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16. Abstract This paper focuses on determining the best way to improve the study habits and academic management skills of summer transportation students in grades 9 through 11. To find the most useful teaching method, 12 students were exposed to three learning methods. Students were taught via field trips, hands-on activities, and lectures. This work describes the program and teaching methods applied. Further research is required to fully determine which method would be most appropriate for students considering careers in the transportation industry.					
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**INCREASING AWARENESS AMONG STUDENTS ABOUT CAREERS IN
TRANSPORTATION**

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Research Project Title:
Transportation Career Development and Outreach Program

Southwest Region University Transportation Center
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EXECUTIVE SUMMARY

The continued growth and success of the transportation industry depends on advanced training for future professionals that will enable them to design, plan, manage, operate, build, and maintain the 21st century transportation systems. Thus, attracting high school students to the field of transportation has become a priority in order to meet the growing demands of the state's transportation system.

To build study habits and academic management skills while stimulating interest in students to take full advantage of the opportunities that exist in the transportation industry, the Center for Transportation Training and Research hosted the 2009 Area National Summer Transportation Institute (NSTI) for high school students from June 8th – July 3rd at Texas Southern University. The four-week program, sponsored by the Federal Highway Administration, is an extremely intense and structured learning opportunity for students in grades 9 through 11 in the Texas high school systems. The goals of NSTI are to:

- Determine the best method of learning that will have a greater impact towards educating students about transportation careers.
- Recruit students to follow a career path leading to a job in the transportation field.
- Improve awareness of professional and technical opportunities in transportation.
- Compile Pre-Test and Post-Test data to ascertain the benefits of an individual student's level of exposure to the transportation industry.

The four week curriculum concentrates on multiple activities that include lectures, field trips, and hands-on activities. Different types of programs have been developed for high school students in order to inform them about the transportation industry. Field trips encompassed the Houston Trans Star System, Houston METRO's light rail system, and the Johnson Space Center. Professional speakers presented various lectures including career opportunities with the Texas Department of Transportation (TX DOT), geographic information systems (GIS), transportation logistics, and electric car operations. Hands-on activities ranged from bridge design, city planning, and flight simulator training.

ABSTRACT

This paper focuses on determining the best way to improve the study habits and academic management skills of summer transportation students in grades 9 through 11. To find the most useful teaching method, 12 students were given a Pre-Test and Post Test to measure their study habits and academic management skills. Students were taught via field trips, hands-on activities, and lectures. Further research may be required to fully determine which method would be most appropriate for students considering careers in the transportation industry.

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DISCLAIMER

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INTRODUCTION

From 1990 through 2004, the average annual amount of travel per interstate-lane-mile in Texas increased by 48 percent (1). For decades, Texas has been among the fastest growing states in the union. Nevertheless, Texas has begun to experience a significant decrease in individuals working and specializing in transportation related fields.

The continued growth and success of the transportation industry depends on advanced training for future professionals to enable them to design, plan, manage, operate, build, and maintain the 21st century transportation systems (2). Thus, attracting high school students to the field of transportation has become a priority in order to meet the growing demands of the state's transit system and help maintain a stable workforce.

To build study habits and academic management skills while stimulating interest in students to take full advantage of the opportunities that exist in the transportation industry, the Center for Transportation Training and Research hosted the 2009 Area National Summer Transportation Institute (NSTI) for high school students from June 8th – July 3rd at Texas Southern University. The four-week program, sponsored by TxDOT with backing from the Federal Highway Administration, is an extremely intense and structured learning opportunity for students in grades 9 through 11 in the Texas high school systems. The goals of NSTI are to:

- Determine the best method of learning that will have a greater impact towards educating students about transportation careers.
- Recruit students to follow a career path leading to a job in the transportation field.
- Improve awareness of professional and technical opportunities in transportation.
- Compile Pre-Test and Post-Test data to ascertain the benefits of an individual student's level of exposure to the transportation industry

According to the Federal Highway Administration (fhwa.gov), 40-50% of the transportation workforce will retire in the next 10 years; fewer people are entering key transportation fields of the transportation industry (3). Different types of programs have been developed for high school students in order to inform them about the transportation industry. The NSTI is one such program which has occurred at Texas Southern University for the past eight years. The four week curriculum concentrates on multiple activities that include lectures, field trips, and hands-on activities. Field trips encompassed the Houston Trans Star System, Houston METRO's light rail system, and the Johnson Space Center. Professional speakers presented various lectures including career opportunities with the Texas Department of Transportation (TX DOT), geographic information systems (GIS), transportation logistics, and electric car operations. Hands-on activities ranged from bridge design, city planning, and flight simulator training. This long-running summer program serves as a tremendous opportunity to examine student learning styles and the program's potential to recruit the next generation of professionals.

