2011

"Dot Diva" Pilot Test Results

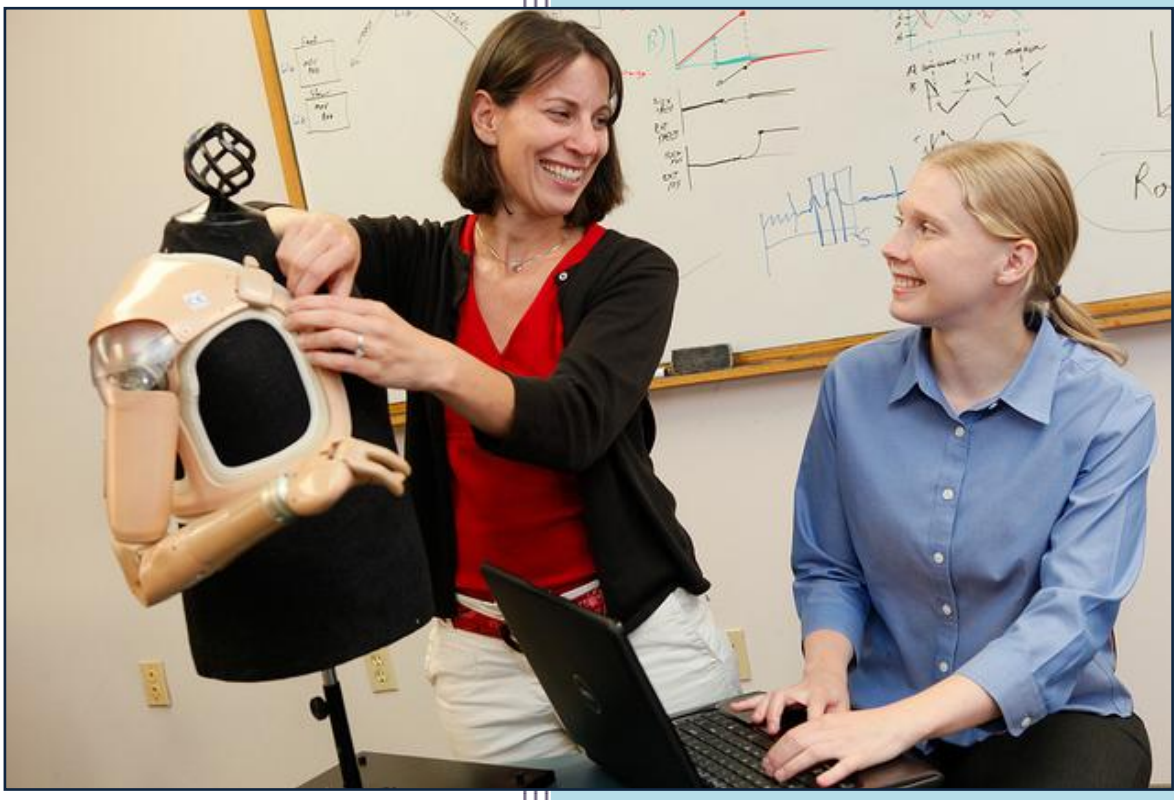

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Table of Contents

Background

In 2008, the WGBH Educational Foundation, along with the Association of Computing Machinery, was awarded a grant from the National Science Foundation, Directorate for Computer and Information Science and Engineering, under the Broadening Participation in Computing Program (NSF 0753686). The purpose of the grant was to develop "a major new initiative to reshape the image of computing among college-bound high school students."

The grant proposal posited that "image is seen as an important factor in the lack of interest in computing majors among high school and college students, who often see computer scientists as geeks and nerds with boring jobs and equally boring lives… The 'New Image for Computing' project (NIC) will research and design a 'communications make-over' -- a new set of messages that will accurately and positively portray the field and will be widely tested for their emotional appeal to and intellectual connection with the targeted audiences."

WGBH conducted market research during the first phase of the grant to:

- understand the attitudes held by high school students toward the study of computing in college and potential computing careers; and
- create a set of market-tested messages that resonate with young people, accurately and positively represent the field, and reshape the way computer science is portrayed to and perceived by young people.

Despite the fact that the initiative originally set out to create messages that targeted college-bound African American boys and Hispanic girls, the market research showed no significant relationships between race/ethnicity and young people's attitudes toward computer science.[1] The research did show, however, a significant relationship between gender and attitudes. Therefore, WGBH decided to sharpen its attention on college-bound girls as the target audience.

The research also revealed that among college-bound students, "the strongest positive driver towards computer science… was 'having the power to create and discover new things.'" This finding, along with subsequent focus group findings that echoed this result, led WGBH to dub the initiative with the moniker "*Dot Diva*." WGBH defines a "*Dot Diva*" as a young woman with the "power and passion to make a difference – believing in the power of computing to build a better world." [2]

A "Dot Diva" is a young woman with the "power and passion to make a difference – believing in the power of computing to build a better world."

Based on its market research results, WGBH developed a website and other resources that were intended for use by teachers, parents and students. Concord Evaluation Group (CEG) was

[1] WGBH Educational Foundation and the Association for Computing Machinery (ACM) (2009) *New Image for Computing: Report on Market Research.* In support of NSF 0753686. WGBH: Boston, MA.
[2] See the *Dot Diva* website at http://www.dotdiva.org

hired by WGBH to conduct a pilot test of the resources and materials. The pilot test was performed in an urban high school setting in Massachusetts during the fall semester of the 2010-11 academic year.

Methodology and Procedures

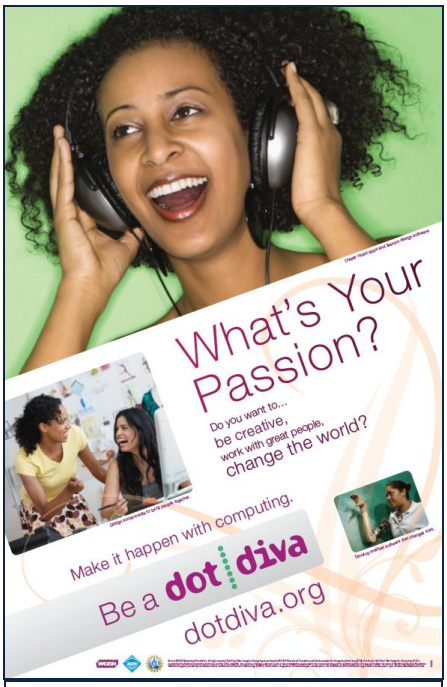
Pilot Test Materials

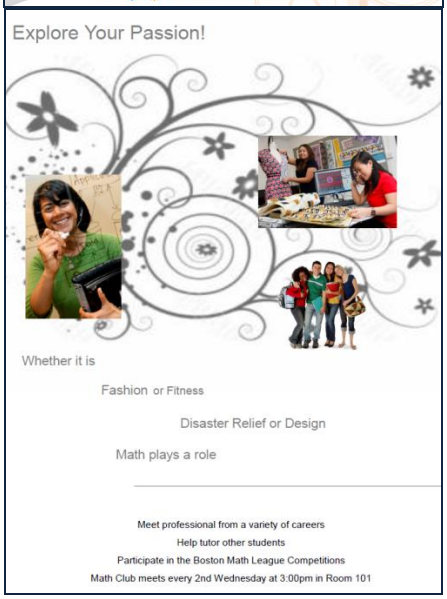
WGBH provided the following resources for pilot testing:

A website (http://www.dotdiva.org) intended for student use at school or at home. The website also contains downloadable information for educators and parents.

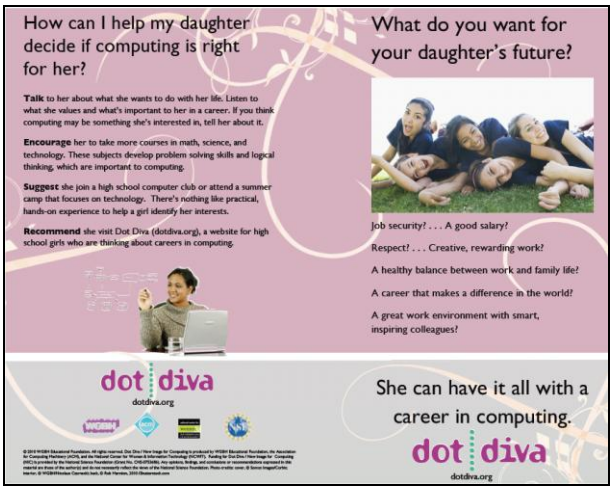
A webisode (http://www.dotdiva.org/webisode.html) intended for students to view at school or at home.

