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**A COMPARISON BETWEEN THE SUCCESS OF TECHNOLOGICAL LITERACY
PROGRAMS AT LANDSTOWN HIGH SCHOOL AND ACADEMY AND
CHANTILLY ACADEMY**

**A Research Project
Presented to the Graduate Faculty of the Department
Occupational and Technical Studies
Old Dominion University**

**In Partial Fulfillment of the Requirements for the Masters of Science in
Occupational and Technical Studies**

**By
Vanessa Barger
December 2007**

APPROVAL PAGE

This research paper was prepared by Vanessa Barger under the direction of Dr. John M. Ritz in OTED 636, Problems in Occupational and Technical Education. It was submitted to the Graduate Program Director in partial fulfillment of the requirements for the Degree of Masters of Science in Occupational and Technical Studies.

APPROVAL BY: _____

**Dr. John M. Ritz,
Graduate Program Director**

DATE: _____

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CHAPTER I

INTRODUCTION

Any piece of knowledge which the pupil has himself acquired-- any problem which he has himself solved, becomes, by virtue of the conquest, much more thoroughly his than it could else be. The preliminary activity of mind which his success implies, the concentration of thought necessary to it, and the excitement consequent on his triumph, conspire to register the facts in his memory in a way that no mere information heard from a teacher, or read in a schoolbook, can be registered.

-Herbert Spencer

Technology education has not always had the reputation it deserves, often being considered inferior and therefore sometimes ignored in favor of other “more academic” subjects. This had happened often when discussing changes to be made in curriculum and in the construction of standardized testing for knowledge in subjects. Technology education has never fit into the neat mold that other subjects have, as you cannot set a standard, teach it, and then test it on paper. Technology education is much more involved than that, and it has been easier as educational “improvements” were made to brush technology education to the side by making it something less than other subjects. Despite this, some institutions have recognized that technology education has a much more important place in the world and the education of its students than some have thought. In a world where human lives are affected everyday by the technology around them, it is even more important that students get a thorough education about the technology available and to give them an idea of what is to come. Some places have begun to take this into account by creating “academies” which are centered around technology education. In these, students are required to take a certain number and track of courses focusing on technology. The goal of this particular study was to look at the approaches being used in two academies, one from Virginia Beach and one from Chantilly, to determine which one had the better technological literacy results for its students, based on factors, such as, curriculum offerings, student enrollments, and resource support.

Statement of the Problem

The problem of this study was to compare secondary technology education programs at Landstown Technology Academy and High School, Virginia Beach, with Chantilly Academy, Chantilly, to determine factors that lead to improved technological literacy of students.

Research Goals

This research project sought to determine answers for each of the following research objectives:

1. Discover the difference in curriculum offerings between the two schools.
2. Find the total enrollment numbers for both schools for courses offered.
3. Find the program completion totals for each school per year.
4. Summarize the factors necessary for the creation of superior technological literacy programs for high school students.

Background and Significance

Comparing Chantilly and Virginia Beach may have seemed like a rather strange idea for a research paper due to the lack of distance between the two places. Originally the researcher's intent was to compare a United States Academy and a British Academy. This proved to be difficult in acquiring the required information because of the distance, and because British academies and city colleges are currently undergoing a major shift in their format and a major push to validate their existence.

The researcher discovered, after two months of researching and trying to contact international schools that a school existed in Virginia which was very similar to the process in England. Chantilly Academy provided the same differences in administration, courses,

and admission that the British school had provided and were available to assist in the study. This is how the researcher decided to conduct a comparison of how each school's students' technological literacy has been affected by curriculum development, public relations efforts, and other variables over the last five years. The main way to determine how well each system has done was to look at the courses, enrollments, and completion numbers over the past five years.

In the United States, technology education is encouraged and there are changes being made constantly, but there is some debate over the direction that it should be taking. Chantilly Academy and Landstown Academy have similar struggles going on and the researcher's goal was to look at the most recent changes in both schools to see whether one has chosen a path that appears to be working better than the other. If one was found to be slightly ahead, then a closer look could be taken to better enable the other to see where it could improve or portions of its approach that could be modified for better results.

Limitations

The limitations for this particular research study were:

1. There is only direct access to Landstown Academy and High School because of the distance between the researcher and Chantilly Academy.
2. Nearly all contact with Chantilly Academy will be internet based, so documents cannot be seen first-hand.
3. Difference in size between the two school systems, and the impact, or lack thereof, has on the enrollment and completion numbers.

Assumptions

The items assumed to be true in this study were as follows:

1. Students are of the same general attitude towards their area of study.
2. Required information will be available as public knowledge from both schools.

Procedures

The procedures required for this project involved obtaining information via the city data of Chantilly and Virginia Beach, as well as getting data from the schools/school systems themselves which deal with curriculum, enrollments, and completion numbers. The researcher also needed to determine what information was available about courses and their content from each school, and whether or not there were other places teaching the same courses or if these were unique to the particular school.

Definition of Terms

Terms the reader may not have readily recognized include:

- Academies: For the purposes of this research paper, academy refers to a high school with a focus on a particular subject. In this case, technology education is the focus of the academies.
- Technological Literacy: The ability to evaluate, understand, and utilize technology (ITEA, 2000).
- ASE Certification: Certification given after passing a test administered by the National Institute for Automotive Service Excellence.
- Strand: A series of courses required by the Academy which a student must pass in order to successfully complete the Academy program.

- DECA: An international association of high school and college students involved in marketing, business, finance, hospitality, and sales and service (DECA, 2007).

Overview of Chapters

In the first chapter of the thesis, the researcher has provided a brief overview of the basic components of the research study. The researcher has told the reader about the reasons for choosing to take on the study of the two schools and the reasons she believes it is pertinent to the reader's needs and interest. Chapter II discusses in depth the two schools and the research that resulted during the experiment, covering any literature that may have been previously done on such a topic, as well as any information that was found dealing with the numbers, curriculum, instructional methods, and other factors believed to have affected the students' technological literacy. This will continue in Chapter III where variables will be discussed in relation to their effect (or lack thereof) on the project, as well as a more detailed investigation into the analysis of the problem, explaining the validity of the issue. The Findings, Chapter IV, and the responses to the study will be analyzed and explained in greater detail in the fourth chapter, so that the reader may more fully understand what was found in the course of the research. Lastly, the researcher will summarize the entire study and its variables and responses, followed by their conclusions in Chapter V. This is the chapter that will discuss what the researcher has discovered in the course of the study.

