

Dot.com Boom and Bust Effects on MIS College Enrollments: 1995 - 2006

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ABSTRACT

This paper presents an overview of the impact of the dot.com boom and bust on the enrollment of students in information technology related business school programs at seven US colleges and universities during the period 1995-2006. Also, this paper presents the results of a related survey of factors affecting undergraduate business students' choice of major at two southern US universities.

INTRODUCTION

Many are familiar with the dot.com boom at the end of the 20th century and the subsequent bust in the first few years of the 21st century. Investors became overnight millionaires as Internet stock prices soared, and hundreds of companies went bankrupt in the subsequent decline. The beginning of the e-commerce boom began around 1996 when Internet stock tracking indices first appeared. As seen in Figure 1, the peak in stock values for most e-commerce businesses occurred in the early part of 2000, while the end of the decline occurred in late 2002. Since then, prices have recovered somewhat, but nearly 50% of the businesses operating in 1998 no longer existed in 2003 (University of Maryland, 2006). In addition to the wild fluctuation of stock prices, many other related activities were affected such as advertising expenditures, real estate and rental prices in Silicon Valley, and even the number of academic papers written about electronic commerce (Kim, Aiken, & Vanjani, 2006). Also, while salaries and hiring of information technology (IT) professionals were affected by this bubble to some extent, the enrollments of IT students in colleges and universities were affected to a much larger degree.

The purpose of this paper is to analyze the relationship between the dot.com boom and bust with IT college enrollments between the years of 1995 and 2006 and investigate factors affecting the related enrollment decline. This paper presents a summary of IT related major enrollment at seven different universities in the United States from 1995 through 2006. Also, a survey was used to identify the factors that affected the choice of major for undergraduate business students. The results of this survey of factors affecting undergraduate business students' choice of majors conducted at two universities shows that personal interest in and reputation of the major were significant factors in students' choice of major. It is the expectation that this information will likely better prepare colleges and universities to plan recruitment strategies for IT majors.

BACKGROUND

The history of IT student enrollments at universities and colleges in the United States has shown erratic periods of growth (Lennox, Woratschek, & Davis, 2005; Lomerson & Pollacia, 2006). For example, from 1980 to 1986, the number of Computer Science (CS) students increased by more than four times, but between 1986 and 1990, their number had dropped 40% (Cale, Mawhinney, & Callaghan, 1991; Office of Technology Policy, 1997). By the early 1990s, enrollments again began to grow. However, it was the beginning of the dot.com bubble that really began to spur enrollment growth. For example, at the University of Mississippi, growth in the number of Management Information Systems (MIS) majors had increased by roughly 50% over the first half of the decade (see Figure 2), and many other universities experienced similar bubbles in IT enrollment growth. As an additional example, Florida State's MIS student population doubled between 1995 and 2000 before declining substantially (see Figure 3).

Figure 1: AMEX Interactive Week Internet Index (IIX)
 Monthly candlestick semi-log chart of index values
 (Source: <http://bigcharts.marketwatch.com/>).



Figure 2: MIS Enrollment – University of Mississippi
(Source: University of Mississippi, 2006).

