

Understanding Similarities and Differences in Students Across First-Year Computing Majors

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Abstract—In November 2014, Michigan Technological University’s departments of computer science (CS) and electrical and computer engineering (ECE) were selected to participate in NCWIT’s Extension Services for Undergraduate Programs (ES-UP). ES-UP, supported by NSF and Google, is designed to help departments develop strategies to recruit and retain women in computing and engineering majors. Both departments have enrolled a low number of women in their programs and have had lower retention rates than other departments on campus. As part of the ES-UP initiatives, we surveyed our first-year students in Fall 2015 and followed up with a second survey in January 2016. The goal of the initial survey was to learn what attracted students to their major while the second focused on their experiences during their first semester. Examination of the students across the four majors in the two departments in separate colleges provides a unique perspective on students’ attraction to and persistence in computing-related majors.

Keywords—*retention; first-year programming course; student surveys*

I. INTRODUCTION

The need for STEM graduates, and in particular computing graduates, is well-documented with job projections through 2022 continuing to show strong growth in computing occupations [1]. To meet this demand there is a need for an increase in the number of graduates in these fields. One significant factor in producing more graduates is to increase the pool of talent from which we are drawing prospective students and ultimately graduating professionals. Computing degree programs, in particular, have been attracting low numbers of women and other underrepresented groups.

At Michigan Tech we have had challenges both in recruiting a diverse student population into the Departments of Computer Science and Electrical and Computer Engineering and in retaining students at the same rate as other units on campus. The University strategic plan emphasizes increasing the diversity of the student population. Considering that approximately 17% of the University’s undergraduates are enrolled in one of these two departments, it will be difficult for the University to achieve its strategic goal unless we are able to change the make-up of the undergraduate populations in these two departments.

In light of this during the Fall of 2014, Michigan Technological University’s departments of computer science (CS) and electrical and computer engineering (ECE) applied to and were selected to participate in the National Center for Women & Information Technology’s (NCWIT’s) Extension Services for Undergraduate Programs (ES-UP) [2]. ES-UP, supported by the National Science Foundation and Google, is designed to help departments develop strategies to recruit and retain women in computing and engineering majors. As part of the ES-UP initiatives, we surveyed our first-year students in Fall 2015 and followed up with a second survey in January 2016. The goal of the initial survey was to learn what attracted students to their major while the second focused on their experiences during their first semester. Examination of the students across the four majors in the two departments in separate colleges provides a unique perspective on students’ attraction to and persistence in computing-related majors. This paper primarily focuses on our findings from the initial survey. Our goal is to use this information to more effectively recruit and retain students in our two Departments.

TABLE I. RECENT UNDERGRADUATE ENROLLMENTS BY GENDER

	SCS/SSE*			ECP			EEE		
	<i>Female</i>	<i>Male</i>	<i>% Female</i>	<i>Female</i>	<i>Male</i>	<i>% Female</i>	<i>Female</i>	<i>Male</i>	<i>% Female</i>
2012	22	277	7.4%	15	191	7.3%	36	285	11.2%
2013	21	297	6.6%	19	206	8.4%	36	296	10.8%
2014	23	314	6.8%	17	214	7.4%	33	281	10.5%
2015	37	335	9.9%	16	214	7.0%	42	276	13.2%

*Although our goal is to examine the differences among the separate majors, departments and genders, when numbers are very low data will be combined to insure anonymity.

II. CONTEXT

Michigan Technological University enrolls approximately 5,700 undergraduate students and 1,500 graduate students primarily in STEM-related degree programs. Nearly two-thirds of the undergraduate students are enrolled in programs in the College of Engineering. In terms of undergraduate enrollments ECE is the second largest department in the College of Engineering and CS is the largest department in the College of Sciences and Arts. ECE enrolls undergraduates majoring in electrical engineering (EEE) and computer engineering (ECP) and CS has undergraduates in computer science (SCS) and software engineering (SSE). As can be seen in Table 1, the percentage of students who are female and enrolled in these programs is quite low. Across campus the percentage of undergraduates who are female is 26%. After considerable effort to increase the number of women entering the department, CS did experience an increase in the number of incoming women in Fall 2015 with the largest number of incoming women in over two decades. However, even with this increase the overall percentage is still quite low at 17.5% as can be seen in Table II. Meanwhile only 10.7% of the first-year students who enrolled in ECE were women.

