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What Do Students Know When They Enter College?

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Abstract

The purpose of this research is to determine the current courses students are being offered in secondary education to prepare a model curriculum for higher education. This research evaluates a sampling of high schools to determine what computer classes students are required to attend and what electives are now available. Topics researched included application courses, programming courses, web or e-commerce courses, hardware and networking courses, and graphics and desktop publishing courses. Classes were evaluated based upon offerings as well as content.

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1. INTRODUCTION

In an age of technological advances, computers have become an integral part of a student's secondary education. In 2001, computer and Internet use was more popular among school-age children and adolescents than among adults (DeBell and Chapman 2003). Schools are recognizing that technology education plays a major role in preparing a competent, business-literate, and skilled graduate. However, unlike traditional subjects such as math and English, there does not appear to be standardization in curriculum for computer courses and students currently entering colleges and universities have received varied levels of technology education.

Nationwide, schools seem to differ greatly in the number of elective computer classes that they offer. Some schools simply offer the application courses and one or two alternative electives while other schools offer more than a dozen different computer classes ranging from networking to web design. Experts predict that in the future most secondary students will receive all or part of their education from Internet-connected computers (Blaylock and Newman, 2005). Yet, in the case of the majority of high schools, programming courses are not offered, and in most cases computer classes are not mandatory. To better prepare a model curriculum for higher education it is important to be aware of what students already know in terms of technology as they enter college.

Currently, almost all high schools now offer some kind of applications courses, and a few states now require that students demonstrate proficiency of computer skills through state testing programs (e.g., North Carolina Maine, and Nevada). While some high schools provide computer labs or in-class computers, others are going further. Empire High School in Vail Arizona is giving up textbooks and issuing every student a laptop (Rotstein, 2005). The state of Maine is now in its third year of outfitting all seventh- and eighth-graders with their own laptops, and Maine's Governor John Baldacci and his education commissioner are now trying to put together a budget proposal for deploying laptop computers to all Maine high schools over the next three years (Sack, 2005). Once these students have greater access to computers, what will they be taught to do with them? Are students being taught to simply use word processing and spreadsheet programs, or are they learning advanced concepts such as programming and network-

ing? To develop higher education curriculum programs we must first determine what students are currently being taught prior to college.

2. METHODOLOGY

In spring 2005, data from over one hundred randomly selected public secondary schools nationwide were collected to determine what information technology courses were offered and which classes were required. The information was gathered in a three-tier process. The first phase was to try and gather the necessary information from the Internet. Many high schools now offer course requirements and descriptions online, either directly from the school's website or from the state's Department of Education website. If the course information was not available online, and email addresses were available, teachers or guidance counselors were directly emailed. If email addresses were not available, then the schools were directly contacted by phone.

3. SCHOOL DEMOGRAPHICS

The schools contacted were varied in terms of geographic region, ethnicity, locale, school size and economic status. Overall average ethnicities of the schools were 4% American Indian, 4% Asian, 8% Hispanic, 7% Black and 77% White. The information on region, locale, and schools size is displayed in Charts 1-3 respectively. To evaluate the economic status of the school the median income for the zip code in which the school was located was compared to the state's median income. Twenty-six percent of the schools had a median income of 25% or more below the state average. Fifty-five percent were either below or above the state's median income by less than twenty-five percent. Nineteen percent were more than 25% over the state's median income. The data on the locale, student size and economic information was taken from public school review which provides detailed profiles of USA public schools and their surrounding communities (Public Schools Review, 2005).

