficient instruction for every single assignment given.
Merge together some of the courses that are related such as statics, strength of materials, dynamics, and machine design. also combine courses like fluid power and fluid mechanics. Offering some MET courses over the summer may also help some students graduate sooner.
Asses the completion time to get a degree and plan for the next two years, rather than just planning for the next semester.
N/A
Restructuring programs that require multiple pre-requisites. Push classes together to form a mega class that can be taken in a semester.
There were many times that classes were only offered once during the fall or the spring. This makes it impossible to graduate a semester early because the sequences is very strict. Also varying the instructors teaching these courses would help. There are a few teachers who are not very good, but because they are the only teacher, there is not avoiding bad teachers.
Offering classes on a less restrictive basis. As opposed to offering certain classes once a year during daytime hours, perhaps offer them year round with an additional night class.
I am not sure. I only attend part-time. Speed is not my goal, completing the program is my goal.
Offer courses at night. Offer courses online. Offer courses in the summer. Modify curriculum to 12 credits per semester.
More classes available at night and over the summer. I work full time for a company that is very flexible with when I come and go but a lot of classes just aren't offered outside of the middle of the typical work day.
Offer more major classes over more semesters and more sections per semester.
Push meeting with advisors more often
no
Make it easier to register for classes
More hands on activities to help keep students interested. Also more open lab time so students can do work late evenings/weekends
A tutoring program specifically for MET students could be helpful (such as the writing center for writing classes), so if students needed extra help with something like a statics problem there would be more time available for consulting outside of class and instructor office hours.
I think Delaware Tech is doing a good job in helping their students graduate. I think a lot of the reason some students drop out of courses of the MET program or of college itself is because of their own work ethic and their personal life. Maybe having an advisor specifically dedicated to talking to

Q14. Is there anything Delaware Tech can do to help students graduate more quickly from the MET Program?

students about school and home problems would help them achieve their goals faster and to a higher standard. Having a designated person rather than a normal advisor to talk to can add comfort to the student in the fact that the student won't feel they are wasting their advisors time and its adds confidentiality.
offer tutoring for some major classes such as statics and strength of material.
I am not in the MET program.
No
I honestly haven't a clue, I'm an Architectural Major student.
Offer all classes during both semesters!
I am not an MET student, I am a CET student.
Don't lower your standards.
not currently in the program so it makes it impossible for me to give an opinion about the material
not have a job, not very night time friendly course, the general courses are well enough but once it gets down to the specialized MET courses it's poor findings.
No, I think it just takes time to complete the degree.
Make the program less a theoretic but involve more labs and more hands on training which will prepare them for the real world applications. Also, I believe having more team work writing the class helps students learn how to play along with others come the time to go to the outside world.
Offer some more MET classes during the summer, so that students don't have to just take the summer off from any MET classes and come back in the fall with almost no recollection of what they learned last.

Q15. Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?

Text Response
meet with your advisor, build relationships with other students
Know their math and physics very well coming into the program
Calculus always helps, and if the student is thinking of going to a four year college then calculus based classed should be available.
Sit down and plan out your semesters so that you can graduate when you want to.
Complete Pre-Requisites as quick as possible.
Work at a pace and have an education plan to follow.
Math skills should be more advanced than what I'm seeing MET115!
Study and apply yourself
Just devote your time to school. Education is important and you should focus

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Q15. Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?
on that first and foremost.
Get prerequisite classes out of the way early so you can more on to classes that may interest you more.
Focus on your studies and honestly spend the time necessary to learn what needs to be learned, even if it is not required. Approach college as a personal growing experience not just as something to get through for a title.
New students entering the MET program will be able to complete the program more quickly by a few ways that will follow. One is taking the placement tests that you can take. These placement tests may allow you to skip over some of the lower math, English, writing, and science courses a student would otherwise have to take. With less credits to work through a student can complete their degree much faster than those, who do not take the placement tests. Another way to increase a student's completion in the program is to take classes not only during the spring or fall semesters, but take a class or two in the summer. This will not only help you complete more classes faster, but could also help lower a student's work load in the other semesters allowing a student to focus on the more challenging classes without having an excessive amount of credits to go with it.
HUSTLE. DON'T GIVE UP.
think ahead and discuss the courses early
Don't let the classes only offered every other semester mess you up, plan ahead with those classes
I am a big fan of when the classes where flipped like they were in statics and strengths, I would recommend teaching more classes like that or offering multiple segments of the classes where there were times that classes was traditional and segments where the classes are flipped. so students don't just graduate faster but also have a better understanding of the material when they graduate, because what's the point of graduating in 2 years if you don't know anything.
Try taking AP scores in high school and get good scores on the SAT so that you don't have to take the entry level courses.
Make sure you spend the hours outside of class in order to get that good grade. It helps to read the book and highlight it (for conceptual classes only). For math classes make sure you work on math problems that you might encounter in a test.
If you have to take prerequisites courses, make sure you complete them as quickly as you can.
Summer classes and online classes can cut time during the day while also leaving room for studying or working.
N/A
Be sure to be ready for the math that is needed to be taken. Also include