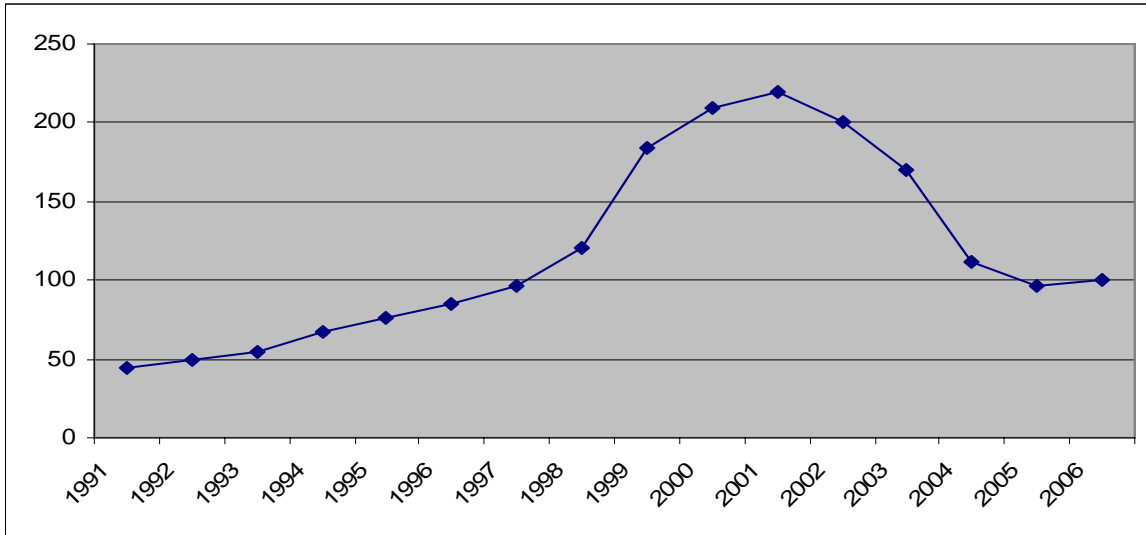
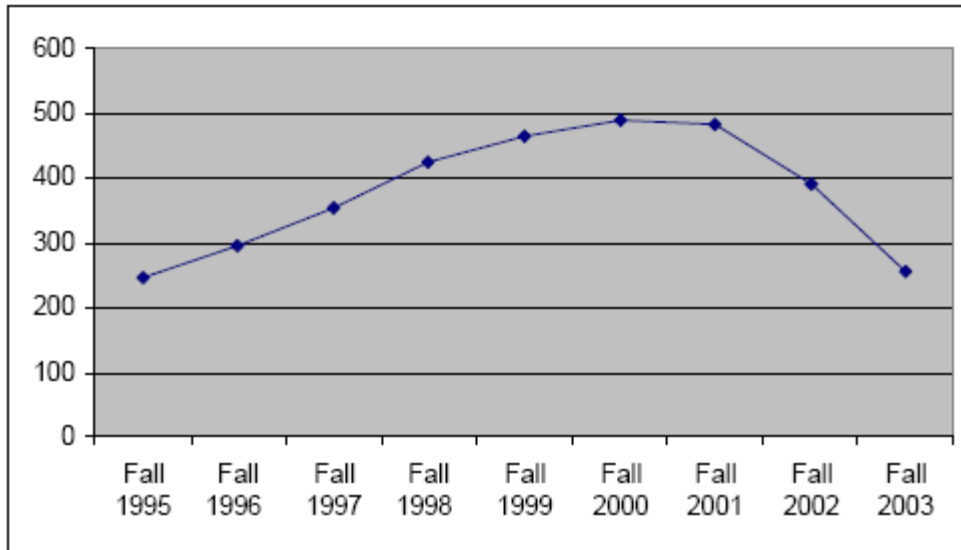


Figure 3: MIS Enrollment - Florida State University
(Source: George, Valacich, & Valor, 2004).