Posters for use in school settings.





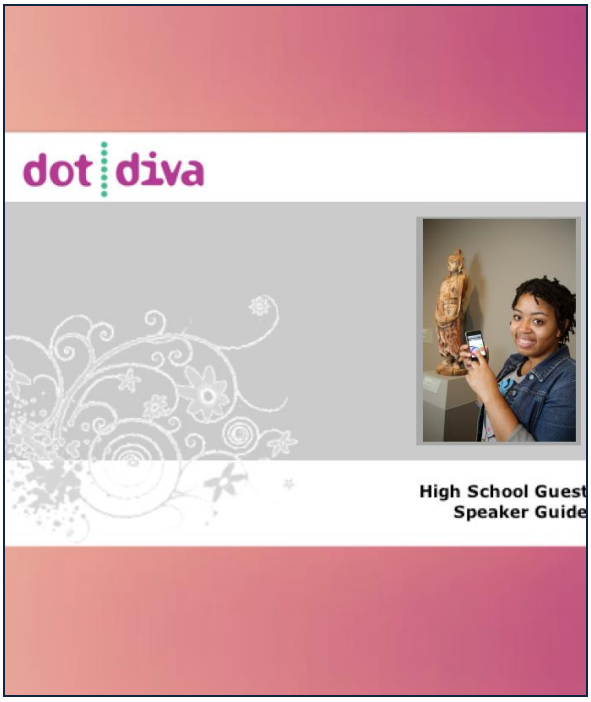
A brochure intended for distribution to parents.



A brochure intended for distribution to students.

A speaker guide intended to help school teachers and counselors coordinate guest speakers containing:

- Information on the *Dot Diva* Philosophy
- Tips and resources for finding and inviting a guest speaker
- A discussion about preparing students for guest speakers
- Ways to extend the experience beyond the event
- An Educator Planning Form
- A Sample Invite Letter
- A Sample Logistics Letter
- A Sample Thank You Letter



In addition, WGBH arranged for two computer scientists to visit the school and speak to the young women about their experiences.

Jenny Zhang
Originally from Los Angeles, California, Jenny's computing aspirations began in high school, where she was heavily involved in her school's FIRST robotics, VEX robotics, and Remotely Operated Vehicle (ROV) teams. Her and her team's robotic endeavors lead them to compete in several national and international competitions, where her team placed third out of approximately 30 other college and universities (including MIT). As an intern at the Center for Embedded Networked Sensing at the University of California, Los Angeles for two consecutive summers, Jenny worked on the development and validation of mobile sensing applications for environmental and health monitoring. Jenny was a current freshman at Harvard College, studying the engineering sciences with a minor in computer science.

Claudia Gold
Claudia was the Chief Operating Officer for Difra, Inc. She held a B.S in Political Science from the Massachusetts Institute of Technology. At age 26, Claudia developed computer programs that made it possible to build houses of any shape faster, easier, and cheaper. The program figured out the dimensions of the wooden pieces needed to build the structure and delivered the

instructions to a laser cutter. "When you get the wooden pieces back, you just snap them together like a giant 3-D puzzle—no nails or screws required!"

Using the speaker guide developed by WGBH, the pilot school also arranged for a third speaker:

Emily Reid
Emily was an Information Security Engineer at MITRE Corporation. There, she worked as a software developer / programmer to help her project team identify and combat cybercrime and terrorism.

Procedures

We recruited a sample of teachers and students from the high school to participate in the pilot test. The pilot test sample did not include the entire student body. Rather, because the *Dot Diva* resources were intended to target college-bound high school girls, the pilot test included teachers and female students from advanced math classes only. Students from all four grades (9^{th} – 12^{th}) were eligible. Four math and science teachers were chosen to participate (and expressed interest) in the pilot test. At the start of the study, teachers completed an online, pre-test survey (Appendix A) to measure their:

- Ability to help girls prepare for computing careers (self-efficacy).
- Attitudes towards computing careers.
- Perception of how interested their female students were in computing careers.

To familiarize the participating advanced math teachers with the *Dot Diva* resources, WGBH conducted a teacher training. The training introduced the teachers to the *Dot Diva* resources, including a description of how they could be used in the classroom. The training also explained the teachers' participation in the pilot test and their responsibilities for distributing materials such as brochures, as well as study invitations to parents.

Following the teacher training, CEG provided teachers with survey invitations and postcards to distribute to the college-bound females in their courses. The letters and postcards invited parents and their daughters to participate in the pilot test and provided instructions on how to indicate their interest in the study.

Parents who were interested in the pilot test participated in a screening process (screening was offered in English and Spanish) and gave permission for their daughters to participate. Students were qualified to participate in the study as long as they were female, planned to attend college, and had at least a B average in school.

Upon enrollment in the study, one parent from each family and their college-bound daughters separately completed online pre-test surveys (Appendix B and C). The surveys were designed to measure:

- Attitudes towards computing careers: Students and parents.

- Ability to help girls prepare for computing careers (self-efficacy): Parents only.
- Perceptions of how interested daughters were in computing careers: Parents only.
- Ability to succeed in computing career (self-efficacy): Students only.
- Interest in a computing career: Students only.

After the pre-tests were completed, WGBH provided the four teachers with resources to use during the pilot test. Teachers were encouraged to distribute brochures to all of their college-bound, female students. Teachers also placed posters in their classrooms and in the school hallways. In addition, three guest speakers (with professional backgrounds in computer science) were invited to the school to talk with college-bound students about their careers.[3] We also asked teachers to allow students to visit the website during their class time or to remind students that they should try to visit the website at home (the website address was also included in the brochures and on the posters). At the end of the semester, CEG administered Web-based post-test surveys to the teachers, parents, and students who completed pre-test surveys. This report describes the results of the pilot test and offers recommendations for additional field testing and future implementation of the initiative.

In addition, we reviewed comments posted on the *Dot Diva* website and the *Dot Diva* Facebook page to gather additional data on what users liked and didn't like about the *Dot Diva* Web-based resources.

[3] Male students were not prevented from attending these guest speaker events.

Sample Characteristics

School

The pilot test was performed in an urban high school that served a diverse student body in grades 9 through 12. Based on data from the Massachusetts Department of Education, the school's 2009-2010 student body reported the following racial/ethnic identification: 67% white, 18% Hispanic, 9% African-American, 6% Asian, and 1% other races/ethnicities.[4] Other characteristics of the school are listed below:

- The school enrolled approximately 2,200 students.
- 100% of the classrooms had Internet access.
- There were 2.8 students per "modern" computer.
- 32% of the students listed English as their second language; 6% were classified as Limited English Proficient.
- 27% of the students were classified as "low-income" and were qualified for free or reduced price lunch.
- 17% of the students were classified as "special education" students.
- 59% of the students planned to attend a 4-year private or public college upon graduation.
- 19% of the students planned to attend a 2-year private or public college upon graduation.
- The graduation rate among all students was 93% in 2009, and was 95% among female students in the same year.

Students

Twenty-five students and their parents participated in the pilot test.[5] The students' demographic characteristics are summarized in the table below. The ages of students in the sample ranged from 14 to 16 years old. Most of the students (80%) were high-achieving students (maintaining an "A" average). The ethnic composition of the sample mirrored the school's ethnic composition for two categories: White and African-American. But, our sample included a higher proportion of Hispanic students (24% versus 18%), Asian students (28% versus 6%) and other ethnicities (4% versus 1%) than the total school population.

[4] From the Massachusetts Department of Education School Profile Database: http://profiles.doe.mass.edu
[5] The sample was smaller than we had hoped for despite intense efforts to reach out to parents via postcards, emails, and teacher communication, in addition to the chance to win a $50 raffle.

Table 1:

Student Sample Characteristics (N = 25)

Characteristic	Frequency	Percent
Age		
14	14	56%
15	8	32%
16	3	12%
GPA		
Mostly A's	20	80%
Mostly B's	5	20%
Likelihood of Attending College		
Definitely will attend	24	96%
Probably will attend	1	4%
Race/ethnicity		
White or Caucasian	16	64%
Black or African-American	2	8%
Hispanic, Latino, or Spanish	6	24%
Asian	7	28%
Native Hawaiian or Other Pacific Islander	1	4%

Note: Some students identified more than one race or ethnicity.