Chart 1. Schools by Region

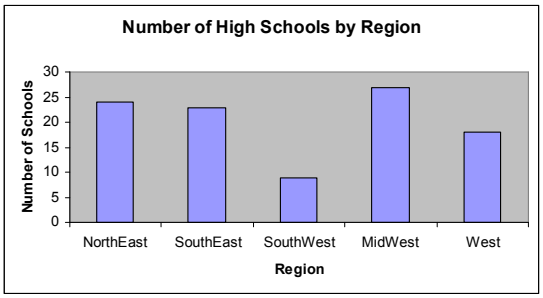


Chart 2. Schools by Locale

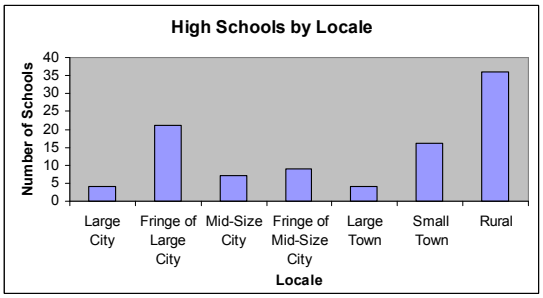
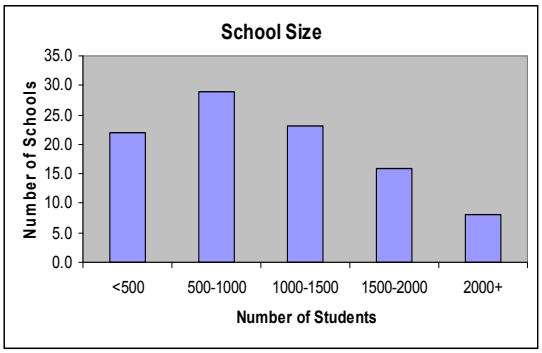


Chart 3. School Size



4. RESULTS

Computer Literacy

Computer literacy courses cover word processing, spreadsheet, presentation and database software. Some type of application course is offered by 99% of the high schools surveyed. These subjects are still mainstream required courses in colleges today. Approximately 13% of the surveyed schools require that students take at least one semester of Computer Applications for graduation. Out of the twenty states that currently have exit exams, North Carolina and Nevada are the only one that requires that students demonstrate a proficiency of computer skills

through state testing programs (U.S. Dept of Ed, 2005). Although North Carolina does not require students to take an applications course, they require their students to show a minimum level of ability. Nevada also requires students demonstrate competency in the use of computers or take a semester course in computer literacy. Eighty-seven percent of the surveyed schools do not require their students to pass any applications courses.

Programming Courses

Many of the high schools surveyed are now offering programming courses as part of their business or math departments. Two percent of the schools offer classes on programming logic and do not utilize a computer room. A little over half of the schools offered computerized programming courses. Of those schools, approximately half offered classes in Visual Basic, 36% in C++ and 36% in Java. Many of the schools that offer programming classes also offer additional programming classes in a variety of languages. The most common language for the high schools surveyed was Visual Basic. However, the advanced placement exams in computer science require students to be knowledgeable in Java. According to the AP College Board, approximately 20,000 students nationwide took either one or both of the computer science advanced placement exams.

Web or E-Commerce Courses

Approximately 56% of the schools surveyed offer some type of web publishing or e-commerce course. The courses vary significantly in the level of exposure and the material covered. A number of schools include a brief introduction to web publishing as part of their applications course. These schools typically utilized Microsoft FrontPage as their teaching tool. However, the majority of the schools do offer full one year courses on web publishing, with topics covering a wide range from an introduction to HTML including how to format text, graphics, forms, tables, and links; to such advanced topics as JavaScript, Dynamic HTML, Flash and CGI.

Hardware and Networking

Thirty-three percent of the surveyed schools offer either hardware or networking courses. Many of these courses' curriculums are geared towards passing a certification exam. Ten percent of all the schools surveyed offer some type of hardware course. Approximately half of these offer computer courses on the essential operating system competencies for an entry level PC service technician. These courses focus on the CompTIA A+ Operating System or Hardware Technologies exam objectives.

Ten percent of the schools offer a two year sequence of courses designed to enable students to pass the CISCO CCNA certification exam. The first year courses' goals are to educate and certify high school students to design, build, and maintain computer networks. The curriculum and exams are accessed online directly through Cisco Systems. During the second year of Cisco, the courses focus on advanced routing and switching and project based learning. Trouble shooting and implementing what has been learned is then applied in a lab setting. In fact, since its inception in 1997, Cisco's curriculum has entered thousands of high schools across the United States. (Thompson, 2004, CISCO)

Computer Graphics and Desktop Publishing

The majority of schools (80%) offer classes in either computer graphics and/or desktop publishing. The most common graphic classes are the area of desktop publishing using Adobe PageMaker or other popular software. One or two schools offer programs in computer animation, gaming, computer art, or digital imaging.

5. CONCLUSION

High Schools are now offering a wide variety of computer science courses, and Higher Education institutions need to be aware of the education that high school graduates are obtaining. Application courses are now commonplace in the secondary education curricula, with two states now requiring students to obtain some competency in computer applications. Networking, programming and hardware courses are also now being taught at the high school level in some locations, with the network and hardware programs often geared towards passing a certification exam.

The networking certification programs usually require students to take two years worth of networking classes.

Higher education must realize that many of the incoming freshman have prior knowledgeable in the area of information technology. This growing advancement in computer education impacts the freshman- level courses offered by colleges. Colleges should acknowledge that students are now educated in the applications courses and should provide a mechanism, similar to the Math and English exams, to test out of these courses.

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