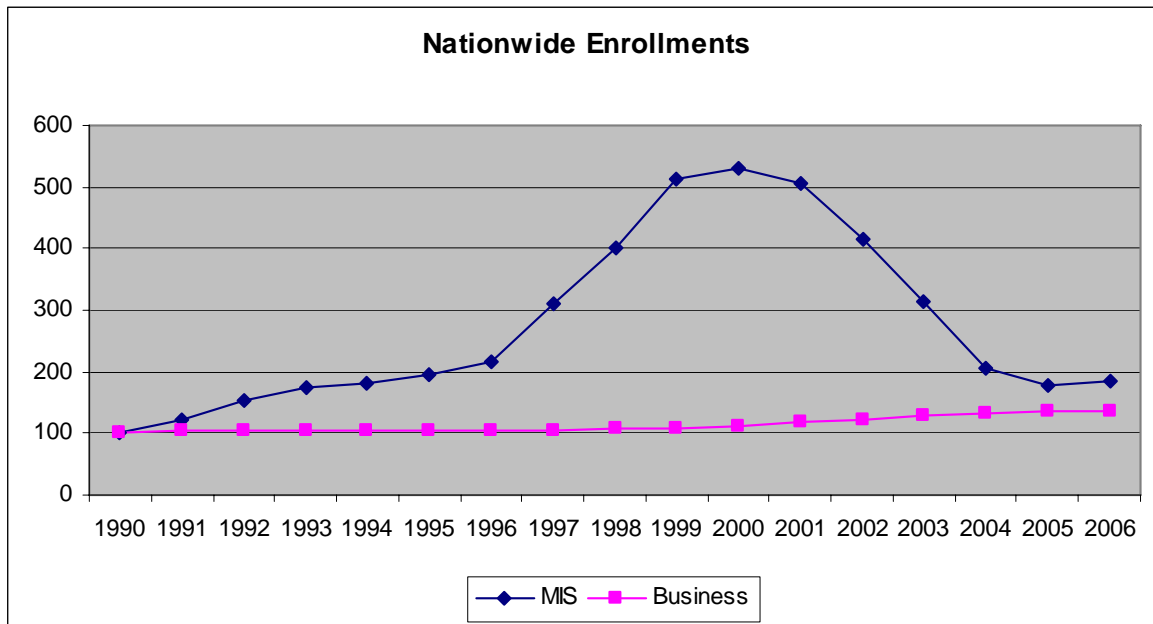


IT enrollment at universities across the country increased dramatically at the end of the decade as many students became aware of the great job offers and the high salaries in the field because of the boom in e-commerce hiring (Goff, 2000; Goff, 2001) and to a lesser extent, the need for programmers to fix the Y2K bug (Edwards, 1999). The job outlook for information technology professionals was very rosy at the turn of the century. In the previous few years, their salaries had increased, in some cases 18% per year, and forecasts were made indicating huge shortages in qualified applicants for IT positions in the future (DePaul University, 2000).

No central repository of data exists for IT enrollment across the country. However, anecdotal data are available from a few Web sites and published journal articles. We accessed several of these sources to obtain MIS enrollment

numbers covering the period from 1990 through 2006 at Florida State University, North Carolina State University, Ohio State University, University of Memphis, University of Mississippi, University of Texas, and Virginia Polytechnic Institute and then normalized them to account for different base enrollments. Results (see Figure 4) are similar to those already shown from the University of Mississippi and Florida State University. On average, IT student populations increased rapidly during the early 1990s, but really began to take off beginning in 1995 with the advent of the e-commerce boom. Some universities had dramatic increases. For example, North Carolina State University went from 99 students in 1994 to 943 in 1999, and the University of Texas went from 105 students in 1990 to 610 in 1999.

Figure 4: MIS and Business Enrollment - United States
(Base = 100).