We asked students to report their experience with technology. The findings are summarized in the table below. All of the students in our sample reported having access to a computer at home and reported that they used a computer on a daily basis. Most students (88%) reported that they considered themselves to have intermediate-level expertise with computers—defined as being comfortable using computers without help. Two students (8%) reported that they had advanced computer skills (i.e., they understood programming languages or had developed a website, for example). Only one student (4%) reported that she considered herself to be only a "beginner" when it came to computer expertise.

Table 2:

Student Experience with Technology (N = 25)

Characteristic	Frequency	Percent
Frequency of Computer Use		
Every day	25	100%
Have a Computer at Home?		
Yes	25	100%
Computer Expertise		
Advanced (I understand programming languages, have developed my own web page or site, etc.)	2	8%
Intermediate (I'm comfortable using computers without help.)	22	88%
Beginner (I can use the computer for basic things.)	1	4%
Have a Smartphone?		
No	17	68%
Yes	8	32%
Smartphone Expertise		
Advanced (I have created or modified a smartphone app, etc.)	1	4%
Intermediate (I'm comfortable using smart phones without help.)	15	60%
Beginner (I can use a smartphone for basic things.)	5	20%
Novice (I need help most of the time.)	2	8%
No experience	2	8%

We also asked students about their smartphone experience and expertise. While most students reported they did not actually have a smartphone (68%), 64% of students considered themselves to be intermediate or advanced users. Seven students (28%) reported they were novice or beginner users, and two students (8%) reported they had no experience with smartphones at all.

Parents

Twenty-five parents participated in the pilot test. The tables below summarize their demographic and background characteristics. Most parents in the sample completed at least some college (92%). Almost one-third (32%) of parents completed a Bachelor's degree, 36% completed a Master's degree, and 8% completed a Ph.D. or similar degree. Only two parents in our sample (8%) did not complete high school.

Table 3:

Parent Education Level (N = 25)

Careers/Jobs	Frequency	Percent
Did not complete high school	2	8%
Some college	2	8%
Associate's degree	2	8%
Bachelor's degree	8	32%
Master's degree or MBA	9	36%
Doctorate degree, JD, MD	2	8%

The parents in our sample held a wide range of jobs. The most common were in business, finance or accounting (12%), followed by computer science or computer-aided design jobs (8%) and office management (8%). Two parents (8%) reported that they were stay-at-home parents.

Table 4:

Parent Careers (N = 25)

Careers/Jobs	Frequency	Percent
Business, Finance, Accounting	3	12%
Computer Science, Computer-aided Design, Illustration, Animation	2	8%
Office Management	2	8%
Stay-at-Home Parent	2	8%
Busser (Busses tables)	1	4%

Careers/Jobs	Frequency	Percent
Child Care	1	4%
Construction	1	4%
Engineering	1	4%
Executive	1	4%
Law, Criminal Justice	1	4%
Medicine: Physician, Dentist, Nurse, Physical, Occupational or Speech Therapy	1	4%
Professor	1	4%
Sales	1	4%
Science	1	4%
Student	1	4%
Technical Writing	1	4%
Unemployed	4	4%

We asked parents to report their experience with technology. All of the parents in our sample reported that they had computers at home and that they used a computer every day. About half (48%) of the parents reported that they were intermediate computer users. Almost one-quarter (24%) reported that they were advanced computer users.

Most parents reported that they did not own a smartphone (68%). Nearly one-quarter (24%) of parents reported that they were intermediate users, one (4%) reported they were advanced users, 7 parents (28%) reported they were beginners or novice users, while 11 parents (44%) reported they had never used a smartphone.

Table 5:

Parent Experience with Technology (N = 25)

Characteristic	Frequency	Percent
Frequency of Computer Use		
Every day	25	100%
Have a Computer at Home?		
Yes	25	100%
Computer Expertise		
Advanced (I understand programming languages, have developed my own web page or site, etc.)	6	24%
Intermediate (I'm comfortable using computers without help.)	12	48%
Beginner (I can use the computer for basic things.)	5	20%
Novice (I need help most of the time.)	1	4%
No experience	1	4%
Have a Smartphone?		
No	17	68%
Yes	8	32%
Smartphone Expertise		
Advanced (I have created or modified a smartphone app, etc.)	1	4%
Intermediate (I'm comfortable using smart phones without help.)	6	24%
Beginner (I can use a smartphone for basic things.)	5	20%
Novice (I need help most of the time.)	2	8%
No experience	11	44%

We asked parents to tell us what careers they thought their college-bound daughters were most interested in (see table below). Parents were most likely to report that their daughters were interested in fine arts (ranked #1), medicine (ranked #2), law/criminal justice and science (tied for rank #3). Computer science was ranked #5, along with engineering.

Table 6:

Parent's Perceptions of Girls' Career Interests

Career Fields (Ranked by Popularity)	Rank	First Choice: Number of Parents	Second Choice: Number of Parents	Third Choice: Number of Parents
Arts: Art, Music, Acting, Writing, Fashion, Photography	1	4	6	4
Medicine: Physician, Dentist, Nurse, Physical, Occupational or Speech Therapy	2	5	7	1
Law, Criminal Justice	3	4	1	2
Science	3	5	1	1
Teaching, Special Education	4	3	0	2
Business, Finance, Accounting	4	1	2	2
Engineering	5	1	0	2
Computer Science, Computer-aided Design, Illustration, Animation	5	1	2	0
Architecture	6	0	0	2
Athletics	6	0	2	0
Culinary Arts	6	1	1	0
Marketing	7	0	1	0
Religion	7	0	0	1
Social Work, Psychology	7	0	1	0
Veterinary Medicine	7	0	0	1

Teachers

All four of the pilot test teachers were white and female. All four held master's degrees in secondary mathematics. Most were new teachers (3 teachers had been teaching for 3 years or less), while one teacher had been teaching for more than 20 years.

The teachers were responsible for teaching the following courses:

- Algebra
- Algebra II
- Computer Programming
- Geometry
- Honors Geometry
- Precalculus
- Problem Solving

All four teachers reported using a computer every day and having intermediate-level computer skills. Half the sample reported owning a smartphone, yet all the teachers reported having intermediate-level expertise using a smartphone.

Table 7:

Teacher Experience with Technology (N = 4)

Characteristic	Frequency	Percent
Frequency of Computer Use		
Every day	4	100%
Computer Expertise		
Intermediate (I'm comfortable using computers without help.)	4	100%
Own a Smartphone?		
Yes	2	50%
No	2	50%
Smartphone Expertise		
Intermediate (I'm comfortable using smart phones without help.)	4	100%

Results

Students

Interest in Computing Careers

One of the objectives of the pilot test was to explore the impact of the *Dot Diva* resources on students' interest in computing careers. To answer this question, we asked students, parents, and teachers at the start of the pilot test about interest (or perceived interest) in computing careers. At the start of the pilot test, students ranked careers in computer science and computer-aided design, animation or illustration at #5 out of 9 career fields. Students' top choices for careers included medicine (ranked #1), fine arts (#2), science (#3), and teaching (#4). Computing careers were tied with law/criminal justice and social work/psychology at #5.

Table 8:

Number of Students Interested in Various Careers, Pre-test

Career Fields (Ranked by Popularity)	Rank	First Choice	Second Choice	Third Choice
Medicine: Physician, Dentist, Nurse, Physical, Occupational or Speech Therapy	#1	7	7	2
Arts: Art, Music, Acting, Writing, Fashion, Photography	#2	3	6	6
Science	#3	7	1	3
Teaching, Special Education	#4	2	0	6
Computer Science, Computer-aided Design, Illustration, Animation	#5	1	4	0
Law, Criminal Justice	#5	0	3	2
Social Work, Psychology	#5	2	2	1
Business, Finance, Accounting	#6	2	1	1
Engineering	#8	0	1	1
Culinary Arts	#8	1	1	0
Athletics	#9	1	0	0
Religion	#9	0	0	1

In fact, as shown in the figure below, at the start of the pilot test only two students (8%) indicated that it was "likely" that they would pursue a computing career. A little more than one-third (36%) thought they "might."

