

**SOURCES FOR LEARNING ABOUT INFORMATION TECHNOLOGY
CAREERS AND PERSONAL INFLUENCES ON THE USE OF INFORMATION
TECHNOLOGIES OF HIGH SCHOOL STUDENTS: A LONGITUDINAL TREND
STUDY**

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Abstract

The primary purpose of this study was to ascertain the sources used by high school students enrolled in agricultural science, business, or biology courses to learn about information technology careers over a three year period. A secondary purpose of this study was to determine the level of influence certain people or groups of people had on these students in their use of information technologies. Instruments used to collect data regarding the importance of sources for learning about information careers and to gather data on the persons who influence students' use of information technologies employed a 4-point Likert-type scale. The scale on the importance of sources instrument was 1 = not important; 2 = somewhat important; 3 = important; and 4 = very important. The scale on the personal influence instrument was 1 = not influential; 2 = somewhat influential, 3 = influential; and 4 = very influential. Over the three year period, results were fairly consistent among students regarding the sources of information for learning about information technology careers and who influences students about such career opportunities. The most important sources for learning about information technology careers were parents or guardians, Internet, other family members, teachers, and work experience. The most influential individuals or group of people on high school students' use of information technologies were parents or guardians, teachers, other family members, and friends.

Introduction/Theoretical Framework

Information Technology (IT) is a concept describing all aspects of managing and processing information. Most IT careers are based on computer technologies, the Internet, and networks that tie it all together. Information tools, such as personal computers and the Internet, are increasingly critical to economic success and personal advancement. However, a widening technological gap in America currently exists. This significant digital divide separating American information 'haves' and 'have nots' will further segregate America's IT workforce.

Individuals least likely to have access to such technologies, by default because of lesser opportunities for economic well being, are low-income Blacks or Hispanics in rural communities. In Mississippi, this is an alarming fact since one in four individuals in Mississippi lives at or below the poverty level, and nearly one in three children lives at or below the poverty

Note: This paper is based upon work supported by the National Science Foundation Information Technology Workforce Project, Project # 0089970. level (US Census Bureau, 1998). Yet, Mississippi has the research, industry base, and public/private institutions to support information technology clusters (Mississippi Economic Council, 2000). Jackson, the state capital, has been recognized as a telecommunications hub for not only the state, but also the world (Doty, 2000). Because these building blocks are present, the state can enhance the productivity of traditional industries and move towards a competitive advantage within the region (Mississippi Economic Council, 2000). Such gains would be more attractive at the national level and could entice information technology businesses to locate in rural areas of Mississippi.

If Mississippi is to develop a competitive advantage in relation to IT, public school systems must educate and train students about information technologies. The Governor's Task Force for Classroom Technology (Office of the Governor, 2001) established as its goal to have an Internet-accessible computer in every public classroom by the end of 2002. By achieving this goal, the educational experiences of students could be enhanced and the digital divide in Mississippi will be bridged.

If the United States is to remain competitive in the world marketplace, the foundation of information technology knowledge and skills is a necessity of the U.S. is to have a well-trained workforce (Kotrlik, Redmann, Harrison, & Handley, 2000). The Office of Technology Policy found a number of factors affecting the supply and quality of IT workers. These included a poor image of the IT profession, lack of career information and encouragement for students, a need for increased competency in math and science, challenges in the IT teaching infrastructure, and a failure to attract underrepresented groups to the IT profession. The OTP report encouraged educators to provide K-12 students, especially middle school students, with information on science and technology careers, their rewards, and what education and training are necessary to pursue them (Meares & Sargent, 1999). At the heart of this encouragement should be a

basic understanding of IT and its connection to using computers in the workplace. Mississippi's Agricultural and Environmental Science and Technology (AEST) programs—a computer skills and IT based curricula—are fostering students' IT career path decisions as it relates to using information and computer technologies for today's food and fiber production. For Mississippi to focus on information technology careers and move towards a competitive advantage, potential factors affecting the future IT workforce need to be identified and addressed. What are the factors associated with the decision to enter an IT career path? Who influences this decision?

According to Fisher, Margolis and Miller (1997) most students, males and females, are introduced to computing by a parent and school is almost incidental. Andrews, Gahris, Reeder and Tizzano (2000) point out that parents or guardians are the number one influence on children's career choice. Likewise, Harkins (2000) proposed that the most influential role models for school children are their own parents. Whether by example or through their expectations for their children's futures, several authors (Ramos & Sanchez, 1995; Reisman & Banuelos, 1984) pointed out that parents exerted a powerful influence on their children's early educational and career aspirations. Because parents may be unaware of their influence in this area, they may need education about their role in the children's career development (Whitson & Sexton, 1998). Reisman and Banuelos (1984) suggested that because of this unawareness, school counselors might include home-based projects such as family trees highlighting family members' occupations or collages about family members' occupations and/or aspirations. Further, they advocated inviting parents to into school classrooms and encouraging parents to invite students into their work environments as effective means of capitalizing on parent's influence as role models.

