

Teachers' Perceptions on the Availability and Quality of Computer Science and Technology

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Senior Research Project
Educational Studies
December 2012**

Introduction

- Constant technological advancement
- Students need to experience Computer Science and technology to be “functioning members of society”
- “Lack of the presence of Computing in K-12 schools” –National Science Foundation¹

Research Question

- Part 1:

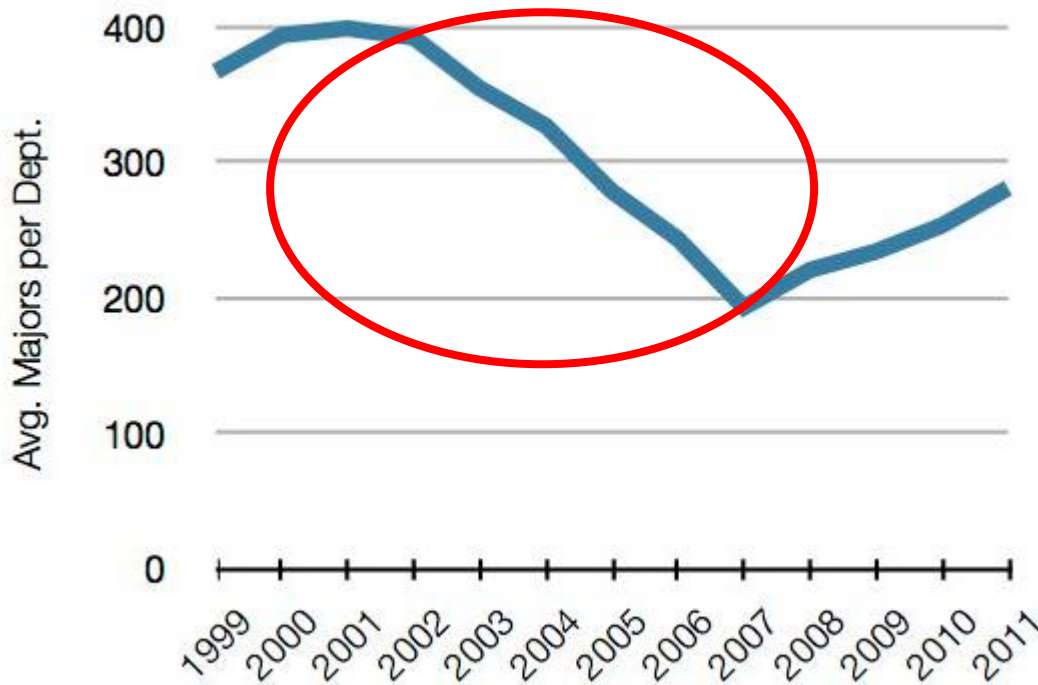
How do teachers perceive the availability of Computer Science and technology in schools?

- Part 2:

Based on teachers' perceptions, what factors affect the amount of Computer Science and technology that is offered in schools?

Significance

Figure 1. Average CS majors per U.S. CS Department



Source: CRA Taulbee Survey; Computing Degree and Enrollment Trends 2010-11

Since 2004 the number of Trinity's CS majors has declined².

CS majors went from:

21 in 2004



15 in 2005



6 in 2013

Computing Education
for the 21st Century



Thesis

Part 1: How do teachers perceive the availability of Computer Science and technology in schools?

- Teachers perceive some schools to have less Computer Science and technology than other schools
- Disconnect between teachers' perceptions when comparing their current school to other schools

Thesis

Part 2: Based on teachers' perceptions, what factors affect the amount of Computer Science and technology that is offered in schools?

- Funding
- Student home access and readiness
- Lack of technical support
- Teachers' inexperience with Computer Science and technology
- Lack of administrative approval

Relevant Literature

- Perceptions of Technology in Schools
 - Niederhauser and Perkmen (2008) studied preservice teachers and argued that “teachers’ intrapersonal beliefs [are] central to our understanding of their predisposition to integrate technology into their classroom.”
 - Li (2007) studied perceptions of students and their teachers and argued that many teachers refused to use technology.
- Technological Divide
 - Clarke and Zagarell (2012) argued that “a variety of factors may be at play... Administrators have some influence, but in the long run, it comes down to the availability of funds.”
 - They also argue that discussing technology integration is a way to bridge the technological divide.

Methodology

- Online survey distributed via e-mail
 - Anonymous and voluntary
 - 58 completed surveys
- Follow-up interviews
 - 2 recorded interviews
 - Pseudonyms used
- SPSS and PSPP for analysis
- Looked for common themes

Table 1: Description of Survey Participants

N = 58

Demographics	<i>N</i>	Percent
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Gender

Female	33	65%
Male	18	35%

Total Years Teaching

< 1	1	2%
1-4	5	10%
5-9	13	26%
10+	31	62%

Years Teaching at Current School

< 1	10	20%
1-4	13	25%
5-9	18	35%
10+	10	20%

Note: Gender missing 7, total years teaching missing 8,
years teaching at current school missing 7

Table 2: Description of Survey Participants' Schools

N = 58

School Characteristics	<i>N</i>	Percent
<i>Location</i>		
Hartford	42	84%
Windsor	2	4%
Enfield	1	2%
Milford	1	2%
Newtown	1	2%
Tolland	1	2%
West Hartford	1	2%
<i>Type of School</i>		
Magnet	34	65%
Public	16	31%
Private	2	4%
Charter	0	0%
Technical/Vocational	0	0%
<i>Total Student Enrollment</i>		
< 500	25	49%
500-1000	23	45%
1000-2000	2	4%
> 2000	1	2%

Note: Location missing 8, type of school missing 6
total student enrollment missing 7