First-year students at Michigan Tech are admitted directly into their intended major. Again from Table II we can see that both departments attract strong students with minor differences between the departments. ECE students appear to have slightly higher high school GPAs and CS students slightly higher ACT scores. Students are primarily from the nearby four-state region including Michigan, Wisconsin, Illinois and Minnesota, however, both departments also attract students from across the country and internationally. The majority of the students are from Michigan with most Michigan students being from downstate as can be seen in the map in Figure 1. (This shows the student home towns for the ECP students. Maps for the other majors look similar.) The distances are substantial, e.g., Detroit is 550 miles, nearly a 9 hour drive, away, Chicago is 400 miles and about a 7 hour drive and Minneapolis is 370 miles and 6 hours away. In spite of the distances, many students have visited campus prior to choosing to attend. (See Table III). Most expect to receive financial aid as evidenced by filing a FAFSA form (See Table IV).

TABLE II. FIRST YEAR STUDENT ACTIVITIES

	CS	ECE
Total First Year Students	120	131
Males	99	117
Females	21	14
Overall Avg. GPA	3.56	3.64
Males	3.54	3.62
Females	3.65	3.8
ACT English	26.7	25.9
ACT Math	26.9	27.4
ACT Reading	27.8	27.2
ACT Science	27.9	27.5
ACT Composite	27.5	27.2

Students in all four majors take coursework offered by CS. The EEEs take CS1111 (Introduction to Programming in C/C++) while the other three majors take Java-based introductory programming courses. Students taking the Java-based courses typically start in one of three possible courses. The standard introductory course sequence is CS 1121 (Introduction to Programming I) and CS 1122 (Introduction to Programming II). These are fairly typical CS1 and CS2 3-credit courses and are meant for students with little or no programming background. Students with programming background can test into CS 1131 (Accelerated Introduction to Programming) which is a 5-credit course and combines material from CS 1121 and CS 1122. Students with Advanced Placement credit in CS receive credit for CS 1121 and typically begin in CS 1122. SCS, SSE, and ECP students typically enroll in a CS course their first semester. Only a few EEEs enroll in a CS course their first semester. Much of our focus is on the CS courses since it is what we can most easily influence in order to improve retention of these first-year students.

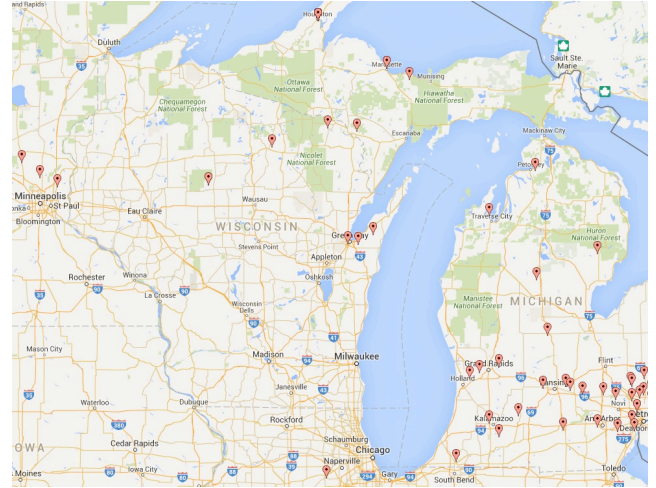


Figure 1: Hometowns for first-year ECP majors

TABLE III. PERCENT OF FIRST-YEAR STUDENTS WHO VISITED CAMPUS PRIOR TO ENROLLING.

SCS	SSE	ECP	EEE
66.7%	77.8%	81.4%	65.8%

TABLE IV. PERCENT OF FIRST-YEAR STUDENTS WHO FILED A FAFSA

SCS	SSE	ECP	EEE
93.9%	85.2%	97.1%	86.8%

III. RELATED RESEARCH

There appears to be little in the literature that directly relates to recruiting students into computing majors. Obviously the many different types of outreach programs that expose high school students to programming and related engineering topics are related since previous programming experience appears to be a substantial factor in students considering one of the computing-related degree programs [such as 4, 5, 6, 7].

