

## Project Rationale

The intent of this research is to discover avenues of continued improvement of the Haile Middle School Engineering Academy. The term continued improvement in this research can be narrowed to the impact of successful middle school programs enrollment and retention, and also community awareness and local employment preparation. Research was guided by the following three focus questions:

1. Is the academy promoting retention in high school programs?
2. Does the curriculum provide focus of career readiness?
3. What actions are required to improve the overall success of the academy?

A stride to improve engineering education academies in Manatee County and also in conjunction with Florida House Bill 1255, in 2012 Haile Middle School established a dual enrollment engineering academy. This academy is the first middle school engineering academy established in the District of Manatee County and has a mission of increasing student performance outcomes regarding career readiness while aligning with standards and guidelines for middle school career academies. To ensure the success of the CAT academy, standards were developed which replicated the standards of the National Career Academy Coalition. The mission National Career Academy Coalition is to “To create and support a national network of existing and emerging career academies” (National Career Academy Coalition, 2013). Career academies benefit the student by integrating themes from career backgrounds while teaching methods and curricula to prepare students for success in four year colleges and universities (National Career Academy Coalition, 2013).

To date there has been no research or tracking of the student body enrolled in the engineering academy. While the National Career Academy Coalition is responsible in development of national standards and benchmarks for career academies, the coalition also recognizes that in order to maintain the “integrity” of the academy, it is important to gather data, report data in regards to accountability measures including factors such as retention and attendance in programs. Development of these essential practices places accountability of teaching and learning effectiveness upon each school and program. Although no academy is faultless 100% of the time, advancement of student performance should be vital to the academies mission (National Career Academy Coalition). Evaluating the academy at this time will facilitate and improve teaching and learning within the academy.

The capstone academy course is compiled of twenty-five 8<sup>th</sup> grade students who have already completed two years of engineering at the middle school level. An application process was implemented for students to be accepted into the academy to uphold rigor and relevance. Meetings with feeder secondary program teachers took place to establish a curriculum. Students enrolled in a capstone course will have the opportunity to earn high school credit and receive an industry certification in SolidWorks. This research documentation could give further insight into the effectiveness of offering a dual enrollment engineering course and industry certifications at the middle school level.

Data outcomes as far as vocational students completing programs fall heavy on the negative side. To merely analyze the data from entry level students regarding retention is simply avoiding the complexity of the situation (Round, Brownless, & Rout, 2012). Questioning could also display what impact career academies and industry certification hold on the retention of students. Retention is an action which can be promoted through a “shared vision, open-mindedness, and a strong commitment to learning” (Hoachlander & Yanofsky, 2011). A stronger recognition of these characteristics could benefit programs and employers. Horn in 1998, examined the college dropout trend of 1989 and 1990. He questioned if there was a similar first year dropout rating (16%) among vocational students and of students of four year colleges and universities (Ko, 2005). Research has noted that many of the most successful and brightest students have little to no contact with working adults, or the extensive range of career opportunities in science, technology, engineering and mathematic associated fields (Hoachlander & Yanofsky, 2011). Nationally recognized training and skills embedded into a classroom culture is critical in retention and endorsing enhanced use of skills (Smith, Oczkowski & Smith, 2008). Retention commonalities promote question in many categories of education. Currently, some school reform designs are driven by career academies. Academies are developed to better prepare students for current job markets, skill sets and needs. Career academies are designed for students to be trained in smaller learning situations, focusing on integrating work based learning (Estacion, D’Souza & Bozick, 2011). According to Doug Wagner, Director of Adult, Career and Technical Education in Manatee County Florida, after 3 years of data collection of participation of STEM (Science, Technology, Engineering and Mathematics) elementary students, scored better than students in schools that did not offer STEM programs. Charles Dayton, former coordinator for the Career Academy Support Network stated, “Career academies are a logical place to bring academic and vocational education together” (Lewis, 2005). A great deal of further research involving career academies is needed as Assistant Secretary of Education Susan Sclafani stated, “we do not yet have the gold standard of research on career academies, but the standards provide a document researchers can use (Lewis, 2005).

According to Kemple in 2004, for young men the opportunity to be involved in a career academy improved their chance of obtaining a job. This is a group that has been in a steady decline over the past few years as far as wage earnings. Kemple found on the other hand, academies had no large impact on the young women. Research has shown that there are 54% more girls than boys (46%) currently enrolled in career academies (Estacion, D’Souza & Bozick, 2011). A larger percentage of the population enrolled in career academies were Hispanic (Estacion, D’Souza & Bozick, 2011). However, the larger picture shows career academies are a viable source for a range of students to develop skills needed for high skilled, high pay jobs. School to work transitions for at risk populations proved to be the most beneficial as far as academies improving the labor market (Kemple, 2004).