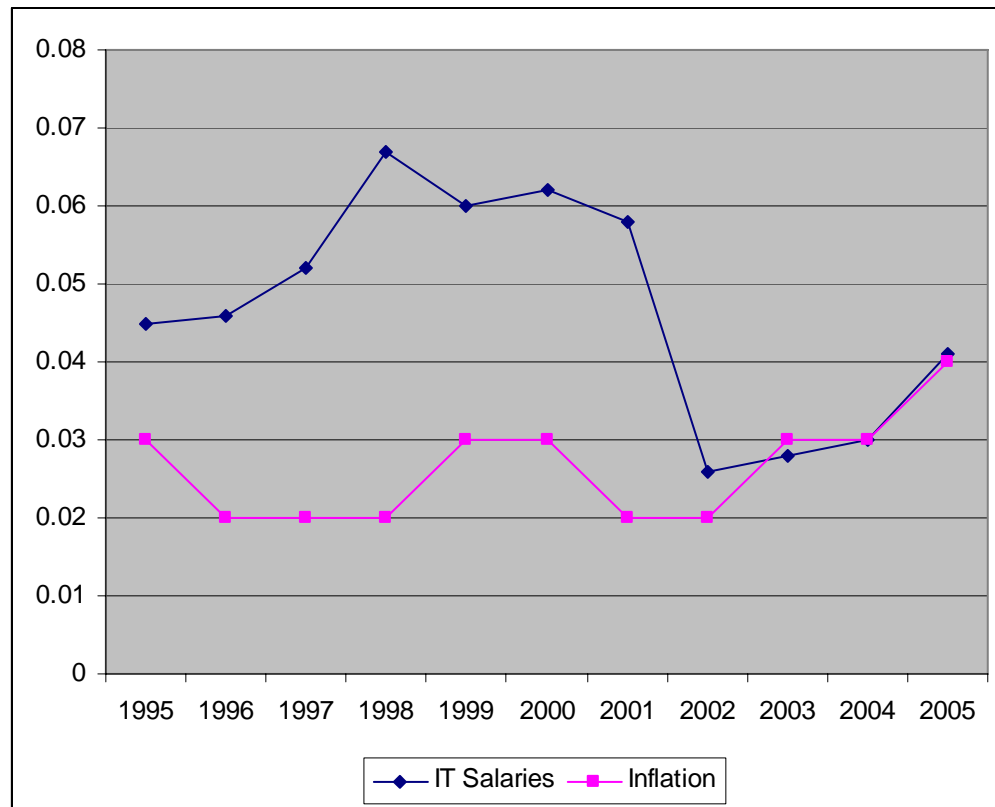


While MIS enrollments have subsequently declined since their peak, they are still up nearly 200% from 1990, while overall Business enrollments were up only 30%-33% from the same time periods. Yet, it is widely perceived now that the pendulum has swung too far, and many universities are trying to increase IT enrollment (Dick, Granger, Jacobson, & Van Slyke, 2007; Koch, & Kayworth, 2007).

FACTORS AFFECTING ENROLLMENT DECLINE

After the Y2K problem was resolved and the e-commerce bubble burst, hiring decreased and students began to lose interest in the IT field as a career (Aken & Michalisin, 2007; Alsop, 2001). In addition to these two factors, some other reasons have also been cited for this decline. For example, the perception that fewer opportunities will be available as programming jobs are outsourced to China, India, and other countries (Gray, 2005; Lomerson & Pollacia, 2006) may have had a negative impact on MIS enrollment. All these reasons combined diminished IS job opportunities and reduced IT salaries to some extent (see Figure 5), but perceptions of job scarcity and declines in salaries might have been more severe than actuality.

Figure 5: IT Salary Change Rate vs. Rate of inflation
(Sources: Collet, 2005; Computerworld, 2004).



Increasingly stringent academic requirements might have been an additional factor in the decline in enrollment and especially graduation rates, as many universities deliberately attempted to decrease the number of students after a surge of applicants from 1998 to 2000 (De Los Santos, 2004). Finally, a lack of information about the opportunities available with an IT major could have also played a role (Jones, Schambach, Walstrom, & Crampton, 2007).

FACTORS AFFECTING CHOICE OF MAJOR

While economic motivations (e.g., likelihood of finding a job, potential beginning salary) are large contributors to the choice of a major, other factors can have an influence as well (Akbulut & Looney, 2007; Cohen & Hanno, 1993; Gul, Andrews, Leong, & Ismail, 1989; Pritchard, Potter, & Saccucci, 2004; Zhang, 2006). In an attempt to better understand why students choose one major rather than others and perhaps determine additional reasons why MIS is not being selected, a Web-based survey (see Appendix 1) was conducted at two moderate-sized Southern universities in the United States.

University A

A total of 145 undergraduate Business students (66% male) in an introductory MIS course took the survey for extra credit. The sample consisted of 27 seniors, 88 juniors, and 30 sophomores. Of these, 26 were Accounting, 26 Marketing, 21 Banking and Finance, 21 Management, 13 Managerial Finance, 10 Real Estate, 9 Other, 8 Marketing Communications, 6 MIS, and 5 Insurance and Risk Management.

As shown in Table 1, respondents stated that career opportunities, financial benefits, personal interest, and reputation were factors in their choice of major, while lack of difficulty in major courses, influence of friends and relatives, an introductory class, faculty discussions, and advertising were not.

Table 1: University A Responses (N=145).

<i>Factor</i>	<i>Mean</i>	<i>Std.Dev</i>
Perceived career opportunities	*5.221	1.362
Perceived financial benefits	*5.083	1.516
Perceived lack of difficulty in major courses	*2.800	1.657
Personal Interest in major	*5.531	1.270
Reputation of major	*4.807	1.450
Influence of friends	*2.855	1.662
Influence of relatives	3.676	1.943
An introductory course in major	*3.366	1.863
Discussions with faculty in major	*3.097	1.923
Magazine stories, ads, etc. about the major	*3.393	1.850

* = significantly different from 4 at $\alpha = 0.025$ (2-tailed)

As might be expected, a significant positive correlation at the .05 level was found between perceived career opportunities and perceived financial benefits (R-square = 0.61). In addition, a significant moderately negative correlation was found between personal interest in the major and the perceived lack of difficulty in the courses (R-square = 0.61), indicating that students were more interested in rigorous majors. Those who were influenced by relatives were also influenced by friends (R-square = 0.58), and those who were influenced by an introductory course in the major or through discussions with faculty were also influenced by friends (R-square = 0.41 and R-square = 0.44).

University B

A total of 30 students (70% female) took the survey, including 18 seniors, 10 juniors, and 2 sophomores. Of those declaring a major, 15 were Management, 9 Marketing, 4 Banking and Finance, 1 Managerial Finance, and 1 Other.