High school students' perceptions of computing is clearly a factor. A study by Carter showed that high school students had a misperception or no idea of what a career in computing would entail and hence chose not to major in computer science [8]. Considering that our data indicates that most of the students entering our SCS, SSE, or ECP degree programs have programming experience, it is likely the case that Carter's finding still applies to the many students who do not experience programming today. Indeed even some of the students who entered these majors at our University showed indications of not accurately understanding the career they were preparing for, particularly SCS and ECP students. Interestingly this contrasts somewhat with a study by Uzoka et al. on student perceptions of the differences among computing fields [9]. In that study, students were asked to indicate how well certain tasks fit in with different computing disciplines. Students in their study did best identifying the tasks that are most closely associated with computer engineering, i.e., tasks that involve hardware or integrate hardware and software. Students were least able to identify the tasks typically associated with software engineering.

Also of interest is how students' previous programming background impacts their performance in computing degree programs, as well as how the programming background of some students may impact the performance of novice programmers taking the same course. In a study of first-year engineering students, Salzman and Ohland [10] found no statistically significant differences in the students' performance in their first year engineering courses as measured by final grade between students who had precollege engineering experience and those who hadn't. They did notice, however, that those students who had multiple precollege experiences tended to have higher grades in their Engineering 2 course (although not statistically significant). Although still focused on design, Engineering 2 is organized around learning MATLAB. Hence, they speculate that the students with multiple engineering experiences may have encountered programming in one of these activities and consequently performed better in the programming-centric Engineering 2 course.

A group of studies examines a student's sense of self or identity and how that relates to persistence in a computing major. A study by Veilleux et al. [11] indicated that a student's sense of belonging is closely related to a student's perception of his or her ability to do computer science and that a student may discount his or her actual performance when determining self-efficacy. Kinnunen and Simon [13] also studied students' sense of self-efficacy and their success in programming. They found that computer science majors tended to develop their sense of self-efficacy based on a comparison of themselves with their classmates. These findings are consistent with some focused more broadly on STEM education [14, 15]. These studies raise concerns regarding the students in our introductory course since novice programmers in that course may be determining their sense of self-efficacy by comparing themselves with the many students in that course with programming experience.

Lewis et al. [12] identified five factors that impacted students' decisions to major in CS. These were: ability in CS,

enjoyment of CS, their fit in CS ("the extent to which their own values and identity align with the values and cultural expectations they associate with CS"), utility of CS, and the opportunity cost. Students measured their CS-related ability based on their previous experiences, their speed in completing CS-related tasks, and grades.

IV. FIRST SEMESTER SURVEY

A. Survey Overview

The purpose of the first semester survey was to get a better understanding of what attracts our students to their major and how that fits into Lewis's et al [12] factors that shape the decision to major. Additional questions asked about the decision to attend the University. Two versions of the survey were produced – one for students in CS and a separate one for students in ECE. (The CS version of the survey is shown in Appendix A.) The two versions of the surveys were similar with some tailoring to the separate majors. For instance, the CS survey asked about interest in pursuing a SSE or SCS degree while the ECE survey asked about EEE or ECP degrees. A question on the CS survey asked students if their interest in pursuing their major was due to wanting to make video games. Video games was replaced with robots on the ECE survey. The surveys were administered to all new incoming first year majors in CS and ECE during the 6th week of the Fall semester via an emailed Google form. Students were offered a chance to win an Amazon gift certificate for completing the survey. The survey was initially due one week after it was emailed. A reminder and 2-day deadline extension was emailed to all students who had not yet replied on the original deadline date. The overall response rate was 53%. A breakdown of the response rates by major and gender can be seen in Table V. In this table and throughout this paper we show aggregated data by department when looking at information by gender when necessary to ensure privacy as the numbers are quite small in some cases.

TABLE V. RESPONSE RATES

Major	Total Students Enrolled	Number of Responses	Response Rate	Males	Females
CS	120	75	63%	58	17
SCS	96	63	66%		
SSE	24	12	50%		
ECE	137	60	44%	54	6
ECP	69	35	51%		
EEE	66	25	38%		
All	257	135	53%	112	23

B. Survey responses related to the University

The first portion of the survey focused on what attracted the students to the University. Table VI shows the results for the top University resources used by the students. Some observations include:

TABLE VI.