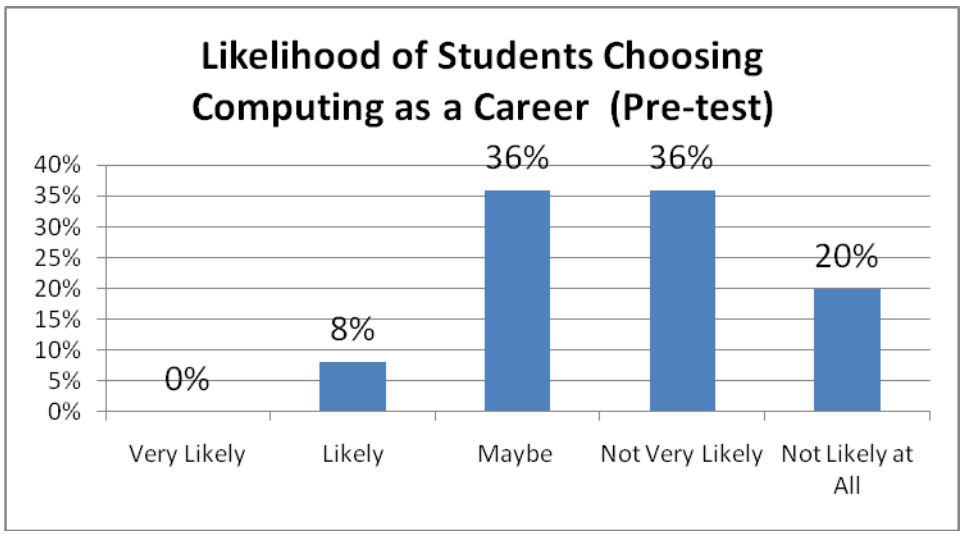


Figure 1. Student self-reported likelihood of a computing career (pre-test).

As a way of triangulating data to get a comprehensive picture of student interest and intentions, we asked parents to report on a scale of 1 ("Not Likely at All") to 5 ("Very Likely") whether their daughters would someday have a computing career. The figure below summarizes the findings. Only two parents (8%) reported that it was "likely" or "very likely." Most parents said "maybe" (44%) or "not very likely" (36%). Twelve percent said it was "not likely at all" that their daughters would have a career in computing.

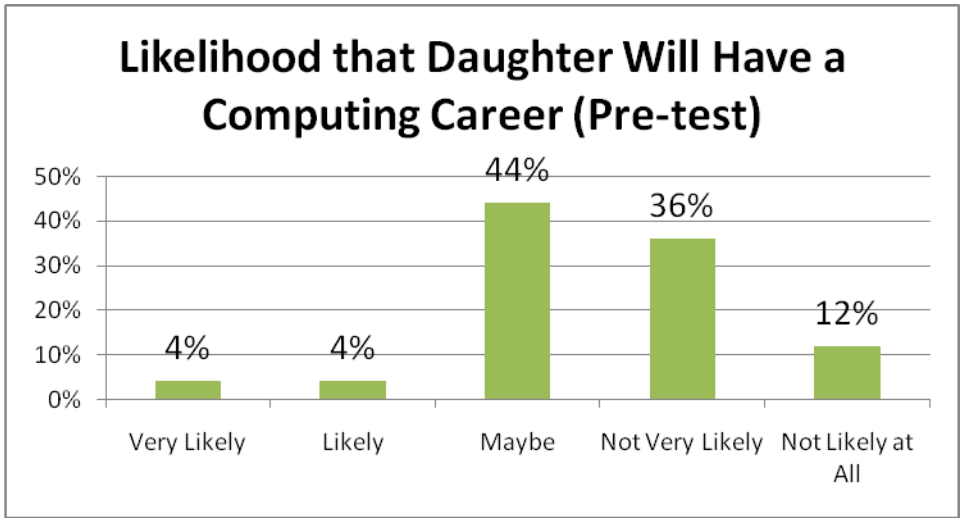


Figure 2. Likelihood that students would pursue a computing career, according to parents (pre-test).

We also asked teachers to report on their perceptions of student interest in computing careers. Three teachers reported that "some" of their students might be interested in computing careers, while one teacher reported that "only a few" students would be interested.

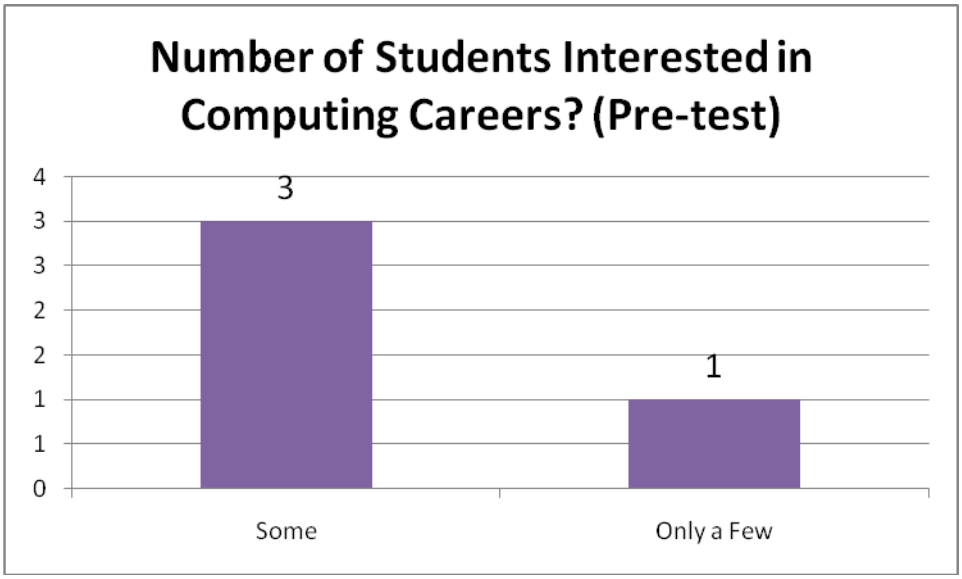


Figure 3. Student interest in computing careers, according to teachers (pre-test).

So, at the start of the pilot test, a pretty clear picture of college-bound, female student interest in computing careers emerged—the interest in pursuing such careers was moderate at best and not pervasive. That is, only some girls were interested in it. And, of the girls who were interested, it wasn't the highest ranked career choice on their list. In fact, most reported it was unlikely they would pursue computing as a career.

What happened after participating in the pilot test?

At post-test, we asked students again what careers they were most interested in and the likelihood of them pursuing a computing career. As shown in the table below, students ranked computing careers higher at post-test than they did at pre-test (rank #4 versus #5). So, it moved up in the rankings to tie with teaching. There was some other shifting in the rankings as well: fine arts and medicine switched places, but they still remained the top two choices. Law/criminal justice careers made a big jump from #5 to #3 and science dropped from #3 to #5.

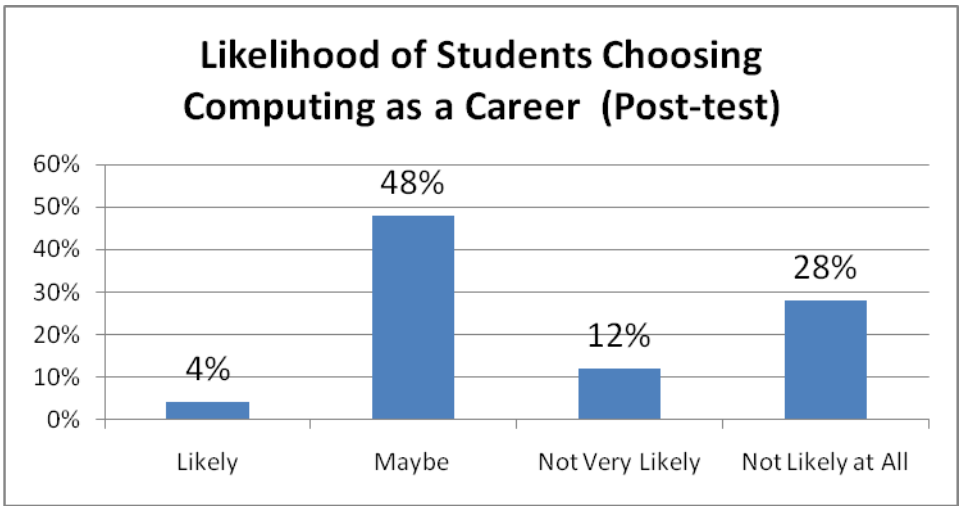
Table 9:

Number of Students Interested in Various Career Choices, Post-test

Career Fields (Ranked by Popularity)	Pre-test Rank	Post-test Rank	First Choice	Second Choice	Third Choice
Arts: Art, Music, Acting, Writing, Fashion, Photography	#2	#1	4	6	6
Medicine: Physician, Dentist, Nurse, Physical, Occupational or Speech Therapy	#1	#2	6	4	2
Law, Criminal Justice	#5	#3	0	3	4
Computer Science, Computer-aided Design, Illustration, Animation	#5	#4	1	2	2
Teaching, Special Education	#4	#4	1	2	2
Science	#3	#5	3	1	0
Business, Finance, Accounting	#6	#6	0	1	1
Culinary Arts	#8	#6	0	1	1
Engineering	#8	#7	0	1	0
Astronaut	n/a	#7	0	1	0
Athletics	#9	#7	1	0	0
Political Science	n/a	#7	1	0	0
Religion	#9	#7	0	0	1
Social Work, Psychology	#5	#7	1	0	0

Only one student (4%) reported it was "likely" that she would pursue a computing career, when we asked students to tell us about the likelihood that they would pursue a career in computing (at post-test). More students (nearly half) reported that they would "maybe" pursue a computing career at post-test than at pre-test (48% versus 36%). Likewise, fewer students reported that it was "unlikely" at post-test than at pre-test that they would pursue a computing career (40% versus 56%). **So, the data do seem to show a slight shift from unlikely to at least possible**

interest in computing careers. When we compare average scale scores from pre-test to post-test, we find that this shift is significant ($t_{(22)} = -1.311$, $p = .10$).[6]

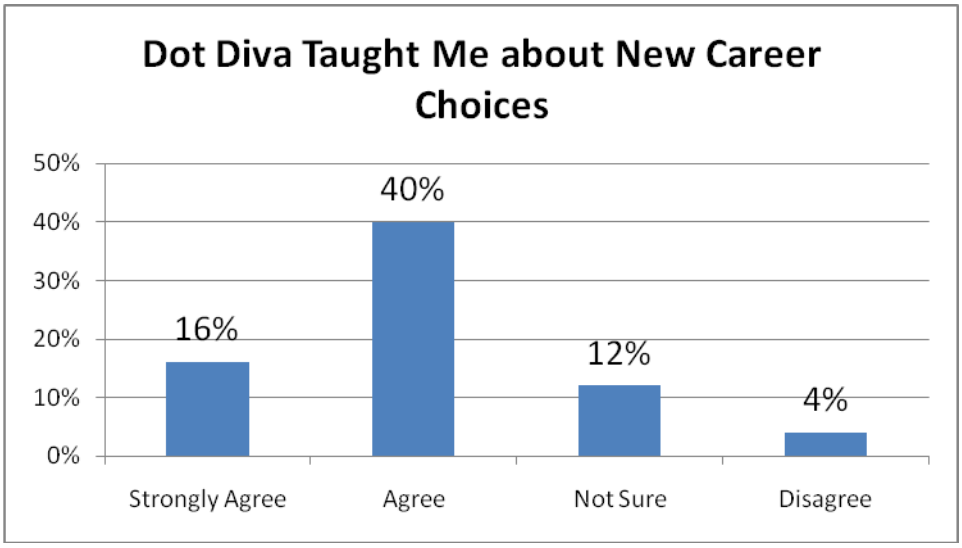


Note: Two students did not answer this question.

Figure 4. Student self-reported likelihood of a computing career (post-test).

To determine the extent to which positive shifts in interest in computing careers could be attributed to *Dot Diva*, we asked students what they learned from *Dot Diva*. As shown in the figure below, most students (56%) reported that the *Dot Diva* resources exposed them to information on *new* career choices. Twelve percent were unsure, and only one student (4%) disagreed that the *Dot Diva* resources exposed them to anything new.

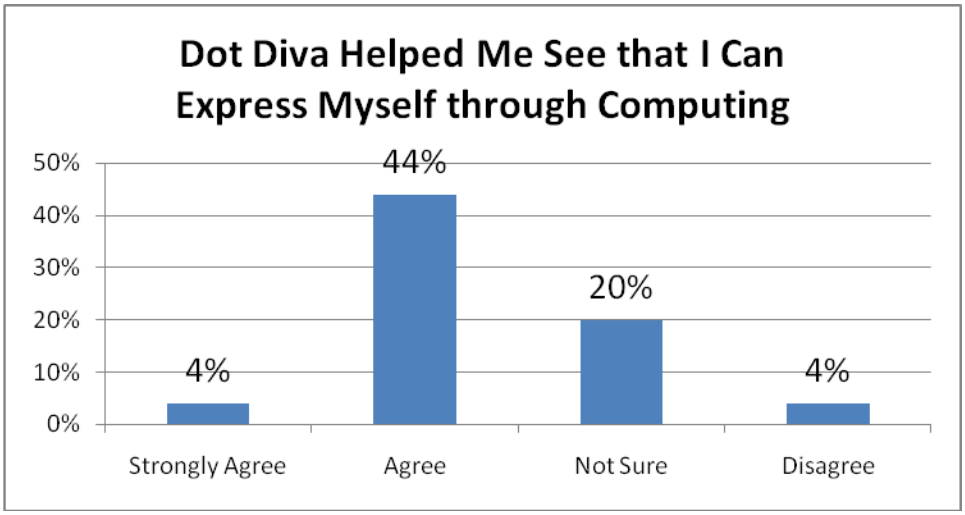
[6] A "t-test" enables us to test the directional hypothesis that one score (post-test) is higher than the other score (the post-test). The "p-value" tells us how likely we are to reject the null hypothesis when it is actually true. In this case, we have only a 10% chance being wrong about the difference between pre-test and post-test scores. The most commonly accepted p-value "upper limit" in social science is $p = .05$. Any values lower than .05 are typically considered statistically significant. Because this is a pilot test, we are using a critical value of $p = .10$ instead of .05 as the cutoff for significance, which is a common practice in exploratory social science or educational research.



Note: Seven students did not answer this question.

Figure 5. Whether *Dot Diva* taught students about new career choices.

Many students (48%) also reported that *Dot Diva* helped them to learn that they could express themselves though computing, which may be another possible reason that *Dot Diva* caused a shift in their interest level (see above).

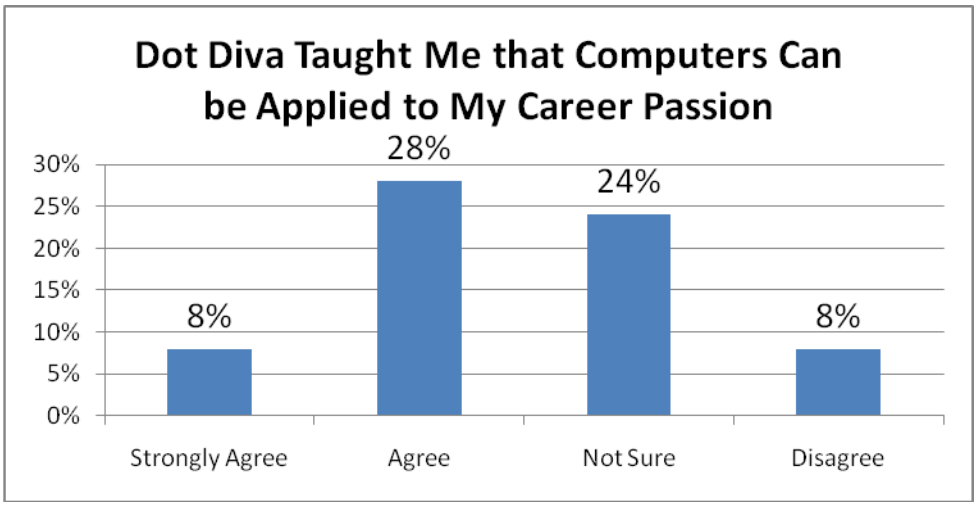


Note: Seven students did not answer this question.

Figure 6. Whether *Dot Diva* helped students see that they could express themselves through computing.

Many students (36%) also reported that they learned that computers could be applied to their career passions—regardless of what field they were interested in. But, an almost equal number

of students reported that they were not sure or disagreed that *Dot Diva* helped them learn this idea (32%).



Note: Eight students did not answer this question.

Figure 7. Whether *Dot Diva* helped students see that computers could be applied to their career passions.