As shown in Table 2, respondents from University B stated that career opportunities, financial benefits, personal interest, and reputation of major were factors in their choice of major, while lack of difficulty in major courses, influence of friends and relatives, an introductory class, faculty discussions, and advertising were not. These results are consistent with those from University A.

Table 2: University B Responses (N = 29).

<i>Factor</i>	<i>Mean</i>	<i>Std.Dev</i>
Perceived career opportunities	*5.276	1.623
Perceived financial benefits	*5.586	1.427
Perceived lack of difficulty in major courses	3.483	2.064
Personal Interest in major	*6.172	1.490
Reputation of major	*5.172	1.774
Influence of friends	*2.172	1.853
Influence of relatives	*2.862	2.263
An introductory course in major	*2.862	1.903
Discussions with faculty in major	*2.552	2.046
Magazine stories, ads, etc. about the major	3.552	2.046

* = significantly different from 4 at $\alpha = 0.025$ (2-tailed)

Like University A, there was a significant correlation (R-square = 0.61) between perceived career opportunities and perceived financial benefits, and a significant negative correlation between personal interest in the major and lack of perceived difficulty (R-square = 0.39). Students who took personal interest in the major perceived the reputation of the major to be higher than the ones who did not take personal interest in the major (R-square= 0.46). Friends (R-square= 0.41), relatives (R-square= 0.45) and discussions with faculty (R-square= 0.43) seemed to have influenced a student's choice of introductory course in major.

DISCUSSION

Several University A students added comments to the questionnaire (see Appendix 2) that give more insight behind the choice of a major. Of the 29 comments (some containing multiple reasons for choosing a major), 34.5% mentioned job opportunities, 31% mentioned personal interest, 24.1% mentioned the influence of family, instructors, or friends, 17.2% mentioned financial benefits and, 6.9% mentioned the reputation of the major (see Table 3).

Table 3: Percent of Respondents at University A Citing a Specific Reason for Choice of Major.

<i>Reason for Choosing Major</i>	<i>Percent of Respondents at University A (N=145)</i>
Job Opportunities	34.5 %
Personal Interest	31.0 %
Influence of Family, Instructors or Friends	24.1 %
Financial Benefits	17.2 %
Reputation of the Major	6.9 %

Thus, it seems that personal interest (e.g., "I just like houses," "I love math.") and career opportunities / financial benefits (e.g., "I want an office job that pays well," "Job opportunities seem to be abundant if you obtain this major.") are the primary motivators in the decision, as one might expect.

Therefore, to encourage more students to choose MIS as a major, more advertising might be needed to show how favorably ranked the field is in comparison with others in Business. Although the outlook for computer programming jobs appears grim with job growth expected to decrease by 4% over the next 10 years (U.S. Department of Labor, 2006a), the outlook for other, related IT careers such as Systems Analyst and Software Engineer is much better with jobs expected to increase by 29% (U.S. Department of Labor, 2006b). In addition, Money magazine ranked "Software Engineer" as the best job in 2006 (Kalwarski, Mosher, Pashkin, & Rosato, 2006), and the National Association of Colleges and Employers states that the IT field is the highest paying for new graduates (see Table 4).

Table 4: Average job offers in Business – 2008
(Source: <http://www.naceweb.org/press/display.asp?year=2008&prid=275>).

<i>Major</i>	<i>Salary</i>
MIS / CS	\$56,921
Finance	\$48,795
Accounting	\$47,413
Microsoft Office W Management	\$43,823
Marketing	\$43,459

CONCLUSION

Although, enrollment in the MIS field is far below its peak in 2001, on average, IT class sizes are still higher on a percentage basis than in most other fields in Business. To help with recruiting MIS majors and to increase enrollments further, potential students should be made aware of the excellent job and financial opportunities within the career, as these were found to be major criteria in their selection decision. For example, a recent article posted in the *HotJobs* section of Yahoo (www.yahoo.com) listed Senior Database Administrators, Network Security Administrators, and Web Interface Design Directors as some of the fast-growing careers groups with high salaries (Hyman, 2008). The article indicated that these IT careers along with the five others listed in the related article showed no signs of slowing down through the end of the decade and offered strong salaries with room to grow.