CHAPTER II

REVIEW OF LITERATURE

This particular case study was chosen because in several articles, different approaches have been used and promoted when developing technology education programs and curricula. These methods are being debated and looked at carefully to determine which had the most effective system. Using the information about the courses and the curriculum as well as the other information, one can compare the results and see which institution has a better success rate, and what factors have had the most impact on this success.

School Styles

While researching Chantilly Academy and Landstown Technology Academy and High School, it became clear that the basic setup of the academies was extremely similar. They both placed students through a selective process and then provided them with a specifically crafted curriculum and series of courses, designed to help them improve their technological literacy and their ability to make a significant contribution to the technological world after they graduate.

The main difference between the two schools lies in their composition. Both schools have an Academy, but Chantilly Academy has *only* academy students. Landstown is a normal high school in addition to an academy, and so its student body is a more diverse, and those classes designated as being academy level, are not filled with strictly academy students. The populations both schools serve are similar enough to compare, as Virginia Beach's Landstown Academy and High School is in a city of around 450,000. Chantilly Academy is located in Fairfax County and so has a slightly higher population surrounding it, but it is within a range that the researcher believes is acceptable.

Enrollment

Of the two academies, Landstown Technology Academy and High School has the fewest seats available of the two institutions. There are approximately 100 spaces reserved for freshmen each year, with a maximum capacity of 400 total academy students. There have been occasions where the school has not filled all one hundred seats, and so thus far the 400 student limit has not been reached. As of the 2006-2007 school year, the academy had 350 students total in its program; the previous year there were only 359 students enrolled. To be accepted, the student must complete an application and submit four letters of recommendation: one each from the student's current Mathematics, English, Science and Social Studies teachers. In addition, students are also required to submit a digital portfolio, which should include three of the following eight projects:

1. A 5-minute, self running multimedia PowerPoint presentation that markets tourism for Virginia Beach.
2. A newsletter on international issues.
3. A collection of web pages for the school.
4. A technical guide that explains how to troubleshoot and repair simple hardware and software problems.
5. An intriguing resume, designed to catch the attention of those reviewing the student portfolios.
6. A floor plan of a business office for 12-15 employees.
7. A database for a business that is set up so five employees can enter sales and can track them by product type and employee.

8. A project proposal that tells the reader what is required to network a house (Landstown High School, 2007).

Chantilly Academy's enrollment numbers look much larger and more impressive on paper because they are strictly academy students, and so have approximately 1140 seats total in their building. In the 2006-2007 school year, they had 999 students enrolled total, down from the previous year's 1064 students. As compared to Landstown High School, Chantilly Academy's procedures for admission are a little different. In February and March of every school year, the guidance counselors at the "base high schools" (meaning any high school outside of the academy in Fairfax County Schools) begin to enroll students in the academy. Any student wishing to attend the academy would have, by this time, submitted an application form that includes a brief essay on why they want to attend the course they have chosen, and if they have a low GPA or poor attendance, they must also provide a letter of recommendation from the counselor. After this is received, a transcript is attached by the base school counselor and forwarded to the Academy counselor to be reviewed. At the Academy, the counselor works with the course instructor to select the students that appear to be the best fit with the class. This does not necessarily mean that students with the top 30 GPAs will get in. The essay and the classes the student has already taken as well as their interests are also taken into consideration. For some courses, such as Culinary Arts, Automotive Technology, and Animal Science, the counselors and instructors are looking for a student who is seriously dedicated to that subject area. For example, if there were one seat left in Culinary Arts and there were two applicants, one of whom intends to be a chef, and one who merely likes to cook, the student who plans to become a chef would likely get precedence. This does not mean that if a class is full the student is out of options. If a

student has applied for one class, but the class is already full, they work with the base school counselors and the students to provide a second choice, and the counselor will try to match students with a similar subject (L. Terhar, personal communication).

Courses

At Landstown Technology Academy and High School the focus is on the technology “strand” the student chooses, rather than the class-specific academic experience that Chantilly Academy promotes. The students enter the school and must decide to enter one of three strands: Engineering, Information Technology, or Marketing. To receive the academy seal on their high school diploma, they must complete a sequence of two or three courses in that area. The number depends on their admission date to the academy, as there was a change made to the requirements for the freshmen admitted in the 2006/2007 school year. For students admitted prior to 2006-2007, they must only complete a sequence of two courses. For anyone admitted in 2006-2007 (and future years), they must complete a sequence of three courses (Landstown High School, 2007).

In the Information Technology strand, there are four courses currently available to enroll for completion of the technology academy requirement. They include: Information Technology Fundamentals, Web Development and Administration, Database Management and Administration, and Advanced Database Management and Administration. For the Engineering strand, the student must complete two to three of the following courses: Introduction to Engineering, Engineering Design, Bioengineering, or Digital Visualization. Last, in the Entrepreneurship strand, students may choose from Travel and Tourism, Advanced Travel and Tourism, Sports, Entertainment, and Recreation, Advanced Sports, Entertainment, and Recreation, Internet Marketing, International Marketing, Advanced

International Marketing, Exploring Entrepreneurship, and Advanced Entrepreneurship. All of these classes have been offered over the course of the last five years, with the exception of Digital Visualization, which was first offered during the 2006-2007 school year. There are several other classes in development at the moment, including a Geospatial (GIS) class (Landstown High School, 2007).

Outside of the electives a student must complete their chosen strand; students do not have any mathematics or science academy classes, and there is only one available English class that is considered to be an academy class. Students are not required to take this; many opting to instead enroll in Advanced Placement courses for college credit (Landstown High School, 2007).