HYPOTHESIS

Structured study habits, hours of study, and teacher management skills of students in grades 9 through 11 can be significantly influenced by participating in an interactive summer program.

SIGNIFICANCE OF PROBLEM

Because academically strong students are critical to the future of the nation's transportation system and its security, the lack of student interest in transportation careers cannot be marginalized. Air, land, and sea transportation affect the flow of commerce nationally and internationally. The nation's industries depend on a secure and dependable transportation system for the flow of various goods to and from their companies.

Identifying the best methods to educate students about careers in the transportation industry is crucial because students acquire knowledge in different ways. Even limited exposure to a specific area, such as the rail or aviation industry, could motivate a student to pursue a lifelong career in that field. Therefore, this study will accumulate and analyze data regarding various teaching methods; then the most effective teaching method will be recommended based on the results of the data analysis.

LECTURES

One of the teaching methods utilized during the study involved lectures where students were presented real time data and information directly from professionals currently working in the industry. When an instructor is trying to educate students, he or she will typically stand before a class and present information for the students to learn (4). Lecturing is a straightforward way to deliver knowledge to students quickly. Instructors have a greater control over what is being taught in the classroom because they are the sole source of information.

In the National Summer Transportation Institute the students were exposed to different types of lectures that were presented in order to enhance their understanding of the Transportation industry. The types of lectures students participated in are as follows:

- Aviation History
- History of Transportation
- Rail System
- Highway Design/ Bridge Design
- How to become an Entrepreneur
- Traffic Simulation
- Career opportunities with Texas Department of Transportation (TXDOT)
- Air Quality
- City Planning
- Trip to TranStar
- Evacuation Planning

Lectures focused on the history and significance of the transportation industry and all modes of travel. A presentation was made on how to optimize the signal timing of an intersection. Students

then surveyed the intersection in front of the technology building, summarized their data using MS Excel and presented their findings using MS PowerPoint.

Students who are auditory learners find that lectures appeal to their learning style (4). However, the lecturer must keep in mind that there should never be an assumption that the student knows the details of his lecture. In order to gain and maintain their students' attention, the lecturer should not hesitate to use interesting details such as examples that clearly support learning objectives (5).

FIELD TRIPS

In general, field trips are used to complement classroom teaching. Field activities help close learning gaps that students may have on a subject and enhance lifelong learning (7). Furthermore, field trips reinforce and expand on concepts taught in class, offer students another method to learn concepts, and are especially good for the many tactile/kinesthetic students in the classroom. They allow for a shared reference that can be referred to later as new concepts are introduced (8). The field trip method incorporates the hands-on, physical aspects of training through the interaction that occurs in some of the transportation settings. For example, in an airport environment students are exposed to all levels of career activity that takes place at an airport by interacting with aviation professionals in very restricted work areas. There are many reasons to believe that students learn better about transportation careers through field trips, but field trips may not always be productive because teachers may have to plan ahead--above and beyond their normal lessons (8).

The NSTI also employed field trips as a type of experiential learning in order to transition students away from the traditional classroom setting and into a new learning environment (6). The various types of field trips students participated on were to Houston-Galveston Area Council (HGAC) Tour, Houston Light Rail Tour, and National Aeronautics and Space Administration (NASA) Tour. In the trip to Houston's Metro facility, students were educated on the Metro Rail and were able to go behind the scenes and experience many things that go on at Metro, including driving a rail simulator. The students drove an actual light rail simulator where they were put into various traffic situations, including vehicle pulling in front of the train. Students also took a tour of the full rail line; a trip that was very exciting for those students, some of whom expressed an interest pursuing a career dealing with this area of transportation. Furthermore, students were taken to Houston – Galveston Area Council's monthly Technical Advisory Committee where they observed the process city officials use to discuss vital issues and matters concerning the region. The speaker discussed bike safety, pedestrian safety, and the HGAC 2035 plan. A trip to tour NASA was informative and one that the students found very interesting. Prior to going to NASA, students were asked to do research on NASA and the various kinds of activities that go on there.