Findings from research by Hall, Kelly, Hansen, and Gutwein (1996) and Way and Rossman (1996) suggested that career counselors and career educators should (a) shift the focus from the individual to the family system; (b) develop a new and richer view of parent involvement in schools; (c) help families become more proactive; and (d) consider ways of duplicating helpful types of family functioning in schools, especially for children whose families are not proactive.

Other possible sources for learning about careers and vocational planning have been the focus of recent studies. In one study, Mau (1995) found that middle school students of color were more likely to rely on peers than school counselors for information about and assistance with educational and vocational planning. Mau, Hitchcock, and Calvert (1998) concluded from data gathered in a follow-up study that students of color who do not plan to pursue postsecondary education might not receive adequate information about and encouragement from school counselors. Rosenbaum, Rafiullah Miller, and Scott Keri (1996) suggested that counselors may inadvertently even prevent students from receiving the advice and information they need to realistically prepare for their future.

Purpose/Objectives

The purpose of this study was to ascertain the sources used by high school students enrolled in agricultural science, biology, or business courses to learn about information technology careers over a three year period. Furthermore, this study sought to identify the people that influenced high school students on their use of information technologies over the same period. Specific objectives guiding this study were to:

1. Determine the importance of sources for learning about information technology career.
2. Identify the people that influence students to use information technologies.

Methods/Procedures

This study was conducted as a longitudinal trend study (Creswell, 2002; Gay & Airasian, 2003; Borg & Gall, 1989). According to Borg and Gall (1989), "In trend studies, a given general population is sampled at each data collection point. The same individuals are not surveyed, but each sample represents the same population" (p. 422).

The population for this study consisted of students enrolled in either Agricultural and Environmental Science and Technology (AEST) programs (N = 14) or Biology/Business programs (N = 14) from all geographical areas in a southern state. A census of all students from these 28 programs was used in the study each academic year. Schools were matched based on demographics, such as school size, ethnic makeup and school programs.

The researchers developed the instruments used in the study. Before the first year of data collection, twenty-four teacher consultants attended a workshop to develop the instruments to be used in the data collection process. After conducting a session on survey instrument development, university staff shared with teacher consultants the project objectives and sample questionnaires developed from a review of literature. Teacher consultants added and/or deleted items, recommended age-group appropriate wording, and revised the format of the instruments. Teacher consultants also recommended procedures for data collection and suggested placing the survey instruments on-line to expedite data collection as well as save money on printing instruments and postage. Since they would assist in data collection process, teacher consultants participated in Institutional Review Board (IRB) Human Subjects Research Training. Following each year of data collection, the instruments were reviewed and revised by the teacher consultants.

The section of the instrument used to collect data regarding the importance of sources for learning about information careers employed a 4-point Likert type scale (1 = not important; 2 = somewhat important; 3 = important; 4 = very important). A similar 4-point Likert type scale (1 = not influential, 2 = somewhat influential; 3 = influential, 4 = very influential) was used on the sub-section of the instrument to gather data on the persons who influenced students' use of information technology. University staff finalized the instruments and placed them on the web for teacher consultants to review and provide additional feedback before pilot testing. After receiving feedback the

instruments were pilot tested using state officer candidates attending the state FFA convention and re-administered at the state leadership conference. Test-retest reliability coefficients were .41 for the sub-section of the instrument used to gather data on the importance of sources for learning about information technology careers and .44 on the sub-section used to gather information on the people who influence the use of information technology. Even though reliability coefficients were low, such reliability coefficients are acceptable according to the recommendations by Nunnally and Bernstein (1994) for instruments that are developed and used for the first time.

The instruments were then printed and mailed to teachers and also placed on the web for the data collection. Each year teacher consultants were supplied with parental consent and student assent forms. During years one and two of the study, 17 of the 28 teachers had their students complete the instruments online with the remaining teachers having their students complete paper instruments. During year three, all schools completed traditional paper instruments. AEST teachers surveyed students enrolled in the Concepts of Agriscience Technology course and business and biology teachers surveyed introductory classes primarily made up of 9th and 10th graders. Since the instruments were administered to students on a specific day(s) designated by the researchers, only those students who were in class on those days completed the instruments. No follow-up measures were used to collect data from those students who were absent, so results cannot be generalized to all high school students enrolled in AEST and biology/business programs in Mississippi.