Disconnect in Perceptions

Table 3: Availability of Computer Science and Technology in Schools

N = 58

	<i>N</i>	Percent
<i>Number of Computer Labs</i>		
0	4	8%
1-4	37	74%
5-9	6	12%
10+	3	6%
<i>Number of Computer Science Courses</i>		
0	19	38%
1-4	17	34%
5-9	7	14%
10+	1	2%
I don't know	6	12%
<i>Number of Technology Courses</i>		
0	10	20%
1-4	17	34%
5-9	11	22%
10+	7	14%
I don't know	5	10%
<i>Classroom Computers for Students</i>		
Yes	48	96%
No	2	4%
<i>Classroom Computers for Teachers</i>		
Yes	46	96%
No	2	4%

Note: Number of computer labs missing 8, number of Computer Science courses missing 8, number of technology courses missing 8, classroom computers for teachers missing 10

Table 4: How do you feel about the amount of Computer Science and technology in your school compared to other schools

N = 58

	<i>N</i>	Percent
My school has less Computer Science and technology than other schools.	12	21%
My school has the same amount of Computer Science and technology as other schools.	16	28%
My school has more Computer Science and technology than other schools.	24	41%

Note: Missing 6

Barrier 1: Teacher Inexperience

- Teachers incorrectly define the meaning of Computer Science

“The study of computer technology?”

“another support to use in the classroom”

“Use of technology to enhance work.”

“learning with the use of computers“

Barrier 1: Teacher Inexperience

- Minimal exposure to Computer Science leads to technology being used as an aid but not for teaching Computer Science

Table 5: Computer Science Experience of Survey Participants

N = 58

Experience	<i>N</i>	Percent
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Number of Computer Science Courses Taken

0	9	18%
1-4	31	61%
5-9	7	14%
10+	4	8%

Experience with Programming Languages

No	28	56%
Yes	22	44%

Note: Number of CS courses taken missing 7, experience with programming languages missing 8

Barrier 2: Administrative Support

- Lack of Professional Developments on Computer Science and Technology
- Administrators control what is offered in the Professional Developments
- Teachers reported Professional Developments on how to use the Smart Board
- “We’ll have PD every once and a while. It’s never very useful.” – Mr. Wright, Physics

Barrier 2: Administrative Support

- Restrictions on technology use
- They block EVERYTHING here ... Yeah, there's crap out there, but it's an INVALUABLE resource to say "What does an air bag crash look like?" ... Who's gonna sue a school district for showing a video? ... So if there's a problem with the district, that's it. The filters, the block." –Mr. Wright, Physics
- "I don't wanna say they limit you, but there's definitely intentional things put on the school property, you know, that you could use or not use... And, I had a really hard time, even trying to pull up the videos, just because of the internet blocking certain things." –Mrs. Smith, Kindergarten

Recommendations

- More administrative and technical support is needed for our teachers
 - More Professional Developments on the difference between technology and Computer Science, including on the basic principles of Computer Science
- My CS Senior Project - Computer-Technology Helper is a digital repository in which educators can upload, view, edit Computer Science and technology teaching materials
 - Bypass internet restrictions that are on other sites
 - Gaining support for other educators
 - Collaboration between educators locally and nationally

Sources

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Special Thanks To:

- Professor Dyrness
- Professor Leventhal-Weiner
- Rachael Barlow
- YukShan Li
- ED 400 classmates
- Richelle Benjamin

Questions?

Definitions

- Computer Science:

a field that focuses on problem-solving skills that are developed through the use of computers and computer programming. This includes learning about abstraction, computation, and algorithms.

- Technology:

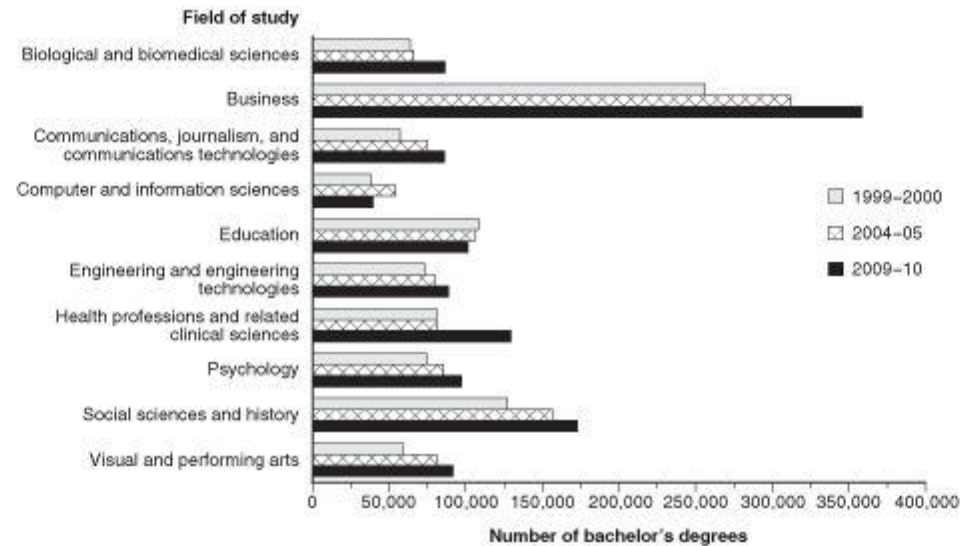
any device or tool that improves everyday life, such as computers (both hardware and software, such as Microsoft Office), cell phones, projectors, Smart Boards, etc.

Future Research

- Survey and interview administrators
- Interview more teachers
- Surveys and interviews with entire schools
- More comparison with surrounding areas

Major Statistics

Figure 16. Bachelor's degrees conferred by degree-granting institutions in selected fields of study: 1999–2000, 2004–05, and 2009–10



SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Fall 2000, Fall 2005, and Fall 2010, Completions component.