INCORPORATING HANDS-ON ACTIVITIES

Research has confirmed many of the seemingly intuitive benefits of hands-on learning. Hands-on activities may cause students to rely on the evidence instead of upon authority and it forces student thinking by requiring interpretation of the observed events, rather than memorization of correct responses (9). Because of the unpredictable expectations of what is actually learned, there

is some hesitancy from teachers to use the hands-on learning method as a primary method of education.

In today's society, hands-on activities have played a prevalent role in educating our students. NSTI teachers embraced hands-on learning in the classroom which is reflective of a student-centered instructional approach. Students were exposed various hands-on activities in NTSTI. The different types of hands-on activities are as follows:

- Presentation Skills
- Resume Preparation
- Computer Skills
- Financial Aid- Tour
- Web page
- SAT Prep
- The Airplane and It's Components
- Basic Aerodynamic
- Flight Simulator Training
- Sports
- Research (NASA)
- How to conduct Survey in Road Intersection
- Techniques related to Intersection Signal Timing
- How to make the Signal Timing in Computer
- African American Pioneers in Transportation
- Highway Design/Bridge Design
- Logistic in Transportation

The Center for Transportation Training and Research (CTTR) staff introduced the students to web page designing concepts. Students were then given a project to create a personal web page of their own lives which would also include information on what they learned in the Houston National Summer Transportation Institute (HNSTI). Students received hands on practice with MS Office Suite where they learned to use advanced features available with MS WORD and EXCEL.

In the Texas Southern Aviation building, students built their own paper planes and then tested them for flight and acrobatics. Students were given the opportunity to use the Aviation Department's flight simulator at TSU. This gave the students hands-on experience on how it feels to actually fly a commercial airplane.

The Texas Department of Transportation presented a wide range of interesting highway design strategies to the students. Students learned what planning goes into the designing and building of today's highways and bridges. This helped students understand the manner of how the highway system that we have today was setup and they learned a brief history about the current highway design.

Texas Southern Department of Transportation Studies gave an introduction to the traffic simulator and made students aware of traffic simulation software called Synchro. The students learned how to count the traffic at stop lights and learned how to calculate using different formulas. They, then, designed their own intersections and optimized the signal timing using data they collected from a survey video tape they were shown earlier in the day. This topic was important because it showed the students how important it is to consider all the aspects of an issue and then incorporate those aspects in the optimization process.

TYPE OF RESEARCH DESIGN

According to Gay (10), a one-group Pre-Test/Post Test research design provides the researcher with a methodology that examines the success of the treatment by evaluating the differences between the Pre-Test and the Post Test of a group of individuals. The purpose of this research design is congruent with the objective to examine the effect that lectures, field trips, and hands-on activities have on students' attitudes about study habits and academic management skills. The dependent variables are structured study habits, hours of study and teacher management skills. The independent variable will be the combined effect of the lectures, field trips, and hands-on activities. A Pre-Test was given at the beginning of the summer program to assess the students' attitudes about their structured study habits, hours of study and teacher management skills. At the end of four weeks of activities, a Post Test was administered to each student to determine any significant changes.

TYPE OF INSTRUMENTATION

The instrument used to collect the data in this study was the Learning-Style Interest Inventory published from 1927 through 1985. The purpose of a learning-style inventory is to inquire about participants' interest in a wide range of occupations and is a measure of interest, not of aptitude or intelligence. The Learning-style Interest Inventory has extensive records to prove its accuracy. This instrument takes an average of 25-30 minutes to complete. In regards to the person administering the test, there are no special requirements that need to be met (11).

TYPE OF SAMPLING PROCEDURES

Convenient sampling procedures used in this study targeted students grades 9 through 11 attending a transportation summer career enrichment program. The sample consisted of 14 high school students attending a free transportation summer career enrichment program located on a Historically Black College University Campus in Texas.

DEMOGRAPHIC PROFILE OF THE RESPONDENTS IN THE STUDY

There were 14 students who participated in this study. Urban students provided 100 % of the data collected. The primary descriptive data collected was computed based on the respondents' academic classification. Additional variables included age, gender, involvement in sports, and education of the parents, family socio-economic status, and racial identity.