Students who believed that *Dot Diva* helped them to consider computing careers told us:

- *I knew some of what was being said but learned anyone could do it.*
- *I learned that there are many types of careers that include computing, and they can be interesting and fun.*
- *It gave computer careers more of an appeal.*
- *It helped me see what computing can do in different areas of any career.*
- *It helped explain what careers involving computer technology are really about.*
- *It showed two different kinds of people (working in the same career).*
- *It showed me that there are so many computing careers out there, and that you can have a computing career no matter what area your passion is in.*
- *It was very informative.*

Students who believed that they did not learn anything from *Dot Diva* reported:

- *I did not feel a learned actual context about jobs.*
- *It did not contain the specific details I was looking for.*
- *It wasn't even educational so how would I learn anything?*
- *(The content under) the 'what IS Dot Diva' tab is very vague.*

Computer-related Self-efficacy

At the start and end of the pilot test, we asked students to report on whether they thought they could be successful in a computing career. At pre-test, most students reported that they could probably (48%) or definitely (20%) succeed at a computing career, for a total of 68% of the sample. At post-test, the same proportion of students reported that they probably or definitely could succeed at a computing career. Thus, we observed no changes in computer-related self-efficacy as a result of participating in *Dot Diva*. This is likely due to a "ceiling effect" – students' self-efficacy was already high to begin with, so there was little room for improvement.

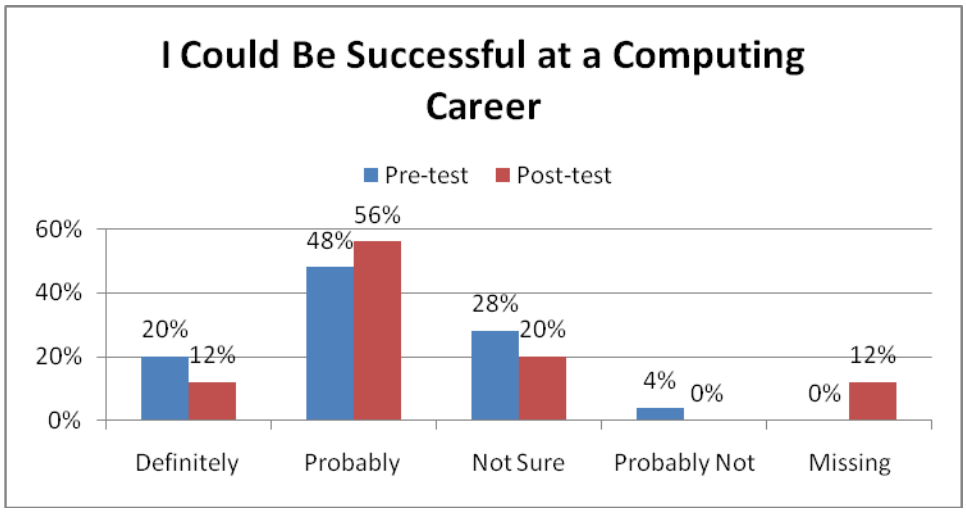
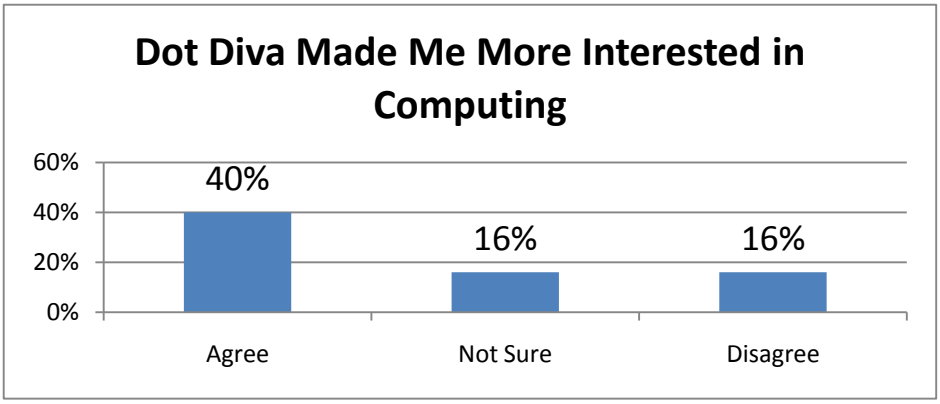


Figure 8. Student computer-related self-efficacy.

Interest in Other Computer-related Activities

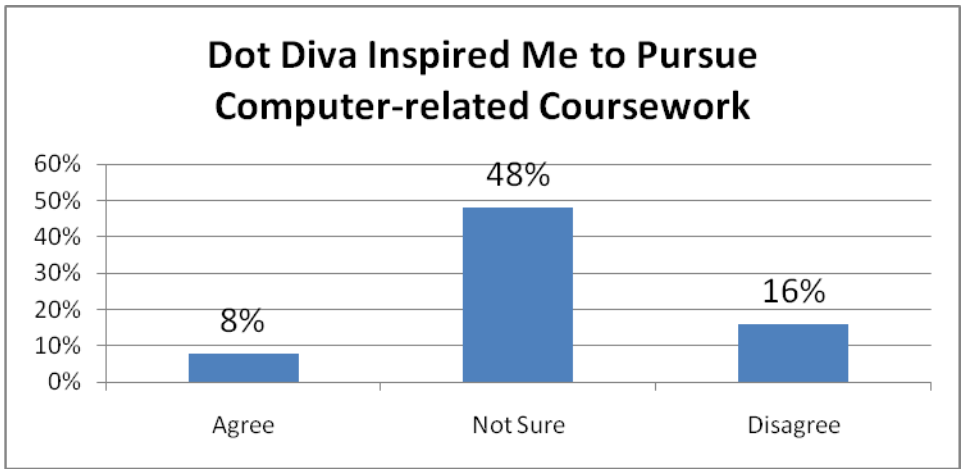
In addition to exploring the impact of *Dot Diva* on students' interest in computing careers, we also explored the effect of *Dot Diva* on students' interest in other, related activities such as computer-related coursework, math clubs and computer clubs, interest in computing generally, as well as their interest in seeking out and meeting other *Dot Diva*s. As shown in the figure below, almost half of students (40%) reported that *Dot Diva* helped them to become more interested in computing.



Note: Seven students did not answer this question.

Figure 9. The extent to which *Dot Diva* made students more interested in computing.

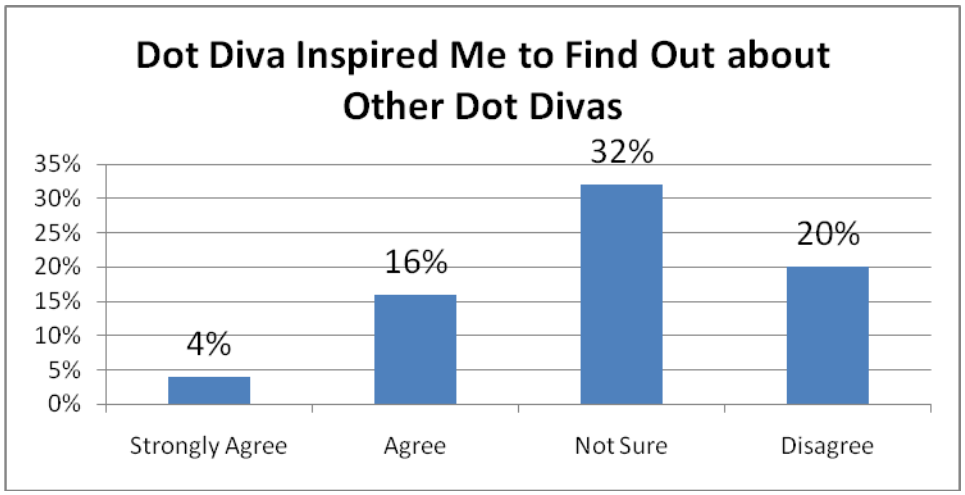
Students were mostly unsure about whether *Dot Diva* inspired them to pursue computer-related coursework (48%).



Note: Seven students did not answer this question.

Figure 10. The extent to which *Dot Diva* inspired students to pursue computer-related coursework.