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APPENDIX 1 QUESTIONNAIRE

1. Sex: M F
2. Level: Freshman Sophomore Junior Senior Other
3. Major: Management Information Systems, Real Estate, Banking & Finance, Insurance & Risk Management, Accounting, Economics, Management, Managerial Finance, Marketing, Marketing Communications.
1 = Strongly Disagree 4 = Neutral 7 = Strongly Agree
4. I chose this major because of perceived career opportunities (e.g., growth in the job market).
5. I chose this major because of perceived financial benefits (e.g., starting salary).
6. I chose this major through the influence of friends (e.g., my friends are in the same major).
7. I chose this major through the influence of relatives (e.g., one of my parents works in the field).
8. I chose this major after reading career descriptions, ads, etc. (e.g., reading stories about the profession piqued my interest).
9. I chose this major based upon its reputation.
10. I chose this major because of an introductory course I took.
11. I chose this major after discussions with faculty members.
12. I chose this major because of perceived lack of difficulty (e.g., I think I can do well in the courses).
13. I chose this major because of personal interest in the area (e.g., I like dealing with numbers).
14. Please rank the relative importance of factors covered in questions 5 through 14 [1 – 10]
15. I have changed majors at least once while at this university. [true false]
16. Please add any other comments: _____

APPENDIX 2 REASONS STATED FOR CHOICE OF MAJOR (UNIVERSITY A)

<i>Sex</i>	<i>Major</i>	<i>Reason</i>
Male	Accounting	The various job offers that come along with the degree.
Female	Accounting	I am good at mathematics. Also, I want an office job that pays well.
Male	Accounting	My family.
Female	Accounting	I took an accounting class in high school and absolutely loved it and was actually really good at it, so I decided that it was what I wanted to do the rest of my life.
Female	Accounting	I love math and I feel that this is a great field to go into for financial reasons. I enjoy learning more about numbers and facts.
Male	Accounting	I just felt like Accounting was the best Business degree from the University of MS.
Male	Accounting	I chose Accounting because it will allow me to have a future advantage in my goal to be an entrepreneur.
Male	Banking & Finance	Working at a bank for 4 years...
Male	Banking & Finance	My current job.

Female	Banking & Finance	More ease in finding internships with a Business major rather than one in liberal arts.
Male	Banking & Finance	I just thought with this major I could possibly find a job easier than the others. I was thinking Management, but with that I guess all I thought I would do is possibly manage a business.
Male	Banking & Finance	I chose this major because in any city where I live I will be able to find a job in Banking and Finance.
Male	Banking & Finance	I choose the degree because it is very good to fall back on if I don't get into law school.
Male	Insurance & Risk Management	I was told that the Insurance/Risk Management major was the 5th largest in the nation and most undergrads have a job before they graduate. I also have a lot of personal interest with the major, and I am very excited about learning more.
Male	Management	I wanted to major in construction management, but since the University doesn't have that major, I thought Management would be the next best thing.
Male	Management	I want to be successful in the business world. I want to have creditable knowledge in the area.
Male	Management	I needed something new to do.
Male	Management Information Systems	Job opportunities seem to be abundant if you obtain this major.
Male	Managerial Finance	My father is a financial advisor and I have seen how successful you can be in this field. I think that watching him over the years has influenced my direction.
Male	Managerial Finance	I realized throughout my life that I was financially minded and good with money/business decisions. I was majoring in Engineering and took an economics class when I realized that this is what I am supposed to be doing. I also had a great teacher.
Male	Marketing	Parents and high school teachers
Male	Marketing	My sister had this major and she got a job as soon as she graduated, so I think I will get a job as soon as I graduate.
Male	Marketing	I enjoy business in general.
Male	Marketing Communications	My advisor gave me a list of majors, and I just picked this one out of thin air.
Female	Marketing Communications	Marketing Communications is the best major for me because I enjoy the business and journalism aspects. I am a social person and would enjoy working around people.
Male	Other	Sometimes the instructors' knowledge base and interest conveyed to the students can affect the view of the major and the performance of the student in the course material.
Male	Real Estate	I know a person that is in Real Estate and is very happy with what he does. He also makes a good living in it. Another thing would be that property prices are increasing everywhere.
Male	Real Estate	My uncle is in the business and you have an opportunity to make or not make as much as you want. It depends on your work ethic
Female	Real Estate	I just like houses. I like to know the history of the house, and I do some interior decorating which can help sell a home if the client is willing to cooperate. I think I am persuasive.

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