DATA ANALYSIS

The instrument used to gather the data was the Learning Style Interest Inventory Test. The scale of measurement was categorized as one being the least valued response and six being the highest valued response. Furthermore, the instrument measured the participant's interest pertaining to the learning styles and learning environment.

In the Post Test analysis the results appear to indicate that students responded more favorably towards information about transportation careers when participating on field trips. However, this initial analysis requires further testing and expanding the pool of participants because the N was too low for a valid assessment.

The following hypothesis was tested:

Ho₁: There is no statistically significant difference in the attitudes of 9th to 11th grade students concerning study habits, hours of study and teacher management skills after participating in the NSTI.

This research will be utilized in future analysis after the nominal group of participants is expanded to include the results of data from two additional summer transportation groups.

LINEAR REGRESSION

This study collected activity from the first group of students involved in the summer transportation program. Fourteen students took the survey, and two incomplete responses were assessed. Twelve surveys were usable. Figure 1 displayed age which represented 1-13 year old, 3-14 year olds, 7-15 year olds, and 1-16 year old. Figure 2 represented gender, which displayed 5 males and 7 females. Ethnicity was represented in figure 3 which indicated 1 Caucasian and 11 African Americans. Because the sample was so small, the work will be completed next summer when students from Beaumont and Texas City summer institutes are added. The same Pre-test and Post-test will be given to students next summer to compare results. A linear regression analysis will be employed to determine specific outcomes in a future paper.

A numerical measure of the association between the two variables based on the value between negative one (-1) and a positive one (1) to indicate the strength of the association is anticipated. The results will follow the attributes of a linear regression line equation form $Y = a + bX$, where X is the explanatory variable and Y is the dependent variable. The slope of the line is b and a is the intercept (the value of y when $x = 0$) based on the data gathered. The number of responses on the Y axis vs. the questions on the X axis reveals a linear relationship. The study cannot use this analytical process until the data from the other two groups is added because linear regression analysis requires the nominal group to be larger than 30.

Out of the group of preferred method of learning questions (5 and 6), most students (70%) said they learned more about transportation careers when they were involved in an activity. Revealing their desire to major in a Science and Technology field after taking a field trip to the National Aeronautical Space Administration and the Houston Transtar System, 80% of the students responded favorably to questions 11, 9, and 3 that queried that interest. Hands on activities questions (4, 13, and 19) were also highly favored (80%) methods of learning by the students.

FINDINGS AND RECOMMENDATIONS

Educators have a unique opportunity to define the variables that affect the level of a student's comprehension. Emphasis on developing existing teaching techniques and methods that include Pre-Testing and Post Testing techniques must continue. The benefits of applying new solutions,

methodologies, and techniques on behalf of our students are an ever expanding responsibility for the educational and business community.

Testing before and after the field trips provided immediate recordable responses from the students.

Some specific observations included:

- Transportation industry career options are not widely understood.
- Students have limited exposure to transportation career options.
- Assumptions related to gender job opportunities in transportation are stereotypical.
- Limited exposure to transportation careers is no guarantee that students will make transportation a career choice although students are very positive towards the discipline.
- Exposure to a summer program is the positive step in replenishing the transportation workforce.

Some recommendations from this study:

- Single training method should be avoided.
- Employ multicultural training as it relates to gender and racial identity.
- Assess students frequently in order to determine how they define academic success and how to achieve it.
- Use interview and testing methods of data collection to encourage more thoughtful responses.

IMPLICATIONS FOR FURTHER RESEARCH

Educators and researchers are key components to the education, training, and promotion of pragmatic approaches to exposing students to the transportation industry. Therefore, the following are recommended for future study:

- Examine the level of knowledge and exposure students have regarding careers in transportation.
- Prepare additional test instruments that provide additional detail on student behavior and interest.
- Conduct a panel to study kindergarten through 12th graders regarding the best methodologies to guide students to transportation careers.

CONCLUSIONS

Observations made of the three methods of training used in this study provided insight into the preferred strength of learning methods regarding student interest in the transportation industry. This study provided an insight into the structured study habits, hours of study, and academic management skills of high school students. Primary results indicate that field trips produced an immediate level of excitement in the students. Conversations seemed to flow between the

students and the tour guides/instructors prior to and during field trips. Students exposed to field trips had the opportunity to engage in numerous hands-on activities. Being able to actually touch a real world scenario had a great impact on the students. Students appeared to adapt to the new environment and activities faster. However, the level of learning could not be ascertained. Some students could accurately repeat an activity after a hands-on experience with little or no support, while others quickly forgot many details about the experience.