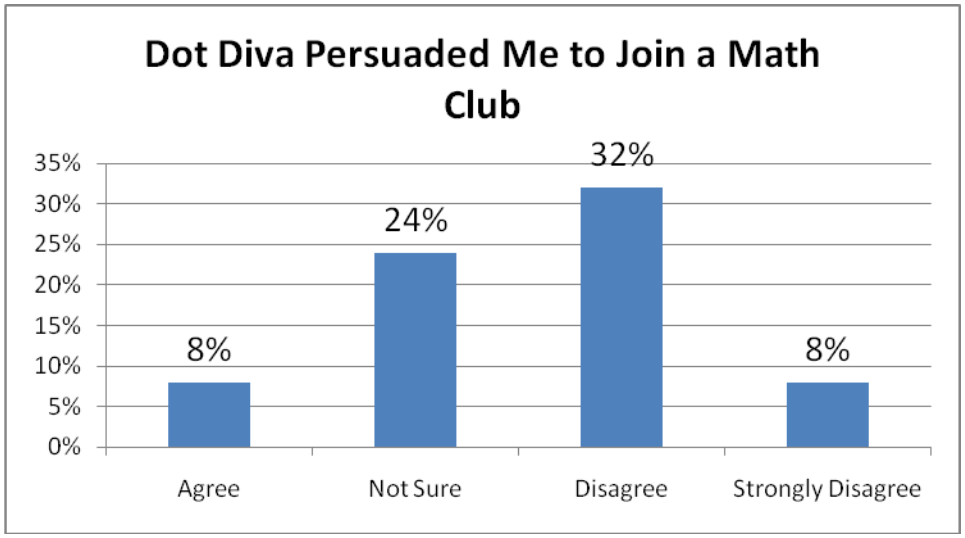
Twenty percent of students agreed or strongly agreed that *Dot Diva* inspired them to find out about other *Dot Diva*s. Almost one-third (32%) were unsure.



Note: Seven students did not answer this question.

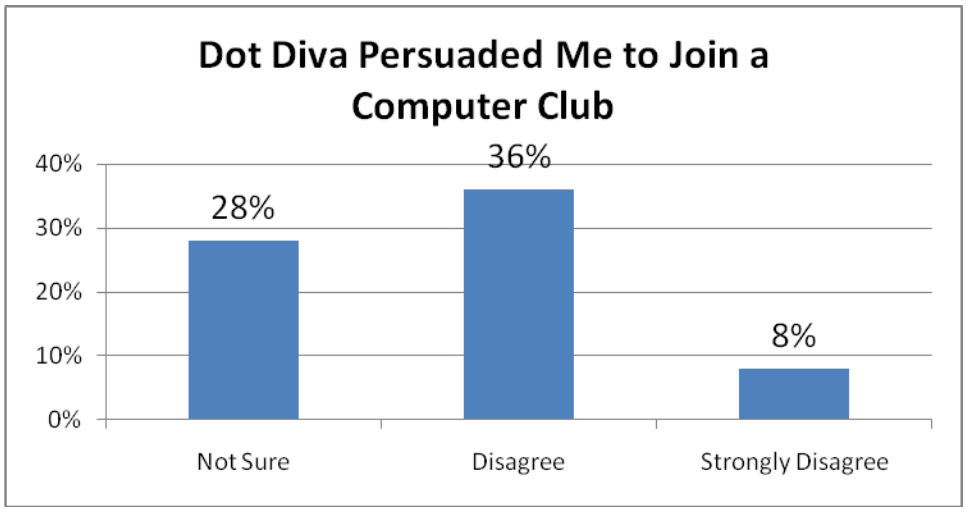
Figure 11. The extent to which *Dot Diva* inspired students to seek out other *Dot Divas*.

With respect to joining math or computer clubs, most students were unsure or disagreed that *Dot Diva* had persuaded them to join such clubs.



Note: Seven students did not answer this question.

Figure 12. The extent to which *Dot Diva* persuaded students to join a math club.



Note: Seven students did not answer this question.

Figure 13. The extent to which *Dot Diva* persuaded students to join a computer club.

Attitudes towards Computing

We measured student attitudes towards computing careers with a 12-item scale before and after exposure to *Dot Diva*.[7] The 12 items asked students to rate their level of agreement on a scale of 1 ("Strongly Disagree") to 5 ("Strongly Agree") with the following statements about computing professionals:

"Computing professionals…"

- Spend a lot of time trying to solve problems.
- Work on things that can help the world, like medical and scientific discoveries.
- Can choose to work in many different kinds of fields (like art, science, government, games, etc.).
- Work alone most of the time.
- Are creative.
- Are well-paid.
- Are mostly men.
- Are "nerds" or "geeks."
- Have bad social skills with other people.
- Have jobs that keep them working too many hours to raise a family.
- Use too much math.
- Work on things that can make the world a better place to live.

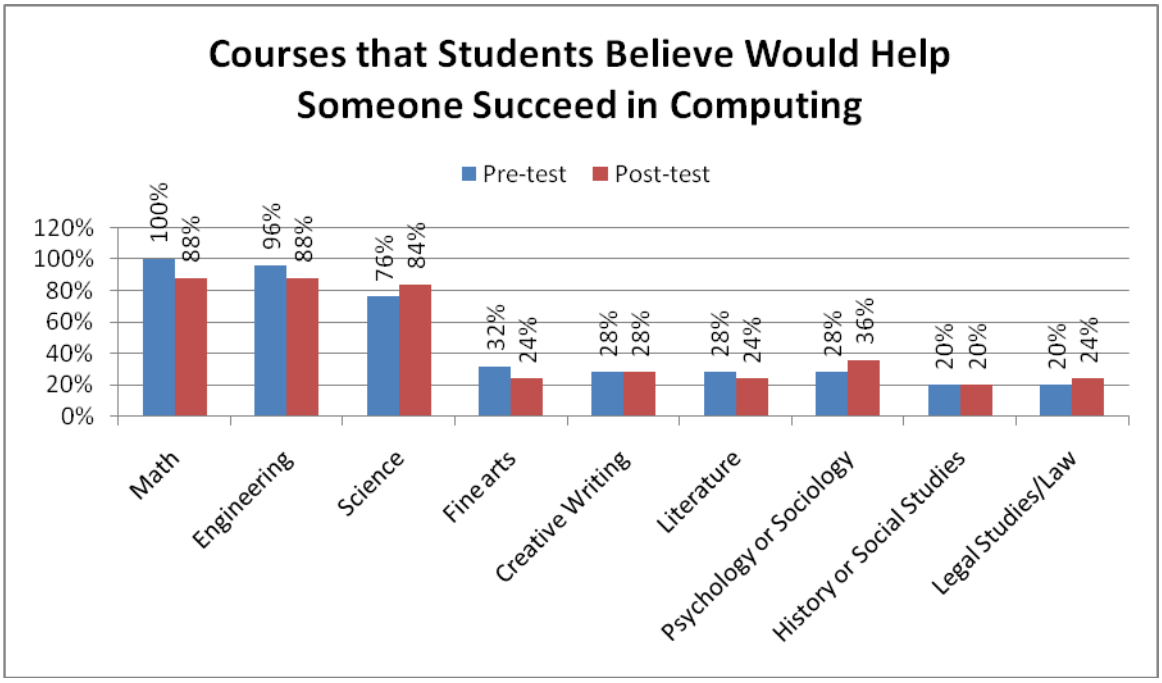
[7] The 12 items together yielded an internal reliability coefficient (alpha) of .839. Alpha speaks to the reliability of the instrument or scale. The higher the coefficient, the more reliable the scale (the highest coefficient is 1.000).

Given that each statement was rated on a scale of 1 to 5, the total number of points possible for the 12-item scale was 60 points (12 x 5). The lowest number of points possible was 12 (12 x 1). The students were asked to provide these ratings at pre-test and post-test so we could look for differences in attitudes over time.

The average attitude score on the pre-test was 43.68 (standard deviation = 5.36). The average attitude score on the post-test was 44.64 (standard deviation = 6.54). This was only a slight, but not statistically significant, increase. Thus, we did not observe any substantial changes in students' attitudes towards computing (again, probably because they were already positive to begin with).

Understanding of Interdependency of Computing and Other Fields

We listed several different types of courses and asked students to choose the ones that would help someone to succeed in the field of computing. As shown in the figure below, the majority of students understood that math, engineering and science would be helpful to a computing professional. But, far fewer students understood that fine arts, create writing, literature, or other social science subjects could benefit computing professionals. We observed no changes in the students' perceptions from pre-test to post-test.



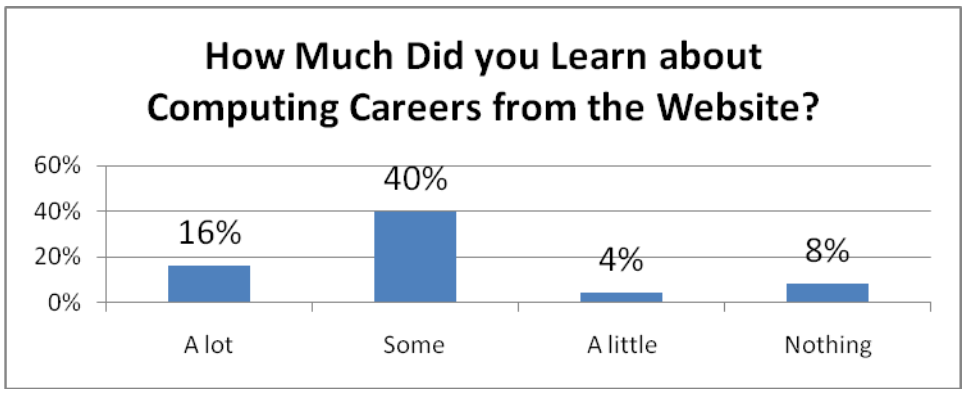
Note: Four students did not respond to these questions at post-test.

