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The Construction Alternative for High School Students

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This paper presents an alternative career path for at risk young people of high school age to obtain skills preparing them to enter the construction industry; the third largest economic engine in the State of Florida. The limited options available to these problem youngsters, combined with the scarcity of skilled labor in construction, presents a unique opportunity for a partnership between a university based construction program and a local public institution. The resulting endeavor is, from a funding perspective, mutually beneficial for both institutions. The program also demonstrates how a professional construction education program can fulfill both the educational and service components of its mission. The program described has been successfully working since 1995 at MacArthur South Senior High School in Miami-Dade County. It is a partnership between the Department of Construction Management of the College of Engineering at Florida International University and the Miami-Dade County Public School System.

Key words: Construction, High School Students, Electricians, At-risk Students, Alternative Program.

Introduction

Construction is the largest industry in the USA, directly employing about 6,000,000 workers. In southeast Florida, comprising Miami-Dade, Broward, Palm Beach and Monroe Counties the volume of construction is on the order of $7 billion per year. In Miami-Dade County alone, 20,000 - 40,000 workers are directly employed in construction. The construction industry contributes with approximately $4 billion per year to the gross county product, which constitutes the 10.5% of the total gross county product (Otazo, 1997).

This high construction volume draws significant numbers of new and returning employees to the industry. These employees come from a broad spectrum of educational backgrounds but a common characteristic is a lack of skilled training. This has a detrimental effect on both productivity and quality. The situation is aggravated by the relatively low educational performance of Florida in public education. Florida ranks as the 4th largest state in population but is only ranked 48th in education.

A significant number of high school students cannot or do not want to continue their education at a college level. These include at-risk students. These young people need alternative means of self-support. They are a natural source of potential skilled laborers for the construction industry. Providing them with the opportunity to obtain skills in well-remunerated and respectable trades

is beneficial to all. These skills will permit these young people to get a job in the trades because they are prepared and like their work, not because they lack other options.

At-risk Students

Within the set of high school students there is a group, which requires special attention. This group is comprised of the at-risk students. The following is the profile of an at-risk student:

1. Academic performance one or more years below actual grade level in mathematics and reading.
2. Pattern of excessive school absences for a period of at least three months.
3. Pattern of excessive class cuts for a period of at least one-month.
4. Pattern of classroom disruption for a period exceeding one month.
    a. Disregard for rights of others in the classroom
    b. Unjustifiable defiance of authority
5. Inappropriate behaviors, interests or aptitudes that would make success in a typical school unlikely.

Other characteristics of these types of students are:

1. High potential for violence
2. Student does not speak English
3. Serious drug or alcohol involvement
4. Six or more months of voluntary truancy
5. Psychotic or pre psychotic behavior
6. Bizarre, unprovoked or irrational behavior of emotionally disturbed student

The behavior of these students is frequently motivated by family situations and social conditions, which are aggravated as the child grows. A lack of manual and intellectual skills is typical in the majority of these students. This leads to low self-confidence, among other characteristics. These students need a place in which to develop their potential, build self-esteem and test their skills and abilities. They also need to have the possibility of a good job when finishing high school. If this possibility is not available, the tendency is for these young people to gravitate towards the marginalized, disenfranchised lower socio-economic layers in order to get “easy money” and eventually become delinquents.

As a way of reducing the problem that these at-risk students represent to society, the Miami-Dade Public School System has created 16 high schools offering alternative programs. These are educational programs which are designed to offer variations of traditional instructional programs and strategies for the purpose of increasing the likelihood that grade 4 through grade 12 students who are unmotivated, or unsuccessful in traditional programs, remain in school and enroll in a program of study that leads to a high school diploma or its equivalent (Florida School Laws, 1996). In Table 1, the number of students per year in both normal and alternative programs in Miami-Dade County from 1990 can be seen.

The table also shows the percent increase in the number of high school students for both types of programs from 1990 to 1996. It is interesting to note that the share of the student population in normal programs decreased from 96.89 % to 95.35 % between 1990 and 1996. This means that the share of the student population in alternative programs has increased from 3.11 % to 4.65 %.

Table 1

Number of students

Year	No. Of students in Normal Programs	No. Of students in Alternative Program	Total No. of Students	% of students in Normal Prog.	% of students in Alt. Prog.
1990	80,891	2,594	83,485	96.89	3.11
1991	83,540	3,092	86,632	96.43	3.57
1992	82,072	3,147	85,219	96.31	3.69
1993	83,039	3,586	86,625	95.86	4.14
1994	83,291	3,586	87,158	95.56	4.44
1995	86,004	4,027	90,031	95.53	4.47
1996	88,464	4,314	92,778	95.35	4.65

The increase in at risk students in alternative programs, coupled with the scarcity of skilled laborers in construction, presents a unique opportunity for a partnership between a university based construction program and a local public institution. It is a unique and creative way to address both problems simultaneously. It is beneficial to the people trained, to the institutions involved and to society as a whole. Furthermore, the resulting endeavor is, from a funding perspective, beneficial for all as well.