STUDENT RESPONSES INDICATING WHAT UNIVERSITY RESOURCES THEY USED TO GET INFORMATION

Factor	By Gender				By Major			
	CS		ECE		CS		ECE	
	Male	Female	Male	Female	SCS	SSE	ECP	EEE
Campus visit	81%	81%	91%	100%	79%	92%	91%	91%
Talked with current student	76%	94%	87%	100%	69%	83%	86%	92%
Talked with alum	59%	87%	72%	100%	65%	75%	69%	84%
Knew someone who went to Tech	79%	100%	83%	100%	85%	82%	80%	92%
University website	93%	100%	94%	100%	94%	100%	97%	92%
Department website	83%	100%	81%	100%	84%	100%	83%	84%

- Most students use multiple resources to obtain information before enrolling.
- A higher percentage of respondents to our survey indicated that a campus visit influenced their decision compared to data from the University Admissions Office. There are a number of possible explanations for this difference. Students who visited campus may generally be more proactive and hence likely to respond to our survey. It is also likely that some students visited campus without taking an official Admissions tour and therefore the visit would not be recorded in the Admissions database.
- Most students are getting information from a person, such as an alum or current student, in addition to written material.
- The female students tended to be very complete in getting their information from a multitude of sources.

Table VII summarizes the reasons why students chose Michigan Tech. The University's reputation and the job opportunities available to graduates top the reasons students indicated. Somewhat surprising more than one-quarter of the students indicated that the ability to get a BS and MS degree in 5 years influenced their decision.

TABLE VII.

STUDENT RESPONSES INDICATING WHY THEY CHOSE MICHIGAN TECH

Factor	By Gender				By Major			
	CS		ECE		CS		ECE	
	Male	Female	Male	Female	SCS	SSE	ECP	EEE
I knew someone who goes here or went here.	71%	53%	74%	67%	67%	67%	69%	76%
Michigan Tech has a good reputation	88%	94%	94%	100%	87%	100%	94%	96%
Students who graduate from Michigan Tech have excellent job opportunities	81%	88%	92%	83%	83%	83%	91%	88%
Students have the opportunity to participate in hands-on activities such as the Enterprise program	62%	65%	54%	83%	60%	75%	60%	52%
I am interested in doing the five-year BSMS degree program	33%	24%	28%	33%	30%	25%	29%	28%
It's in-state, but far from home	41%	71%	52%	67%	52%	25%	54%	52%
It's close to home	19%	0%	20%	0%	18%	8%	14%	24%

TABLE VIII.

STUDENT RESPONSES INDICATING FACTORS THAT AFFECTED THEIR CHOICE OF MAJOR

Factor	By Gender				By Major			
	CS		ECE		CS		ECE	
	Male	Female	Male	Female	SCS	SSE	ECP	EEE
I had previously programmed and enjoy programming.	72%	82%	50%	17%	70%	100%	63%	24%
Although I haven't programmed, I'm fascinated by computers.	22%	18%	26%	33%	24%	8% ^a	31%	20%
I know someone in a computing/engineering career and it sounds like I'd also like it.	33%	29%	52%	33%	30%	42%	57%	40%
I thought computing/engineering would be a fascinating career.	67%	41%	72%	67%	62%	58%	74%	68%
I can use computing/engineering to make a positive change in the world.	45%	65%	70%	83%	49%	50%	69%	76%
The job opportunities are excellent with a computing/engineering degree.	71%	82%	80%	100%	71%	83%	74%	92%
Salaries are good with a computing/engineering degree.	71%	71%	83%	67%	68%	83%	83%	80%
I want to make video games/ build robots.	47%	35%	33%	17%	43%	50%	37%	24%

^a Note: One student responded to both "I had previously programmed..." and "Although I haven't programmed ..."

C. Survey Responses Related to the Major

Table VIII shows a summary of student responses when asked to indicate factors that impacted their choice of major. Note students were allowed to select as many factors as they wanted. Many of these factors align with those identified by Lewis [12] as being important in deciding a major.