At Chantilly Academy, the students sign up for a specific series of (generally) two year courses. They can choose from: AFJROTC, Animal Science, Auto Collision Services, Auto Technology, Construction Technology, Computer Systems Technology, Cosmetology, Criminal Justice, Culinary Arts, Dental Careers, Early Childhood Education, Electronics, Engineering Physics, Engineering Systems, Hospitality Management, Medical Health Technology, Network Administration, Network Design and Engineering, and Pharmacy Technician (Landstown High School, 2007).

Curriculum

Landstown Academy has designed the following strands for students. For those wishing to complete the Information Technology strand, they must begin with the Information Technology Fundamentals course. This class is designed to teach students the basics about computers, from how the components are put together (and what they are), to a basic introduction to subjects like HTML programming. The curriculum is centered around

three certification tests and their corresponding books, provided by IC3, a company that writes books and curriculum materials for business courses. When they are finished, students will know how to utilize and navigate the Microsoft Office suite of programs, identify the basic types of files they will process, and use the Windows XP interface to its best advantage (Landstown High School, 2007).

Web Development and Administration is a course where students learn HTML coding, XHTML, and an introduction to JavaScript. They also are exposed to the “behind the scenes” part of being a web administrator, discussing such things as networks and troubleshooting, and graphic user interfaces, including a brief introduction to Macromedia Dreamweaver (Landstown High School, 2007).

Database Management and Administration introduces students to computer programming, using Oracle Internet Academy as its preferred method. Students then study the basics required to develop databases, including modeling, design, and normalization. Students will put into practice what they have learned to manipulate databases, with the expectation that they will sign up for Advanced Database Management and Administration the following year. As the last class in the Information Technology strand, Advanced Database Management and Administration builds on this first year, introducing students to Java and Java based applications in their programming education. At Landstown Academy, this series of courses is taught by the Business Department, rather than the Technology Department (Landstown High School, 2007).

In the Engineering strand, taught through the Technology Education Department, students have more choices. Students wanting to take only Engineering classes begin with Introduction to Engineering. This class does just what it says: it provides a wide view of

what the engineering field consists. Students do research into what types of jobs are considered engineering based, and what the different types of engineering are, focusing on materials, aerospace, and automotive design, as well as the history of engineering. The course is a research and project based course, and students have the opportunity to put the research and information they have been given to use, completing a project that matches the type of engineering they have been studying. The next class, Engineering Design, focuses on mechanical, automotive, pneumatic, and electrical engineering and further research and project activities (Landstown High School, 2007).

Bioengineering is one course which was placed on its own because of the wide range of areas that are covered under this title. The class is research based, and very heavily computer use influenced, though the students do complete hands-on projects that match what they are studying and/or researching. Bioengineering covers eight major fields: biotechnology, biomedical, biomass, forensics, environment, biochemistry, medicine, and bioethics (Landstown High School, 2007).

The last course, Digital Visualization, uses “3D animation and modeling, script writing and programming, logic and science of multimedia formats, and computer interface testing and validation” (Landstown High School, 2007) to help students complete the course successfully. They will use the skills taught to plan, troubleshoot, analyze, and evaluate their projects, which cover a variety of topics. They will do projects that are based in engineering, architecture, product development, and testing. Students who wish to take this course must complete a series of prerequisite courses, but these are not considered academy courses themselves (Landstown High School, 2007).

The Entrepreneurship strand has many more options than the other two, though many are interrelated. The first classes is Travel and Tourism, which is followed by Advanced Travel and Tourism, both of which help students develop skills in communication, human relations, mathematics, sales, promotion, industry required technology, market research, and creative selling. There is also a tourism/travel based certification available for students who are interested (Landstown High School, 2007).

Sports, Entertainment, and Recreation and Advanced Sports, Entertainment, and Recreation develop similar skills as travel and tourism, though the focus is on marketing analysis, event marketing, communications, and human relations, and in depth knowledge and understanding of the entertainment, sports, and recreation industry. They also discuss, in some depth, E-Commerce and international marketing in the entertainment industry (Landstown High School, 2007).

In Internet Marketing, students will learn about business and marketing information and the transfer of that information through technology. They will discuss the use of the Internet, e-mail, electronic data interchange, and electronic funds transfers in business and marketing to gain a better understanding of how the entire process works. International Marketing and Advanced International Marketing is a similar class, focusing on developing a better understanding of careers involved in international trade, shipping, finance, and marketing. They will learn about the concepts, principles, and theories of international marketing and the way they differ from “normal” marketing (Landstown High School, 2007).

Exploring Entrepreneurship is designed to show students how to start their own business. They will learn how to do long-range planning, effective communication, accountability, responsibility, continuing education, and decision-making. In Advanced

Entrepreneurship, students will learn how to take what they have previously learned and use it to create better strategies for career development through their management of their own business (Landstown High School, 2007).

The classes offered at Landstown rely appropriately on the strand for the basis of their teaching goals. All of them utilize the most up-to-date technology. Students understand what they will be using and doing should they decide to pursue these strands into college or the workforce (Landstown High School, 2007).

The classes at Chantilly Academy are two-year courses, designed for the students to complete as part of their junior and senior years. They do not do “strands” as Landstown does, opting instead to admit the students to only one class, which they take over two years. If they do not complete both years of the course, then they cannot get the certificate of completion. The classes offered are Advanced Air Force Junior Reserve Officers Training Corp (AFJROTC), Animal Science, Automotive Education, Construction Technology, Cosmetology, Criminal Justice, Culinary Arts, Early Childhood Careers, Electronics, Engineering, Hospitality, Network Administration, Network Design and Engineering, and Pharmacy Technician (Chantilly Academy, 2006).

The Advanced Air Force Junior Reserve Officers Training Corp is designed to condense the usual four year AFJROTC program into just two years. The students learn the science of flight, the history of air power, the exploration of space, along with leadership skills including drill and ceremonies, communication, and interpersonal relationship skills. These students also learn how to successfully complete a resume, perform first aid, and use military customs and courtesies. This course allows successful students to become eligible

for ROTC scholarships, appointments to military academies, and monetary benefits for those going straight into the military after graduation (Chantilly Academy, 2006).