The Apprentices for a Positive Tomorrow Program

Apprentices for a Positive Tomorrow is a program designed to provide skilled training in residential electrical wiring to at risk high school students. It has been implemented at McArthur South Senior High School in Miami-Dade County, Florida. McArthur South Senior High School receives students from 13 high schools in the area. It has an annual enrollment of approximately 315 students.

During the last two years, the Department of Construction Management in the College of Engineering at Florida International University has been working together with MacArthur South Senior High School in implementing a program teaching a practical sequence of courses in electricity. The objective of the program is to develop skills in these students, which will increase self-confidence and at the same time, prepare them in the practical application of this knowledge and then getting them related jobs in the construction industry. The success of this program has motivated the Miami-Dade Public School System to bestow a grant upon the College of Engineering at Florida International University for $18,800. This partnership is mutually beneficial because it is possible to take advantage of the fact that dual enrollment permits both institutions to claim the FTE for funding purposes. The budgets of both institutions depend heavily on FTE generated.

Course Characteristics

The course is offered in high school as two elective subjects, under the name of “Electrical Wiring in Residential Construction” and "Practical Electricity", two hours per day, five days per week, during one semester. This represents 180 classroom hours where practical skills and theoretical concepts are developed. The classroom is housed in a 32’ by 22’ room, where the students have constructed partitions for the electrical installations. At the beginning of the course, the students work on tables, learning how to use the different tools and how to connect simple circuits at low scales. These circuits use electrical boxes, pipes and wires that have been used during the past semester. This gives the opportunity to the students of familiarizing themselves with tools and electrical materials, without using new materials for beginning practices, which will otherwise represent a waste of resources. When the students have acquired enough practice, they learn to install different electrical circuits at real size on the partitions using Romex, EMT, PVC, liquid tight, etc.

Everyday, the class is divided into two parts: First, a theoretical background is taught and later, different tasks are assigned. The students are assigned these tasks individually or in-groups of two, depending on the type of work to be accomplished.

In this way, the students learn the necessary theory and the practical aspects that they will need in their jobs. These aspects include the practical installation of any fixtures in a house, the reading of blueprints, and the calculations of the service entrance and branch circuits.

Course Objectives

1. To explain the principles and the basis of electrical circuits and electrical properties of conductors and isolators.
2. To describe the electrical circuits components.
3. To teach how to select essential tools for residential wiring and discusses the basic principles of tool use and care.
4. To teach safety and grounding essentials.
5. To teach the theory and practice of residential electrical installations.
6. To describe the service entrance and its characteristics.
7. To give the fundamentals of residential wiring calculations.
8. To teach how to prepare and read prints and wiring circuits.
9. To teach the related aspects of the NEC.

After finishing this course, the student will be capable of:

1. To properly use the essential tools for the electrician.
2. To install boxes and conductors, to realize electrical installations using pipes and other materials used for the same.
3. To calculate residential electrical circuits.
4. To recognize the essential materials and components used in residential wiring

In Table 2, the number of enrolled and promoted students each semester is presented.

Table 2

Number of Enrolled and Promoted Students with A or B

Semester	Enrollment	Students with A orB	Percent
Fall' 95	16	8	50
Spring' 96	20	6	30
Summer' 96	11	6	54.5
Fall' 96	14	4	28.5
Spring' 97	13	4	30.7

Table 2 shows promising results. On average 38% of the students have successfully completed the program, which the authors consider quite good, considering that these are students with serious behavioral problems. More than 20% of the students that finished the course are working as electrician helpers in the construction industry. The students have presented their works in different fairs, with the following results:

1996 Miami-Dade County Youth Fair	First Place
1996 South Florida Regional Science and Engineering Fair	Third Place
1996 Miami-Dade County Youth Fair	First Place (two presentations)
	Second Place (two presentations)
	Special Award

The additional cost of the program is in the order of $60,000 per year, including salaries, tools and materials. Considering that the cost of maintaining a prisoner in jail in Miami-Dade County is on the order of $30,000 per year, the program is self-sufficient if it keeps only 2 at-risk students per year form going to prison.

Conclusions

It is possible to simultaneously address the lack of skilled labor in the construction industry and the dilemma of what to do with at-risk high school students. Florida International University and MacArthur South Sr. High School have been working together, providing needed skilled labor for the local industry as well as education and hope to troubled and disenfranchised young people. Their partnership, Apprentices for a Positive Tomorrow, has yielded promising results: on average, 38% of the students have successfully completed the program, and more than 20% of these are working as helper electricians in the construction industry. Some have decided to obtain more advanced training, with the goal of obtaining journeyman and master electrician licenses in the future. Apprentices for a Positive Tomorrow is a unique and creative partnership, beneficial at-risk young people, the institutions involved, and the local community.

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