Some observations related to ability in the major include:

- A very high percentage of students going into SCS and SSE have previously programmed. This is in stark contrast to those in EEE with only one-quarter of the students having previously programmed.
- Only 17% of females in ECE had previous programming experience. This may explain why ECE has a higher percentage of females in EEE compared to ECP.

An observation related to enjoyment in the major include:

- The EEEs show less interest in computing. Less than one-half indicated that either they enjoyed programming or were fascinated by computers. For the other three majors 94%-100% included these factors in their responses.

An observation related to fit in the major include:

- ECPs were most likely to have known someone in the field.

Observations related to utility of the major include:

- ECPs and EEEs were more influenced by being able to make a positive change in the world, but approximately 50% of SCS and SSE majors are also motivated by being able to make a positive impact.
- Both ECE females and CS females were more likely to indicate that they were influenced by being able to make a positive change in the world.
- More than half of the SCS majors (55%) who indicated a desire to make video games also indicated an interest in making a positive change in the world.
- 79% of the ECE majors indicating an interest in making robots also indicated an interest in making a positive change in the world.
- Only two students (one each in ECE and CS) indicated “Salaries are good ...” as the only factor in their decision of their major. (Only one was still an active student the following semester.)

In addition to selecting factors that influenced their decision, students were also given two open-ended questions, one asking about other events or activities that contributed to their interest in computing and the other asking them to tell us about anything else that would help us understand why they chose their major.

Observations based on analyzing the comments regarding events or activities that contributed to their interest in

computing mostly fit within the constructs of ability, enjoyment, and fit.

- The most frequently mentioned activity across the majors related to having been involved in robotics. For SSE, ECP, and EEE majors robotics was mentioned as frequently as a programming class as having been influential. Perhaps somewhat surprising, SCS majors mentioned robotics more than twice as often as a programming class.
- The second most frequently mentioned activity was a programming class. Again, a programming class was mentioned by all 4 majors, but with the highest percent response by SSEs followed by ECPs.
- Programming clubs were mentioned by SCS and ECP majors.
- Wanting to make or having tried to make video games was also mentioned by students in all degree programs except EEEs.
- A few SCS and ECP students mentioned having worked with the technology department in high school or having built a computer. This was not mentioned by any of the SSE majors.

The major specific question revealed a few differences among the students in the different majors.

- The SCS and SSE majors continued to mention enjoying activities similar to those in the previous question, such as enjoying programming or video games and liking computers.
- One ECP mentioned wanting to be a solar power engineer and a couple ECPs talked about liking circuits.
- The responses to this question from the EEEs were quite different from the other majors. In particular, students mentioned being interested in electricity, light and energy. One student mentioned that it was “very mathematical compared to other engineering majors”.
- At least for one student, “engineering” has some special meaning having stated “I wanted to get a degree in engineering, but was also interested in computer science, so I thought that computer engineering was a good middle ground.”

V. DISCUSSION

A. What Does This Tell Us about Recruiting Students

The survey data strongly indicates that programming experience is the significant factor in students choosing to major in a computer-related field with 75% of the students enrolling in the CS Department and nearly 65% of the ECP students indicating they had previously programmed. This is problematic since most high schools do not offer a programming course. Although it is difficult to track schools offering programming courses, we can get a sense of the situation by looking at Advance Placement (AP) computer

TABLE IX RECENT INCREASE IN AP CS EXAMS IN MICHIGAN

	2014	2015	% Increase
Males	498	794	59%
Females	95	142	50%
Total	593	936	58%

science offerings. In 2014-15, 103 schools in Michigan offered AP CS [3]. This is 16% of the MI schools with AP programs. In Michigan fewer AP exams are taken in CS than any other STEM subject. On the positive side there has been a dramatic increase in the number of students taking AP CS exams in Michigan. See Table IX. The over 50% increase in the last year in Michigan is double the national rate of increase which was 25% from 2014 to 2015.

Fortunately the data indicate that programming experience does not have to be gained from formal coursework. The strong push for outside of classroom experiences by numerous organizations to provide computing experiences is having an impact. Students mentioned programming clubs, Google Summer of Code and robotics organizations as having given them the experience and interest to pursue a computing degree.