Animal Science I & II prepares the students to go into the animal health care field. They learn animal anatomy, animal behavior and handling techniques, nutrition, disease pathology, sanitation, and disease control. They work in laboratory situations which allow them to have hands-on experience with cats and dogs in a “grooming practicum.” Once they have completed both courses, students are prepared to enter the pet-care industry or continue into a college or university setting for further training (Chantilly Academy, 2006).

In the Automotive Education class, there are actually two courses, Automotive Technology I and Automotive Technology II. In these two courses, students can earn ASE certifications in four different areas, while they learn the foundations of automotive design, advanced diagnosis and system analysis, and repair and maintenance procedures for late model cars. They also study what the different options are for careers in the automobile industry. When it comes to specific automotive studies, students are introduced to the electrical, fuel, suspension, cooling, drive train, and brake systems, as well as the service and repair of individual systems. The overall goal is to prepare students to pass the eight areas of ASE certification. The software and onboard programs the students learn to use are some of the most recent technologies in the field, so that students will be well prepared in their future endeavors. When students have completed the program, they will be able to pursue employment if they wish or to further their education. Some technical programs at nearby colleges and universities will award students up to 18 hours to credit, in appropriate programs (Chantilly Academy, 2006).

The Auto Collision offering is also divided into two sections: Auto Collision I and Auto Collision II. In the former, students learn what the industry standards are for the restoration and auto body repair industry. All of the class activities and materials are driven by the desire for the students to pass the ASE certification test. The skills taught include unibody and frame construction, steering, suspension, detailing, welding, panel repairs, and painting. Throughout the course of the program, students learn the theoretical and practical aspects of this career path. While learning auto body repair, they learn techniques used when working with metals, plastics, and other automobile materials. In Auto Collision Services II students hone their existing skills and develop others required for repairing damaged vehicles to their original state. The curriculum is driven by the ASE test and includes refinishing, metal work, welding, frame-strengthening systems, unibody measuring principles, structural repair, steering, suspension, mechanical, and electrical repairs. The class also helps the student work towards the ASE, NATF and ICAR certifications, which they can take after two years of work experience (Chantilly Academy, 2006).

The next class is Construction Technology, again, split into two sections. In the first, students can earn six different certifications: basic safety, basic mathematics, introduction to hand tools, introduction to power tools, introduction to blueprints, and basic rigging. In the second course, students add to this list with such certifications as orientation to the carpentry trade, nails, fasteners and adhesives, wood building materials, floor systems, and wall systems. After taking the basic introduction class, students in the second year look deeper into the construction industry. They focus on framing, electricity, plumbing, drywall, finishing, masonry, blueprints, cost estimation, and other needed applications. When

finished, students are prepared for an entry-level job or further education (Chantilly Academy, 2006).

Computer Systems Technology is again designed for those bound directly for the work force as well as those continuing to higher education. They will learn microcomputer building and repair skills that are essential knowledge to a computer technician. The class will also focus on peripheral equipment and operating systems, and those students who are successful will be encouraged to take the A+ Certification Exam (Chantilly Academy, 2006).

Next, Introduction to Cosmetology gives an overview of the subject, as well as comprehensive training in personal grooming. Students learn about basic hygiene, sanitation, styling, makeup, facials, manicures, and pedicures. They will be able to create permanent waves, style and cut hair, perform scalp and facial treatments, and manicuring. Anatomy of relevant parts of the body is part of the course, and at the end of the course, students have a firm foundation to continue in the study of cosmetology by taking Cosmetology II. In the second class, students can become licensed cosmetologists and nail technicians, in addition to getting more information about the study of skin, hair, nails and cosmetic chemistry. As part of the curriculum, students also operate a full service salon according to the state's requirements and what they have learned in the class. At the end, the students have a great opportunity for employment if they pass their cosmetology certifications (Chantilly Academy, 2006).

The Criminal Justice class provides students with the basic knowledge and technical ability to be able to continue in this course of study after their two years are finished. This includes the granting of three credits in Administration of Justice at some universities. There are specific skills taught in the areas of criminal law and investigation, security training,

communications, crimes, emergency response, arrests, search and seizure, crime prevention, court procedure, and police operations. In addition to all this, the class will introduce students to the various careers they may pursue with their knowledge, and provide them with information about the procedures for doing so. In the second course, Criminal Justice II, students will expand on the foundations they have been given. They will study crime in America, the court system, and law enforcement methods. Students will also learn such topics as victimization, due process, prison rehabilitation, and parole, among other things. They will learn the types of careers they might want to pursue, going in depth about some they already knew, and introducing others. This may even include internship or shadowing opportunities to give students a real feel for what is available to them (Chantilly Academy, 2006).

Culinary Arts I & II provides students with the opportunity to gain understanding and ability to demonstrate classical culinary techniques that enable them to be able to enter the food service industry. They cover units on sanitation, meat identification and fabrication, basic culinary skills, and others that allow them to learn and demonstrate that knowledge. At the end of the class, students are able to take the test to receive their Food Handler Certification (ServSafe) as well as the possibility of transferring their classes to a selection of colleges and universities for as much as 15 credits (Chantilly Academy, 2006).

Students may also choose to take the Dental Careers program, which introduces them to all the career options open to them in dentistry. Their curriculum talks about general dental topics, as well as general medical topics. Some of the curriculum topics they study are head and neck anatomy, infection control, tooth numbering and charting, instrumentation, oral health education, dental radiology, and the areas of oral surgery, orthodontics,

peridontics, and endodontics. They also learn the clinical skills necessary to become a dental assistant, which are practiced in a simulated office setting. In the second year class, students are given the opportunity to participate in internships and become certified in radiology (Chantilly Academy, 2006).