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Appendix A - Figures

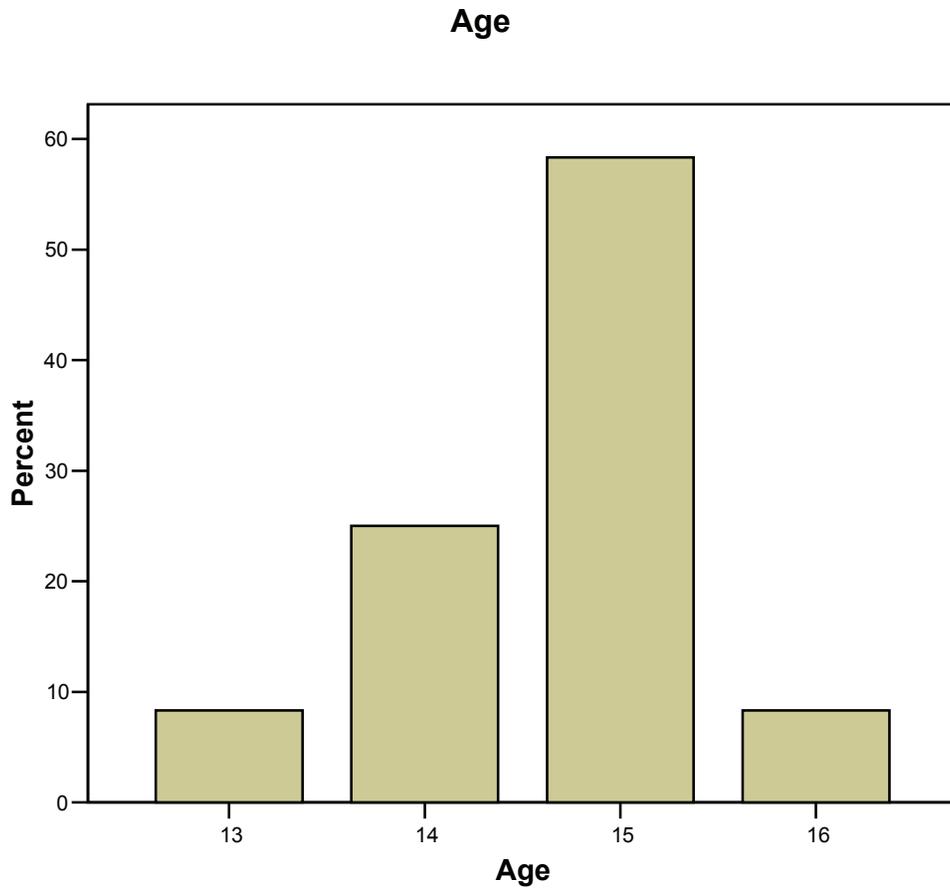


Figure: 1 (Age)