The data also indicate that our students do not necessarily match the typical stereotype associated with computing students and gender. Less than one-half of the males in CS indicated that they were interested in making video games while nearly one-third of the females expressed that interest. In addition, half of the students who indicated an interest in making video games also indicated a desire to have a positive impact on the world.

Comments in the survey also revealed that some of the students may be confused about the differences among the majors. This seemed less of an issue for the SSEs and the EEEs. All of the SSEs had previous programming experience and their comments tied that experience to their major. The EEEs discussed interests in electricity and power and how that impacted their major choice. On the other hand some of the SCS and ECP students indicated their interest in computing was sparked by having built computers or having worked in IT support in their high school with no indication that their current major choice would not necessarily direct them to related careers.

The EEEs did not display any indications that they see their major as a computing-relating major. The degrees are sometimes described as being on a continuum from electrical engineering through computer engineering to computer science. This continuum did not appear to be a part of the thinking of the EEEs. Talking about EE as a computing major could confuse or even potentially turn-off a perspective EEE major.

Finally, many students, and most particularly the female students, rely on information from current students and alumni when making their college decision. Thus, the experiences of current students may have implications for future recruiting.

TABLE X STUDENT ENROLLMENT IN INTRODUCTORY CS COURSES

Number/ Percent	CS1121	CS1131	CS1122
SCS	69	17	7
	74%	18%	8%
SSE	13	6	5
	54%	25%	21%
ECP	58	7	3
	85%	25%	4%
EEE	8	2	0
	80%	20%	0%

B. Programming Experience

Considering that 70% of the first-year SCS students and 85% of the first-year ECP students in Fall 2015 enrolled in our introductory programming course that is designed for students with little or no programming experience, we were surprised to see the high percentage of students who had indicated that they had previously programmed. (See Table X.) For many years CS has offered two starting points for students interested in pursuing further coursework in CS. CS 1121 is designed to be taken by students with little or no programming experience and CS1131 is designed for students with programming experience, but not sufficient background to place into the second semester course which is CS1122. The intent is to provide an introductory course in which novice programmers need not compete with experienced programmers.

The survey data indicate that we need to question how students are being placed into and/or choosing these courses. Students are typically given an opportunity to take a placement exam to determine their preparedness for CS1131 either during the summer or during orientation week prior to the beginning of fall classes. During Fall 2015 all incoming SCS and ECP students were expected to attend a session during orientation which discussed the different courses and then provided the students with the opportunity to take the exam. And yet, many with programming experience enrolled in CS1121. One possible explanation is that although the students had programmed, their programming experience was fairly limited. A follow-up survey administered in spring 2016 indicated that about half of the students in CS1121 who indicated they had previous programming experience had a year or more of formal programming coursework in high school.

VI. CONCLUSIONS

A survey was conducted of our first-year students in the departments of computer science and electrical and computer engineering. The goal was to better understand what attracted the students to our university and to their intended major. In addition, we hoped to gain insight into the similarities and differences across the different majors. What we learned is that the students in SCS, SSE, and ECP appear to have similar backgrounds and experiences. The SSE students all had previous programming experience and thus tended to have a sense of the role software development would play in their careers. The SCS students and the ECP students had similar responses except a few comments by ECP students that

referred to circuits. Fewer ECP students than SCS students had programming experience, but those that hadn't programmed expressed a fascination with computers. It is quite possible that these students do not understand the differences among the different computing programs. The most notable difference was between the EEE students and the other three majors. There was little in the EEE responses to indicate that they were interested in computing. Indeed their answers were more indicative of traditional EE areas, such as electricity, energy and light.

The differences between male and female students were notable in a few cases, but not stark contrasts. For instance, females tended to be more complete in utilizing the various resources when making their college decision, but some males also accessed the resources used by the females. We've noted reports for many years have discussed the importance of emphasizing social applications to attract and retain young women in computing [16, 17]. Our surveys indicated that a higher percentage of women did consider having a positive impact to be important, however, again many males also indicate that factor is important. Similarly although more males indicated an interest in developing games, a substantial percentage of women also indicated an interest in developing games. Thus when planning recruiting activities it is important to not bend to the stereotypes: it's not just boys that want to make games and it's not just girls that want to have a positive impact on the world.