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Q15. Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?
more projects that build into what is being learned. Possibly line up developmental internships that can lead to a higher involvement in the learning process.
Take as many or as few classes as you can take while maintaining good grades. Don't over commit to more classes than you can handle and drop out. Other than that, take AP classes in high school.
expect it to be a 3 year degree unless you are a full time student, also dont expect much in usable financial aid if you are listed as a dependent or have a job.
Live at home so you can attend full time or become wealthy so loans and school payments are not a worry.
No. Its not the student's fault.
Find out which courses are offered which semesters and schedule them appropriately.
Plan courses out
No
Work with advisers to make a plan to complete the program.
Keep focused, don't get discouraged, and always have a goal that you are striving for.
Make sure you come in and take the pre-tests and get good scores to op-out of pre-rec classes. This will help you stay on track and not fall behind.
Go to all classes, get all assignments done, and study when you need to.
My suggestions are keep working and don't give up on yourself. even if something is difficult to understand and you can get over-whelmed, the instructors are there to help you through and make friends with your classmates, they are a great asset.
work hard, study hard and do not be afraid to ask questions in class and make friends, you will need it.
I do not have insight into this degree program.
No
Talk to your advisor frequently.
Be very diligent in taking all required classes in the required sequence. Failing or dropping one class can easily put you behind an entire year!
Turn in all assignments on time and put your best efforts into all the assignments and projects. Always ask questions and inform the instructors. Some students when first starting tend to be shy and do not want to ask many questions, but if they keep communication with instructor it will help them not fall behind and make the instructor aware of any circumstances that might come in the grades.
If it was easy, everyone would do it.
I would highly recommend a student to take summer classes and take the

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Q15. Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?
necessary classes when available
vodka.
I think that putting as much effort as possible into the placement tests will greatly increase the time it takes to graduate because it will eliminate a lot of the prerequisite classes.
Make sacrifices such as parties, completing school quickly is very worth it.
Speak to your advisors and let them help you set your SEP(Education plan) because working under a time variable helps you pace yourself into graduation. Also take instructors like Dr. [Faculty member4 name]. He is one in a million. Very knowledgeable man, not only on material as well as what is expected in the field of work.
Have a good night sleep, a good breakfast every morning, and show up for class ready for anything.

Appendix H

INTERVIEW QUESTIONS ALIGNED TO KEY QUESTIONS

2. How can students at risk of not finishing be identified earlier to improve timely intervention?

3. What do students believe are the major contributing factors affecting how long it takes them to complete the degree?

4. What do instructors believe are the major contributing factors keeping students from completing the degree in a timely fashion?

5. How does faculty believe they can help students complete their degree?

	KEY QUESTIONS			
	2	**3**	**4**	**5**
STUDENT SURVEY				
Q1 Gender	X			
Q2 Current student enrollment type	X			
Q3 Employment status	X			
Q4 Marital Status	X			
Q5 Current living arrangement	X			
Q6 Family financial situation	X			
Q7 Parents education	X			
Q8 Indicate how often you worry about each of the following.	X	X		
Q9 Please rate how frequently you have done these things while taking classes at Delaware Tech	X	X		
Q10 Please rate how frequently you have done these things while taking classes at Delaware Tech.	X	X		

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	KEY QUESTIONS			
	2	**3**	**4**	**5**
STUDENT SURVEY				
Q11 Please rate the importance of these questions to you now.	X	X		
Q12 Please rate how frequently or not you have done these things while taking classes at Delaware Tech	X	X		
Q13 For each of the following, please tell me how much you think this would help someone whose circumstances are similar to yours after high school in getting a college degree.	X	X		
Q14 Is there anything Delaware Tech can do to help students graduate more quickly from the MET program?	X	X		
Q15 Do you have any suggestions for new students entering the MET program on ways to complete the program more quickly?	X	X		

	KEY QUESTIONS			
	2	**3**	**4**	**5**
STUDENT INTERVIEW				
Q1. Tell me why you enrolled in the program and how you see yourself completing the degree.	X	X		
Q2. You are taking a little longer than the prescribed three years to attain the degree. Tell me about the barriers or factors that are slowing your progress.	X	X		
Q3. It costs substantial money to go to school and that can be a burden. What do you think might be some financial effects of not completing the degree?	X	X		
Q4. What do you think Delaware Tech could do differently that would help students finish in the three-year time frame?	X	X		

2. How can students at risk of not finishing be identified earlier to improve timely intervention?

3. What do students believe are the major contributing factors affecting how long it takes them to complete the degree?

4. What do instructors believe are the major contributing factors keeping students from completing the degree in a timely fashion?

5. How does faculty believe they can help students complete their degree?

	KEY QUESTIONS			
	2	3	4	5
FACULTY INTERVIEW				
Q1. Do you feel that Delaware Tech as an institution should be doing more to help students to graduate more quickly from the MET program? If so, what could be done?			X	X
Q2. Do you have any ideas on what could be done in the MET department directly to improve the MET graduation rate?			X	X
Q3. Do you believe there is something that the MET faculty could be doing to educate the MET students on the benefits of graduating more quickly from the program?			X	X

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	KEY QUESTIONS			
	2	**3**	**4**	**5**
FACULTY INTERVIEW				
Q4. Having had contact with the MET students; do you think there are major factors that prevent students from graduating in three years or less? If so, what are they?			X	X
Q5. Are there any ways to accelerate student graduating from the MET program? Please elaborate			X	X
Q6. Can you explain how you think students perceive the MET graduation rate? Do they view the time it takes them to graduate as something that can be improved?			X	X

Appendix I

HUMAN SUBJECTS REVIEW BOARD - EXEMPT APPROVAL

Please note that University of Delaware IRB has published the following Board

Document on IRBNet:

Project Title: [735882-1] Improving Mechanical Engineering Technology Degree

Completion at Delaware Technical Community College

Principal Investigator: Richard Mulski

Submission Type: New Project

Date Submitted: April 13, 2015

Document Type: Exempt Letter

Document Description: Exempt Letter

Publish Date: April 14, 2015