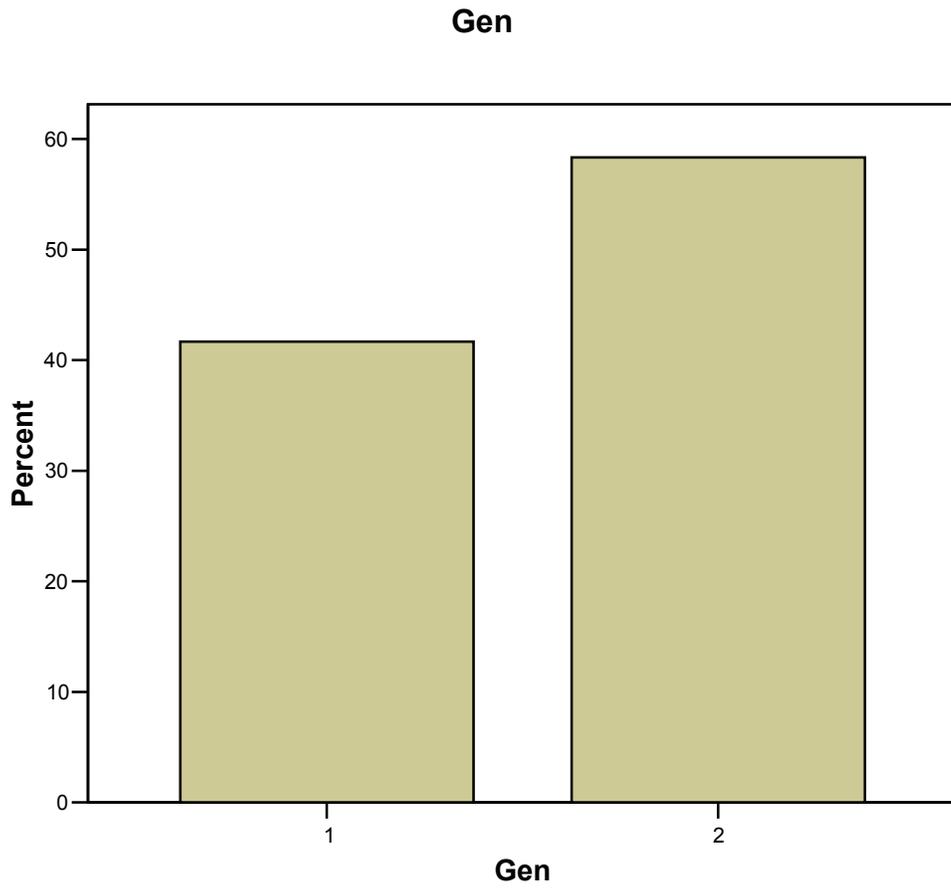


Figure: 2 (Gender)

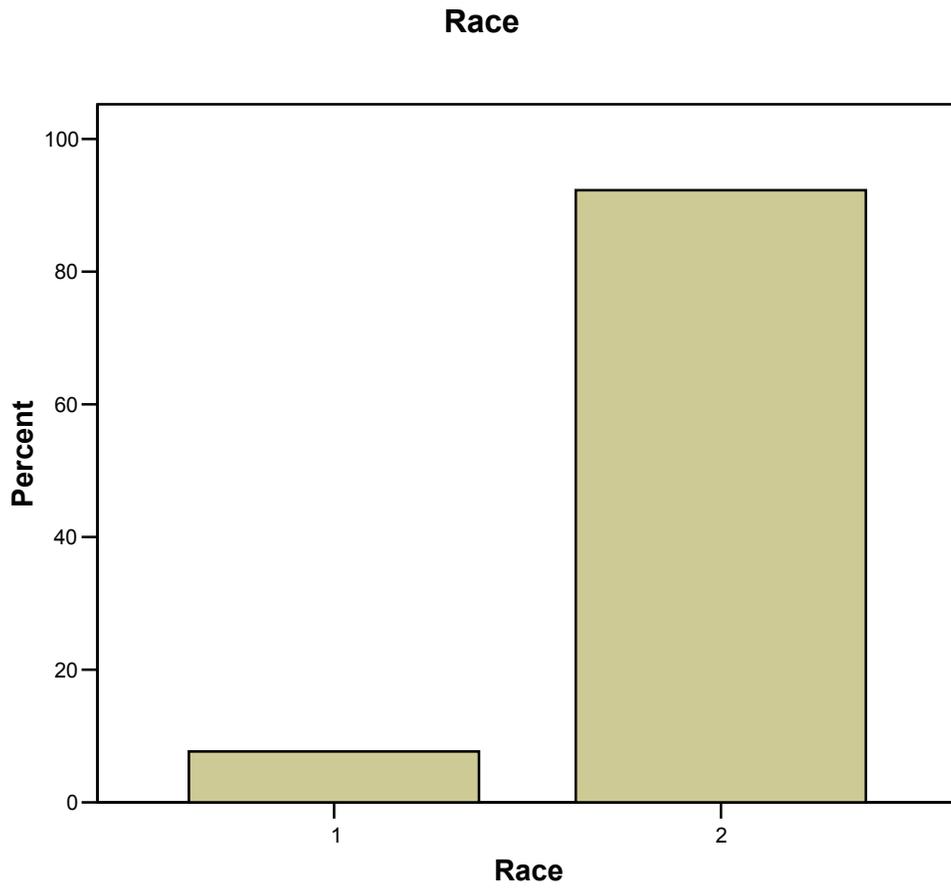


Figure: 3 (Ethnicity)