In the Early Childhood course, students are given the opportunity to learn teaching skills and are exposed to the different careers in education. The first class combines child growth and development with participation in the operation of a preschool “laboratory” for three-and four-year-olds. It gives them basic teaching skills, learning theories, and lesson planning. The career opportunities explored include social work, education, psychology, speech, hearing, and childcare provider. The second class goes more in depth about planning and learning environments, and the leadership skills needed. These students may participate in an internship at a local elementary school. They may also get additional credits if they work in supervised employment in childcare fields (Chantilly Academy, 2006).

Electronics allows students to explore careers in electricity and electronics, while providing the foundations necessary to secure such work. They will learn electrical theory and application, circuit simulation, components circuitry, troubleshooting electronics, using test instruments, consumer information, and how to use lab training devices. The course runs from the basics to the complex AC and DC circuit theory (Chantilly Academy, 2006).

Engineering Physics is a unique class in that it serves as one of the students’ science credits as well as being an academy course. Generally, those taking this class are expected to be going into higher education in science, doing engineering, another science, or technology. The students learn the mathematical calculations and formulas involved in mechanics, electronics, thermodynamics, and fluid systems, and through the use of technology, the

students gather, analyze, and present data. Some of the specifics of their curriculum are learning about analog and digital multimeters, calipers, lasers and IR sensors, Newton scales, oscilloscopes, photometers, pressure gauges, solar panels, stroboscopes, and thermocouples. They also perform simulations and learn about the different career fields of engineering, as well as what their college and career opportunities are. Part of the class involves projects which can be individual or group projects and may be entered into regional or national competitions (Chantilly Academy, 2006).

The Engineering Systems class is split into two distinct halves. The first year is a basic introduction into the types of engineering and the systems and information needed as a base for all of them. The second year focuses on robotics and creating a robot that will stand up to various competitions that the school enters its students. The first class, Engineering Systems I, focuses on the basics of engineering. It gives the students a brief introduction to civil, mechanical, electrical, aeronautical, and robotic engineering through several units of study that include design processes, designing structures, computer aided processes, quality assurance, electrical systems, fluid systems, robotics, materials engineering, materials science, thermal systems, and control engineering. Students then use their knowledge to create engineering projects that incorporate all the facets of their high school education and work in teams to design, research, and build working prototypes of real systems. Part of this practical use of their knowledge is a 6-week engineering project that relates to a specific field they have studied. In the second year, students focus on robotics and building an operational robot that can compete in state and national competitions. The class is structured around learning module systems, design projects, conducting research, and participation in business

and industry partnerships while experiencing work of planners, designers, engineers, machine operators, personnel manger, and technicians (Chantilly Academy, 2006).

In the Hospitality Management course, students are introduced to the hospitality industry and its role in the travel and tourism industry. This allows students to research and prepare for careers in the industry, propelled by the course curriculum, which provides instruction in management and operations, marketing and promotion, guest service training, and food and beverage operation. Students also attend class periods on-site at local hotels and become familiar with the different departments of their host hotel. For the first year students, the course concentrates on developing basic social, economic, marketing, and technical competencies required for successful employment. Second year students are introduced to management and supervisory skills, will create and analyze a business plan, demonstrate supervisory skills, and enhance presentation skills through classroom work, on-site training, and DECA activities (Chantilly Academy, 2006).

The Medical Health Technology classes are also designed, like many of those offered at Chantilly Academy, to help students learn the skills and gain the information necessary to help them find a job in the medical health industry. In the Medical Health Technologies I class, students focus on anatomy and physiology, medical terminology, disease etiology, and care in a hospital setting. In the second course, students learn the basic knowledge and skills needed for health care in the community, including the clinical and administrative duties of a medical assistant, delivery of medications, and gerontology. This course also gives students the opportunity to participate in a job shadowing experience in a variety of health care settings (Chantilly Academy, 2006).

In the Network Administration courses, students receive a comprehensive, application-based course which teaches them to configure, monitor, manage, and troubleshoot computer networks. Students will use their knowledge of network design and installation, configuration management, and troubleshooting of Windows 2000/2003 Operating Systems to learn to set up domain controllers, servers, and workstations and automating and customizing software. Part of the course is also exposing them to cyber and network security configuration and how internet gaming works. The curriculum and coursework is centered around Microsoft Certified Professional/Windows NT Administration (MCP), Microsoft Certified Professional + Internet (MCP + I), and Microsoft Certified Systems Engineer (MCSE) certifications (Chantilly Academy, 2006).

In the CISCO course the simplest explanation is that students are given a comprehensive introduction to fiber optics. Students are working towards a certification, which includes 80% hands-on lab time using major manufacturers' equipment as students practice to achieve maximum performance from splices and connectors. They will develop the knowledge and skills to fabricate, install, add, move, inspect, maintain, bid, troubleshoot service, and restore most fiber optic network cabling systems. Students will also cover voice and data communication network cabling applications and the guidelines and techniques used to ensure the best performance installations. Part of this is learning how to avoid cable breakage and high-loss attenuation (Chantilly Academy, 2006).

The last course offered at Chantilly Academy is the Pharmacy Technical Course. In this class students learn, through classroom and clinical lab experiences and supervised pharmacy internships, the responsibilities of the routine tasks performed by licensed pharmacists. Students will explore the world of pharmacy, prescription orders, sanitation

procedures, new pharmacy technology, insurance regulations, pharmaceutical companies, and careers in the industry. They will also be given the opportunity to take the Certified Pharmacy Technician (National Pharmacy Technician Certification Board) and the Registered Pharmacy Technician (Virginia Board of Pharmacy) certifications (Chantilly Academy, 2006).

Summary

The researcher's goal was to take the basic similarities between Landstown Technology Academy and High School and Chantilly Academy and compare those factors which have the greatest effect on student performance. Using this information, the researcher would determine which one of the two institutions has better programs in place; assuming one school performs better than the other when all factors are taken into account. The analysis of the material and the conclusions that were drawn are available in the following chapters and will more clearly explain the importance of the information that has been provided so far. The numbers for enrollments and completers are expected to be the most effective numbers at demonstrating the benefits of one institution over another, or lack thereof. These numbers are expressed in the next chapter, designed for the reader to better understand how the researcher came to analyze the data collected.