Data were summarized using descriptive statistics. Frequencies, percentages, means, and standard deviations were used to describe demographic characteristics and summarize responses provided by students regarding sources of information on information technology careers and personal influences about information technology careers.

Findings

Results and findings in this paper are based on the responses provided by students who were in class on days the instruments were administered. During year one of the project, usable responses were provided by 753 students. Fifty one percent of those who responded during spring 2002 to the instrument were male. The majority (51 percent) were 9th graders and 34 percent were 10th graders. Another 10% were in the 11th grade with only 5% in the 12th grade. Caucasians comprised 54 percent on the participants while African Americans comprised 42 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 4 percent.

During year two of the project, usable responses were provided by 933 students. Fifty two percent of those who responded to the instrument in spring 2003 were male while 48 percent were female. The majority were 9th graders (59 percent) and 28 percent were 10th graders. Another 10 percent were in the 11th grade with only 3 percent in the 12th grade. Caucasians comprised 52 percent of the participants while African Americans

comprised 43 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 5 percent.

During year three of the project, usable responses were provided by 756 students. Fifty six percent of those who responded in spring 2004 were male while 44 percent were female. The majority were 9th graders (51 percent) and 32 percent were 10th graders. Another 11 percent were in the 11th grade with only 6 percent in the 12th grade. Caucasians comprised 62 percent of the participants while African Americans comprised 32 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 6 percent.

Importance of Information Technology Career Sources

Participants were presented with a list of 23 plausible sources for learning about information technology careers and asked how important each was for learning about such careers. Their responses are presented in Table 1. The top five sources identified in spring 2002 were “parents or guardians” ($M = 3.42$), “Internet” ($M = 3.14$), “other family members” ($M = 3.13$), “teachers” ($M = 3.13$), and “work experience” ($M = 3.11$). The top five sources identified in spring 2003 were “parents or guardians” ($M = 3.10$), “Internet” ($M = 2.85$), “teachers” ($M = 2.83$), “other family members” ($M = 2.82$), and “work experience” ($M = 2.77$). The top five sources identified in spring 2004 were “parents or guardians” ($M = 2.92$), “other family members” ($M = 2.73$), “Internet” ($M = 2.68$), “teachers” ($M = 2.65$), and “career day” ($M = 2.62$).

The lowest rated five sources for learning about information technology careers during spring 2002 (see Table 1) were “magazines” ($M = 2.50$), “newspapers” ($M = 2.56$), “radio” ($M = 2.62$), “school guidance counselors” ($M = 2.63$), and “government publications” ($M = 2.63$). The lowest rated five sources for learning about information technology careers during spring 2003 were “government publications” ($M = 2.29$), “radio” ($M = 2.30$), “magazines” ($M = 2.30$), “newspapers” ($M = 2.2$) and “local business leaders” ($M = 2.39$). The lowest rated five sources for learning about information technology careers during spring 2004 were “government publications” ($M = 2.18$), “magazines” ($M = 2.25$), “local business leaders” ($M = 2.27$), “newspapers” ($M = 2.31$), and “radio” ($M = 2.33$).

Personal Influence on the Use of Information Technologies

Students were asked to rate 11 persons/categories of people based on how influential they were in the students’ use of information technologies. A summary of their responses is presented in Table 2. The top five persons indicated by students as having the most influence on their use of information technologies during spring 2002 were “parents or guardians” ($M = 3.31$), “teachers” ($M = 3.22$), “other family members” ($M = 2.98$), “friends” ($M = 2.87$), and “church leaders” ($M = 2.78$). The top five persons indicated by students as having the most influence on their use of information technologies during spring 2003 school year were “parents or guardians” ($M = 2.89$), “teachers” ($M = 2.89$), “other family members” ($M = 2.59$), “friends” ($M = 2.54$),

Table 1

Importance of Sources for Learning about Information Technology Careers

	Year		
	Sp 2002	Sp 2003	Sp 2004
SOURCES FOR LEARNING ABOUT INFORMATION TECHNOLOGY CAREERS	f = 783	f = 933	f = 756
Peers or fellow classmates	2.73	2.49	2.41
Internet	3.14	2.85	2.68
Parents or guardians	3.42	3.10	2.92
Other family members	3.13	2.82	2.73
Newspapers	2.56	2.32	2.31
Magazines	2.50	2.30	2.25
Teachers	3.13	2.83	2.65
School library	2.90	2.63	2.47
Local business leaders	2.66	2.39	2.27
School guidance counselor	2.63	2.43	2.34
Government publications	2.63	2.29	2.18
Church leaders	2.91	2.46	2.34
Radio	2.62	2.30	2.33
Television	2.83	2.52	2.54
Friends	2.93	2.69	2.60
Field trips to businesses	2.98	2.63	2.55
School Career Center	2.98	2.67	2.54
Clubs and organizations	2.73	2.54	2.37
Work experience	3.11	2.77	2.56
Classroom activities	2.94	2.68	2.58
Career Day	2.97	2.68	2.62
Guest speakers	2.86	2.62	2.52
Movies/videos	2.75	2.52	2.52