In a Periodical titled *Recognizing Career Academy Innovation*, Cheryl Carrier discusses the partnership of Ford Motor Company and the need to prepare students for success in professional careers. She recognizes that high school is a “pivotal” point in a young person’s life. Key success and failures will occur at this point and can have great impact on personal and financial growth in the remainder of their lives. “Educational programs that emphasize career and college preparation through strong academics and exposure to future opportunities ensure young people will not only learn the critical content of today—science, math, engineering—but

important life skills such as teamwork, innovation, critical thinking, problem solving” (Carrier, 2007). The Ford PAS program developed a 12 point action plan which incorporates best practice which are crucial in “sustainable career academics” (Carrier, 2007). Carrier also states, “To make learning relevant, we must create links between schools and businesses, between courses students take and real life experiences” (Carrier, 2007).

Ford Partnership for Advanced Studies promotes project based learning and student created projects to encourage learning involving applicable business issues. Topics such as global economies, engineering, design and corporate citizenship are discussed while promoting skills such as problem solving, communication and core academic studies. The fast paced 21<sup>st</sup> century economy has forced a rethinking of the high school career education objectives. The Fords PAS program is “designed to meet the demands and link the local community to the classroom”. According to Jim Padilla, President and Chief Operating Officer of Ford Motor Company, Ford PAS programs promote academic knowledge and practical skills which give students the assurance they can enter the workforce with confidence (Carrier, 2006).

Ten standards of practice were developed by the Manatee County Adult, Career and Technical Education Department for the benchmarks of the engineering academy at Haile Middle School. The applied standards directly link with *National Standards of Practice*, in order to promote rigor, relevance and retention within the program. To comply the academy must a) Define a Mission and Goals, b) Develop an Academy Structure, c) Host District and Secondary School, d) Higher qualified educators, e) Participate in continuous professional development, f) Design a governing structure, g) Evaluate Curriculum and Instruction, h) Link program to Employer, Higher Education, and Community, i) Measure Student Assessment, and j) Develop a Cycle of Improvement. If these standards of practice are applied, results could lead to rigor and relevant learning which promotes retention of students in vocational settings.

### **Define a Mission and Goals**

The mission of the Engineering Technology program at Haile Middle School is to make certain that all students can be technologically literate and work ready through industry themed learning and career related skills.

### **Develop and Academy Structure**

A successful career academy will be a well balanced structure of the middle school. Structure can be defined as but not limited to student recruitment, cohort scheduling, the physical space for the academy and a clear career or industry theme.

### **Host District and Secondary School**

The importance of the career academy cannot only dwell within the schools teachers and administration. Adequate funding for the program such as facilities, equipment and material needs to be supported by the school board, superintendent and the community.

### **Higher qualified educators**

In most academy situations, it is important that the teachers are qualified in the content area in which they teach. The teacher at Haile Middle School holds a valid Florida Teachers Certification in Industrial Arts, and a professional industry certification in SolidWorks (3-D engineering modeling software).

### **Participate in continuous professional development**

Career academies demand skills from teachers that they may not had in previous traditional training. Continuous professional development for the academy teachers ensures that the student's education is relevant to today's industry standards. Common planning encourages teaches to be collaborative in career themed lessons.

### **Design a Governing Structure**

It is important that the academy follows view that is positive to all stakeholders. Advisory committees which involve local industry members can develop a positive partnership between school and community. Students must apply to be a part of the academy as well as having successfully completed at least one year of Introduction to Technology (Course 860010)

### **Evaluate Curriculum and Instruction**

The curriculum of the Haile Middle School Engineering program meets the standards of the district, state and industry. Curriculum acknowledges the goals and views of feeder programs, and incorporates elements from state and national standards ensuring that the program promotes rigor and relevant learning.

### **Link program to Employer, Higher Education, and Community**

Haile Middle School Engineering focuses on the importance of a link between school and community. The program involves the community, higher education and potential employers in certain aspects of operations to establish the importance and relevance of learning and skills.

### **Measure Student Assessment**

Central to the academies mission should be student performance. Programs should have a focus of Technical learning through multiple measures of collecting student data. The evidence of impact shall be accurate reported regardless of the results.

### **Develop a Cycle of Improvement**

Not all academies will operate flawlessly 100% of the time. Program leaders should asses how the academy is functioning through its strengths and weaknesses. Reviews will lead to refinements in the program. Changes that are made due to these refinements should always reflect the overall mission of the academy.

In attempt to answer the key questions in this research students were surveyed at the middle and high school level, middle school teachers were interviewed, high school teachers surveyed and the academy was evaluated by the standards of the National Career Academy Coalition.