CHAPTER III

METHODS AND PROCEDURES

The methods and procedures used to research and show the information gathered during the course of this study were very simple. The subjects of the study were from two institutions: Chantilly Academy and Landstown Technology Academy and High School. They were compared based on enrollment numbers, course offerings, and curriculum. Both institutions are of a comparable size and age bracket, so there was no need to alter the sizes for comparison, though the actual arrangement of the school was a bit different, as Landstown is also a “normal” high school and Chantilly Academy allows only academy students in its classes. After speaking with representatives from both schools, the researcher took the information they had given and used percentages as the best method to insert the data and answer the research goals.

Population

The population being studied for this research paper consisted of all the students enrolled in Chantilly Academy and Landstown Technology Academy from 2002 – present. It also includes those students who graduated from these two institutions, though this number can be lower than the enrollment due to withdrawal or other circumstances which prevented the student from completing the program. The distinction between completion and graduation is one that the reader needs to take into account. This is because at Landstown Technology Academy and Chantilly Academy, students can complete the academy courses and be considered to have successfully completed the academy, but are not required to graduate “regular” high school. Both schools encourage graduation, but it is not a requirement of the academy itself.

The total population studied at both schools, from 2005-2007, was approximately 2800 students. From Landstown the researcher studied a population of approximately 720 students, and Chantilly provided approximately 2300 students for the study. While there is a large difference between these numbers, when converted to percentages, they can be accurately compared.

Methods of Data Collection

The data for the research project was gathered through the Landstown Technology Academy and High School website, The Chantilly Academy website, information provided through email and contact with members of the Chantilly Academy, Landstown High School and Technology Academy, and the Virginia Beach City Public School System. These people included Douglas Wright, the Principal of Chantilly Academy, Lisette Richardson, the Academy Coordinator at Landstown, Lynn Terhar, the Administrative Assistant at Chantilly Academy, and John Ledgerwood, the Coordinator of Technology Education at Virginia Beach City Public Schools.

Statistical Analysis

Landstown High School and Technology Academy lets a total of 100 freshmen into its Academy program each year. Thus far in Landstown's history, the numbers of freshmen admitted to the academy every year have not met the maximum number. Despite this, we may work with the seats available and the seats filled to get a percentage that can be used to compare Landstown Academy to Chantilly Academy.

Chantilly Academy allows approximately 500 students to enter their programs each year. These numbers can vary depending on applications, changes in classes and instructors, safety regulations, and which class it is. Classroom numbers vary depending on what class

the student is interested in taking. Automotive courses have 20 slots available, while computer based courses have 30. Despite this, the same operation can be performed as was done with Landstown Academy. The researcher has taken the average number of seats available at Chantilly, which is 24 per class, and used this to create the number of seats available at the beginning of each year. The number enrolled and the available seats can be used to create a percentage the researcher can work with.

Summary

In a study such as this, where items like courses, curriculum, and numbers are all being equally compared, it is difficult to use a traditional statistical model. Instead, we will look at the percentages of difference between the enrollment numbers of Chantilly Academy and Landstown Academy and High School to come to a conclusion about which one better facilitates technological literacy. In the following chapter the reader will be introduced to graphs that show the difference in enrollment between the two institutions and acquaint them with the other pertinent information about the goals, limitations, and procedures involved in the study.

CHAPTER IV

FINDINGS

The problem of this study was to compare secondary technology education programs at Landstown Technology Academy and High School, Virginia Beach, with Chantilly Academy, Chantilly, to determine factors that lead to improved technological literacy of students. In this chapter, the researcher will use the findings and observations to look at the differences and similarities between Chantilly Academy and Landstown Technology Academy and High School.

Both institutions were able to provide the researcher with two years of enrollment data. When analyzing this information, one must keep in mind that Chantilly Academy has more students because it has more seats available. Instead of looking at each year's enrollment individually between the two schools, one should look more at the information provided through the numbers.

Both institutions' enrollments have been nearly the same each year. This is encouraging, until one reviews Figure 1. It displays the difference in the two institutions' available seating and actual numbers based on percentages.

Figure 1. Enrollment Numbers

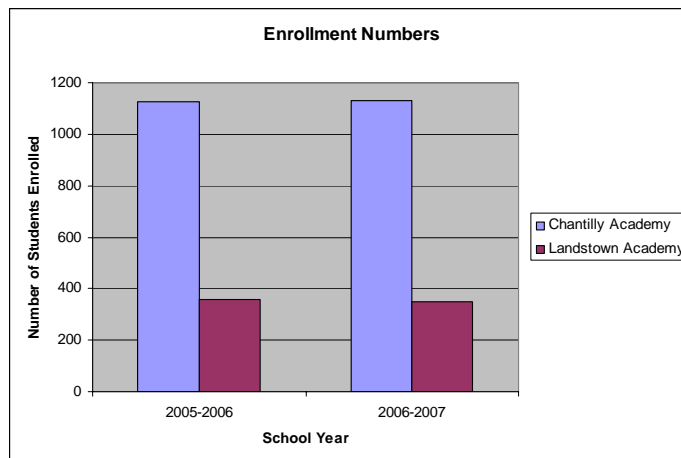
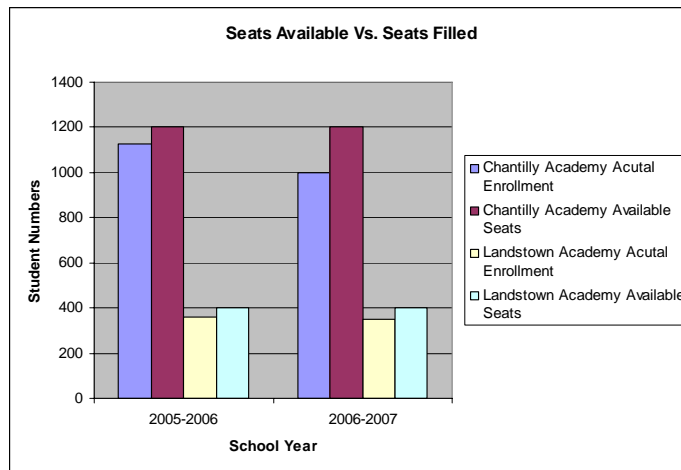