Note. 1 = not important; 2 = somewhat important; 3 = important; 4 = very important

and “peers or fellow classmates” ($M = 2.38$). The top five persons indicated by students as having the most influence on their use of information technologies during spring 2004 were “teachers” ($M = 2.78$), “parents or guardians” ($M = 2.76$), “other family members” ($M = 2.52$), “friends” ($M = 2.43$), “peers or fellow classmates” ($M = 2.28$), and “school guidance counselor” ($M = 2.28$).

Table 2

Person(s) Who Influence the Use of Information Technologies

PERSONAL INFLUENCES	Year		
	Sp 2002 f = 783	Sp 2003 f = 933	Sp 2004 f = 756
Peers or fellow classmates	2.61	2.38	2.28
Parents or guardians	3.31	2.89	2.76
Other family members	2.98	2.59	2.52
Teachers	3.22	2.89	2.78
Local business leaders	2.55	2.27	2.23
School guidance counselor	2.57	2.28	2.28
Government leaders	2.57	2.16	2.08
Church leaders	2.78	2.28	2.18
Job supervisor	2.58	2.19	2.16
Friends	2.87	2.54	2.43
Celebrities	2.42	2.20	2.05

Note. 1 = not influential, 2 = somewhat influential; 3 = influential, 4 = very influential

Conclusions/Discussion

A review of the literature clearly reveals that parents and guardians provide their children an important source for learning about careers (Andrews, Gahrns, Reeder & Tizzano, 2000; Ramos & Sanchez, 1995; Reisman & Banuelos, 1984; Trice & Tillapaugh, 1991). As shown in the findings of this research, this holds true for those careers in information technology. At the end of each academic year, parents and guardians were the most important source of learning about information technology careers in high school students. Because parents and guardians are an important influence on high school students' career choices, schools need to find more ways of involving parents in career education efforts. Suggestions made by Reisman and Banuelos (1984), Hall, Kelly, Hansen, and Gutwein (1996), and Way and Rossman (1996) should be explored. This concurs with the conclusions reached in a 1997 study by

Fisher, Margolis and Miller. Furthermore since the Internet is also an importance source of information for students to learn about information technology careers, schools need to ensure that appropriate rooms, such as career centers and the library, have Internet access for students to use to research possible career opportunities associated with information technologies..

Other family members, in addition to parents and guardians, are also important sources and influences in the career development of youth. Not only do they serve as role models, but children are also exposed to a wider variety of career opportunities as suggested by Reisman and Banuelos (1984). Teachers, especially those who teach agriculture courses, need to incorporate information on careers within each unit they teach. This has been done in the AEST program currently being taught in Mississippi secondary schools. Furthermore, supervised agricultural experience (SAE) programs must continue to be a part of the total secondary agriculture education program. While many of the students in this study were not old enough to work, there still are opportunities for them to learn about careers in information technologies. Even though students in this study are not old enough to work in IT occupations, they can gain supervised experience though “new” types of SAEs, particularly exploratory SAEs where students can job shadow individuals working in information technology careers to learn about the skills and education needed for such careers.

School guidance counselors are not significant sources for career information. This supports the conclusion drawn by Mau (1995). Maybe counselors do not see this as part of their role and it may not. It is suggested that more research be conducted on the role of school guidance counselors with regard to career education and planning.

Parents and guardians, as expected, were found each year to have the most influence on their children’s use of information technologies. This supports the conclusion drawn by Fisher, Margolis and Miller (1997). In addition to parents and guardians, those persons with whom the student comes in regular contact (teachers, other family members, friends, church leaders) were consistently rated as having the most influence on their use of information technologies. This again agrees with Mau (1995).

According to this study, parents and agriculture teachers are an important source of information in career decision making. It is important that they are aware of the many information technology career opportunities available in agriculture. Universities need to make future agriculture teachers aware of the career options through pre-service and in-service activities. Teachers need to be provided with instructional materials to teach their students about information technology careers related to agriculture. Additionally resource materials related to these careers should be made available to parents and those in high school career centers if the agricultural information technology jobs are to be filled not just by those with information technology expertise but also those well grounded in the agricultural field as well.

Even though guidance counselors received a higher rating during the third year of the study, they still have relatively little influence over students’ career choices in

information technology. A plausible reason why guidance counselors were not rated higher is that they are not in regular contact with students due to heavy workloads. Teachers should be encouraged to educate their counselors about information technology careers related to their respective academic disciplines.

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