Finally, both males and females included information from other people, particularly current students and alumni, in their decision-making. This was particularly true for females. If it is the case that students are more frequently in contact with others of their same gender, we may be in a vicious cycle. Low current and past enrollments of women in the computing programs means less female alums and current female students to interact with and encourage the next generation of possible students.

ACKNOWLEDGMENT

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APPENDIX

CS Department First Year Survey

Dear student:

We would like to invite you to complete a short questionnaire about your choice of majors and universities. Participation in this survey is voluntary. You can choose not to participate at all or to ignore individual questions. Your answers will not affect your academic standing in any way.

This survey is part of a national project to improve retention in majors related to computing. The results of this study will be used to improve academic programs at Michigan Tech. Your responses to the survey will be combined

with information from your academic records, and all of your information will be kept strictly confidential. Any published results will be presented only in aggregate form.

Under no circumstances will your individual responses be made available in identifiable form. The questionnaire should take about 10 minutes to complete and your participation does not involve any risks beyond what you would encounter in daily life.

In appreciation of your time, your name will be entered into a drawing for one of five \$20 gift cards from Amazon if you submit a completed survey.

Your username (abcde@mtu.edu) will be recorded when you submit this form. Not abcde? Sign out

1. How often, if at all, did you participate in any of the following events or activities about or hosted by Michigan Technological University?

Mark only one oval per row.

Summer Youth Program
 Women in Engineering
 Engineering Scholars Program
 Women in Computer Science
 Campus visit/tour
 Meeting with Faculty and/or Academic Advisor
 Open House or Preview Day
 Informational webcast about
 Michigan Tech
 Michigan Tech Mind Trekkers program
 Talked with a current student
 Talked with a Michigan Tech alumni
 Know someone who went to Tech
 Visited the University website (mtu.edu)
 Visited the CS Department from the website (mtu.edu/cs)
 Participated in Copper Country Programmers

2. Which of the following events or activities had a significant impact on your decision to enroll at Michigan Tech?

Check all that apply.

Summer Youth Program
 Women in Engineering
 Engineering Scholars Program
 Women in Computer Science
 Campus visit/tour
 Meeting with Faculty and/or Academic Advisor
 Open House or Preview Day
 Regional Event hosted by Michigan Tech
 Informational webcast about Michigan Tech
 Michigan Tech Mind Trekkers program
 Talked with a current student
 Talked with a Michigan Tech alumni
 Know someone who went to Tech
 Researched the University website (mtu.edu)
 Researched the Department from the website (mtu.edu/cs)
 Participated in Copper Country Programmers

3. How disinterested or interested are you in majoring or minoring in Computer Science or Software Engineering?

Mark only one oval.

Extremely disinterested
 Disinterested
 Interested
 Extremely interested

4. What computer science courses are you taking this semester?

Check all that apply.

CS1000
 CS1121
 CS1122
 CS1131
 No CS courses
 Other:

5. Which of the following were factors in your decision to major in a computing degree?

Check all that apply.

I had previously programmed and enjoy programming.
 Although I haven't programmed, I'm fascinated by computers
 I know someone in a computing career and it sounds like I'd also like it.
 I thought computing would be a fascinating career.
 I can use computing to make a positive change in the world.
 The job opportunities are excellent with a computing degree.
 Salaries are good with a computing degree.
 I want to make video games.

6. Please name any other events or activities that contributed to your interest in computing, indicate your level of participation, and if it had a significant impact on your selected major.

7. Please tell us anything else that would help us understand why you chose your current major.

8. Which of the following were factors in your decision to come to Michigan Tech?

Check all that apply.

I knew someone who goes here or went here.
 Michigan Tech has a good reputation.
 Students who graduate from Michigan Tech have excellent job opportunities.
 Students have the opportunity to participate in hands-on activities such as the Enterprise program.
 I am interested in doing the five year BS/MS degree program.
 It's in-state, but far from home.
 It's close to home

9. Please tell us anything else that would help us understand why you chose to come to Michigan Tech

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