Figure 2. Seats Available vs. Seats Filled

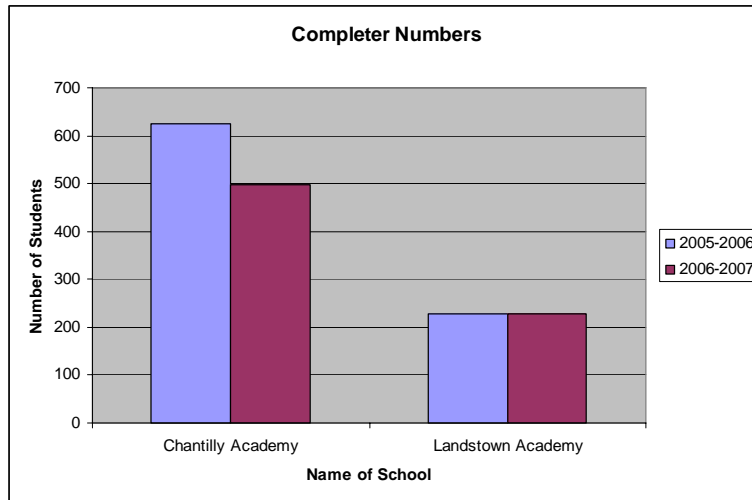


When looking at the percentage of seats filled, Chantilly Academy had, in 2005-2006 school year, 94% of its seats filled. This number drops to 83% in the following year. At Landstown Academy, in the 2005-2006 school year there were 89% of the seats filled. The following year, this dropped to 87%. It was less of a drop per year than Chantilly, although it put both schools in a similar situation to start the next school year. Again, the reason for these drops were different in each place, and only by questioning each student that dropped could one fully understand why they were leaving their programs. This was not practical for the purposes of this research paper, so the reader only knew that there was more than one reason for students to drop out of a program, and to look at what the enrollment numbers show through their percentages.

As Figure 3 shows, the numbers are showing the differences in completers for both institutions for both years. As the chart shows, there is a large drop in Chantilly's completer numbers for the 2006-2007 school year. The difference is nearly a 20% drop from the previous year's completer numbers, just as Chantilly's enrollment dropped for the 2006-2007 school year. Landstown Academy's completer numbers remained steady at 229 students

completing both years; their completers unaffected by the slight percentage drop in enrollment.

Figure 3. Completer Numbers



Summary

Together, the numerical data for both Chantilly Academy and Landstown Academy and High School would seem to show that there has been a decrease in enrollments. The largest drops have come from Chantilly Academy's numbers, in both enrollment and completer numbers. For Landstown Academy the slight drop in enrollment did not affect their completer numbers, as they remained steady for both years. These comparisons between the two schools' numbers allow the researcher and reader the necessary information to develop a better understanding of how the two institutions are progressing. In Chapter V, the reader will be provided with the conclusions the researcher has determined using the information provided throughout the study.

CHAPTER V

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This chapter will use the information provided by the researcher in the previous chapters along with the problem statement, limitations, goals, and assumptions to analyze the problem. It will then inform the reader of the researcher's conclusions according to the original problem and the information gathered during their research.

Summary

The problem of this study was to compare secondary technology education programs at Landstown Technology Academy and High School, Virginia Beach, with Chantilly Academy, Chantilly, to determine factors that lead to improved technological literacy of students. The goals created to find the solution to this problem were to:

1. Discover the difference in curriculum offerings between the two schools.
2. Find the total enrollment numbers for both schools for courses offered.
3. Find the program completion totals for each school per year.
4. Summarize the factors necessary for the creation of superior technological literacy programs for high school students.

The researcher decided to conduct a comparison to determine which school had the most effective method of providing technological literacy to their students. Factors such as curriculum, course offerings, entrance requirements, length of program, certifications, and enrollment and completer numbers from the last two years were gathered and analyzed. In the United States, technology education is encouraged and there are changes being made constantly, but there is some debate over the direction that it should be taking. The two schools have similar struggles going on and the researcher's goal was to look at the most

recent changes in both academies to see which institution had a better program for technological literacy. If one was found to be slightly ahead, then a closer look could be taken to better enable the other to see where it could improve portions of its approach for better results.

The limitations for this particular research study were:

1. There is only direct access to Landstown Academy and High School because of the distance between the researcher and Chantilly Academy.
2. Nearly all contact with Chantilly Academy will be internet based, so documents cannot be seen first-hand.
3. Difference in size between the two school systems, and the impact, or lack thereof, has on the enrollment and completion numbers.

The comparison between the two school populations must also look at the structure of the academy, as well as the size of the student base. In this case, both schools can draw from any eligible applicant in the school system. Through the application and acceptance process, the school narrows down its real population to those students approved for enrollment into the program of their choice.

The procedures required for this project involved getting information via the city data of Chantilly and Virginia Beach, as well as getting data from the schools/school systems themselves which deal with curriculum, enrollment, and completion numbers. The researcher also needed to find out what information was available about courses and their content from each school and whether or not there was overlap in the courses being taught, or if the classes were unique to the particular school.

Conclusions

The researcher has taken all of the information, goals, limitation, and assumptions into consideration throughout her examination and analysis of the problem statement and the two schools being studied. The conclusions reached are listed and discussed using the research goals.

1. Discover the difference in curriculum offerings between the two schools.

The curriculums between the two schools are different in the way they are presented, as well as the subjects that are presented. At Chantilly Academy, the courses are usually two year programs, with both designed to introduce the student to a specific industry and/or career field. Landstown Academy tries to make its focus on the student's entire education by promoting the academy as being a part of the high school rather than separate from it. Also, the range of classes and subjects is more limited at Landstown than at Chantilly. There are many more courses to choose from at the latter, some of which are closely related, so if a student is not accepted into one program, they may be accepted to another. At Landstown High School and Academy, the courses are also all computer based. They deal with technology that can be applied at other places, but deal mainly with computers and learning to use the software and hardware that pertains to the subject strand they have chosen. At Chantilly Academy, the classes are much more varied and are what would be more accurately compared to a Technology and Career Education Center in the Virginia Beach City Public School system. The definition of technology is often one which can have different connotations, and the researcher believes this is the case in this comparison. Landstown Academy, based on their programs and classes, believes that technology must be computer-oriented, and that as an academy, it is better for the students to

have more classes in fewer options. Chantilly Academy appears to view technology much more loosely, and while their definitions are similar, Chantilly's courses are not so narrowly focused few choices in technology can be made. For the purpose of this thesis, this particular thought has a great deal of relevance in how the topic is approached. The institutions are definitely comparable, but there are some places where their philosophies towards technology education will not mesh because of the way that they view the nature of what they are doing. Chantilly Academy has less stringent guidelines for getting in and staying in the academy, while Landstown is more competitive because there are less seats and higher expectations, both before and during the course of the program.

2. Find the total enrollment numbers for both schools for courses offered.

For the years available, the student numbers appear to be quite a bit different in their differences. There is a large difference in the number of Landstown's Academy students to Chantilly Academy's. But when looking at these, one must take into account the fact that Landstown has fewer spaces open, so one must examine the results based on the percentages of students enrolled versus available seats each year. As Landstown Academy only has about 100 seats available each year and Chantilly Academy has an average of 24 seats per class.

3. Find the program completion totals for each school per year.

The program completer numbers for both schools reveal a large discrepancy for Chantilly Academy. While Landstown Academy's completer numbers remained the same for both years, Chantilly suffered a drop in completers that matched the drop in enrollments for the 2006-2007 school year. These drops can be the result of many different choices by students, home high schools, and the academy themselves. For the purposes of this study,

one must focus on the numbers provided rather than the reasons for the drops. The percentages of completers versus enrollments for both schools are very similar, running at about 63% for Landstown's Academy, and 55% for Chantilly Academy. There is a difference, but the size of both institutions needs to be noted when looking at the numbers. Chantilly has a larger population and more classes, while Landstown has a much smaller population and less than half the number of courses. The smaller size may help to keep students in the program as they may receive more attention should they begin to falter, where in a larger population students can sometimes get lost within the system.

4. Summarize the factors necessary for the creation of superior technological literacy program for high school students.

It is the researcher's opinion that however the institution chooses to create a technological literacy program, they offer the best programs they can, with the best curriculum and teachers. The definition used by the International Technology Education Association says that students must be able to understand, use and evaluate technology if they are to be considered technologically literate. This means that students must be taught what technology is, where it can be applied and used, how it is used, and how to determine whether it is effective or not. This can be achieved in any class, as long as the teacher and the curriculum are up-to-date and relevant to the student's course of study.

Whether an entire school or a school's set of courses are achieving these things can best be monitored by the student enrollment numbers and completer numbers. Students will not enroll in programs that are not going to effectively teach them the technology they want to know. They will also not complete a program that is ineffective or using obsolete technologies. Nor will a school system support such a program. When looking at completer

numbers, however, one must keep in mind that they do not mean the student had graduated high school, and they may be affected if the student does not complete the series of courses in which they have enrolled. Despite this, the comparison between enrollment and completion is important because it gives the reader and the researcher information about which institution is more successful in providing students with complete educations in their chosen strands.

Recommendations

For this study, we are using the International Technology Education Association's definition of technological literacy, which is, "The ability to evaluate, understand, and utilize technology" (ITEA, 2000). Both institutions are trying to better prepare their students for a world built on the latest technologies. Taking this into consideration, the researcher believes that the numbers and overall approach of the school would indicate that Landstown Academy has the better of the two programs. One of the first things in the definition of technological literacy is "evaluate." For most, this would indicate the student's ability to evaluate the technology. But it also indicates the teachers and institutions evaluation of the student's knowledge. Landstown Academy's smaller size allows for more frequent and in some cases, more in depth evaluation on both sides. When you are dealing with fewer students, it is sometimes easier to know whether or not the student understands what he or she is doing and allows for more individualized instruction. The requirements for the academy also help to promote better understanding and more intense knowledge of the subject area, as the school requires more courses before the student can successfully complete all their academy requirements.

Landstown Academy tries to set the tone for their students with a rigorous application process. This helps to attract students who are truly interested in their subjects and who are likely to get the most out of the course material. The requirements for admission are a taste of what students must do to stay in, with students being made aware that they can be placed on probation or removed from the program if they cannot maintain their grades in the program. This is important, because it selects out students who have the potential to falter when the courses begin to get more difficult. It helps to set the tone for the student's high school experience, should they be accepted into the academy. Based on all these factors, the researcher recommends that any schools opening in the future follow the model provided by Landstown Academy. The numbers, course offerings, and admissions policies have proven the school to be best suited to providing the best high school program for technological literacy.

For future studies, the researcher recommends the decline of Chantilly Academy's enrollment numbers to be a suitable beginning for the formulation of a research problem. One could look into the reasons behind the enrollment number drops and determine what could be changed or implemented in order to reverse this trend. It could also be interesting to determine whether this decline is more generalized, or whether it is contained within Chantilly Academy. Another possible start for a research problem would be to investigate whether or not graduates of Landstown Academy translate their educational experience there into a college setting and/or a career.

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APPENDIX A

Questions Used for Research:

1. What is the average class size?
2. Have there been any major course changes in the last 3 years?
3. Can you give me more details about the [course name] course?
4. What is your enrollment process?
5. What are your completer numbers for the last three years?
6. What are your enrollment numbers for the last three years?
7. Do the academy students have to graduate to be considered “completers?”
8. Can students pick the courses they take in their strands?
9. What factors affect class size?