Figure 14. Student understanding of the courses that could benefit computing professionals.

Success of the Dot Diva Resources

Feedback on the *Dot Diva* Website, Including the Webisode

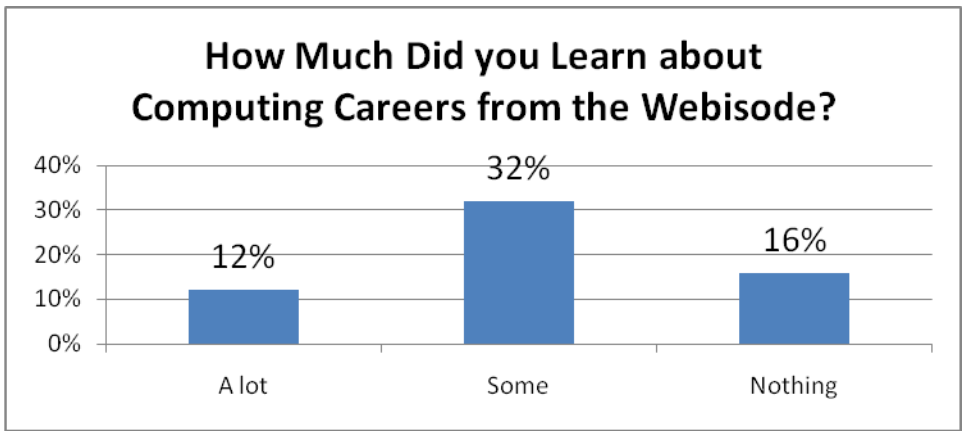
We asked students to tell us how useful the various *Dot Diva* resources were. As shown in the figure below, more than half of the students (56%) reported that they learned something about computing careers from the *Dot Diva* website. Twelve percent learned little or nothing from the site.



Note: Eight students did not answer this question.

Figure 15. How much the website helped students learn about computing careers.

Almost half (44%) of students reported that the webisode helped them learn about computing careers. Sixteen percent reported that they learned nothing from the webisode.



Note: Ten students did not answer this question.

Figure 16. How much the webisode helped students learn about computing careers.

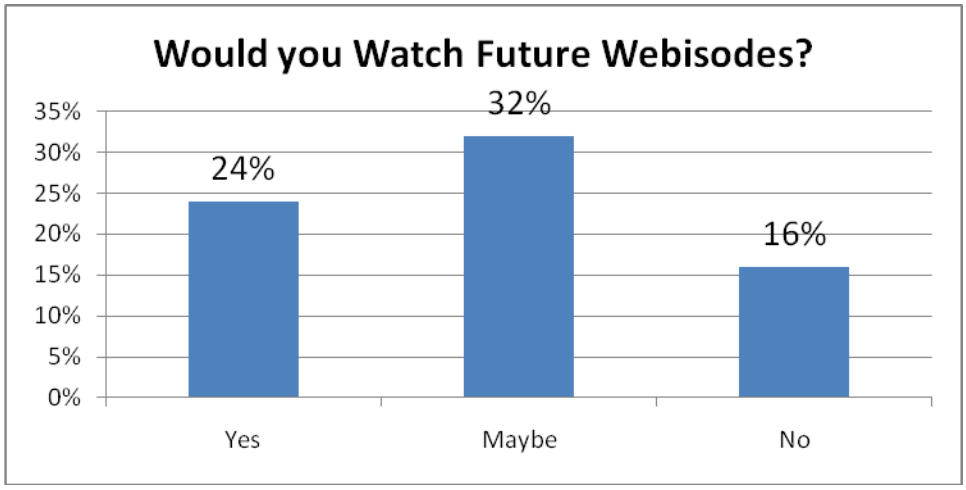
Students who reported that they learned something about computing careers from the website and/or the webisode told us:

- *I didn't know much about computer careers but now I do.*
- *It did give computer careers more appeal by making it seem much more creative and less stereotypical.*
- *It helped me learn a few new things about computing careers.*
- *It was easy to follow.*
- *Many people don't think that girls would want computing jobs, but they do.*
- *The 'what's your passion' section is very informative.*

Students who reported they didn't learn anything from the website or the webisode reported:

- *(The webisode) was just some comedy that had a hint of computers, but if it wasn't on the website, no one would even think about the computers! (It was still funny though)*
- *(The webisode) was not as fun to watch as the Dot Diva website was (to use).*
- *It was very entertaining, but there was nothing truly educational aside from a bit of influence to open to careers based on math.*

We asked students whether they would watch future webisodes. Nearly one-quarter (24%) reported that they would. Almost a third (32%) were unsure whether they would, and 16% reported they would not watch a future episode.



Note: Seven students did not answer this question.

Figure 17. Whether students would watch a future *Dot Diva* webisode.

We also reviewed comments that were posted on the website in response to the webisode to collect additional data on what users liked and didn't like.

Webisode viewers made the following observations about things they liked:

- *Relatively watchable. The girls are cute and engaging. The cinematography is pleasing. Want to see what happens next.*

- *I do like the casting of Kate and Ali.*
- *I love this! When is the next webisode going to be available?*
- *Love the concept.*
- *Great! Can't wait for new episodes.*
- *I think the break up scene is a laugh out loud moment. Love the contrast of your two characters.*
- *I love this!*

On the other hand, there were far more critiques offered in the comments. Some of these included some very strongly worded criticisms. Some sample comments are included here:[8]

- *Needs more code nerd talk. Not convincing enough.*
- *The answers to the interview question about code really need fixing. Find some way to make them actually sound intelligent.*
- *Let us see their code!*
- *It mentions coding, but says nothing about what it really is, and makes it sound like developers sit around all day playing video games and having boy drama. If you really want to make something worthwhile, actually show something technical. Girls are a lot more smarter (sic) than the stereotypes you showed there.*
- *Wouldn't it have made more sense to have a company that actually was doing some good in the world through technology?*
- *Needs more references to what they are actually doing to make it convincing. In my experience (as a programmer) there is a lot of tech talk in offices - how do I? have you ever? do you know about? where can I find? etc. etc. Also I though the interview scene that wanted to know about their tastes in music was weird. No questions about what code they write? what tools? experience?*
- *We don't know anything about the different ways that Ali and Kate work and code. This show seriously needs to learn about showing and not telling. What's their favorite language? Who details and plans out the whole thing and data structures, and comments as they go, and who rushes through and then has to fix things later? My goodness, which part of the project do each of them work on and excel at (testers? debuggers? user interface designers? backend? etc)?*
- *Also, what's with the random dissing of various types of people just for the hell of it? The woman who's a model is a stereotype in every way. And what's with the "she's a girl?" to the woman who, omg, DARES to have short hair? It'd be one thing if Kate or Ali call him on it, but they really don't, so it's presented as something the audience should laugh at: omg, haha, this woman doesn't follow gender norms... despite the fact that this show is supposed to be fighting that. By which I mean: if you are writing a show whose point is to break stereotypes and show some diversity in society, you need to consider ALL marginalized groups, and how everybody in the show is being presented.*

Next, we looked at the comments posted on the *Dot Diva* Facebook page (http://www.facebook.com/DotDiva). As of January 11, 2010, the *Dot Diva* Facebook page was

[8] The comments may be viewed in their entirety at http://www.dotdiva.org/webisode.html

"liked" by 549 individuals and organizations.[9] The majority of the postings were from organizations (such as other non-profits) that were announcing information about their own programs. There were only a few comments from individuals:

- *How is it that I found out about you guys so late?! New member! and SO excited about being a Dot Diva ;)*
- *I love the name of this campaign; Without a technical background, I hope I can still be a Dot Diva.*
- *Which this organization was around a few years back! Glad to see girls getting a chance in this great field of choice!*
- *I love the new branding.*
- *I'm loving it to be a Dot Diva, would try all my best to contribute to computing in whichever form it is possible.*

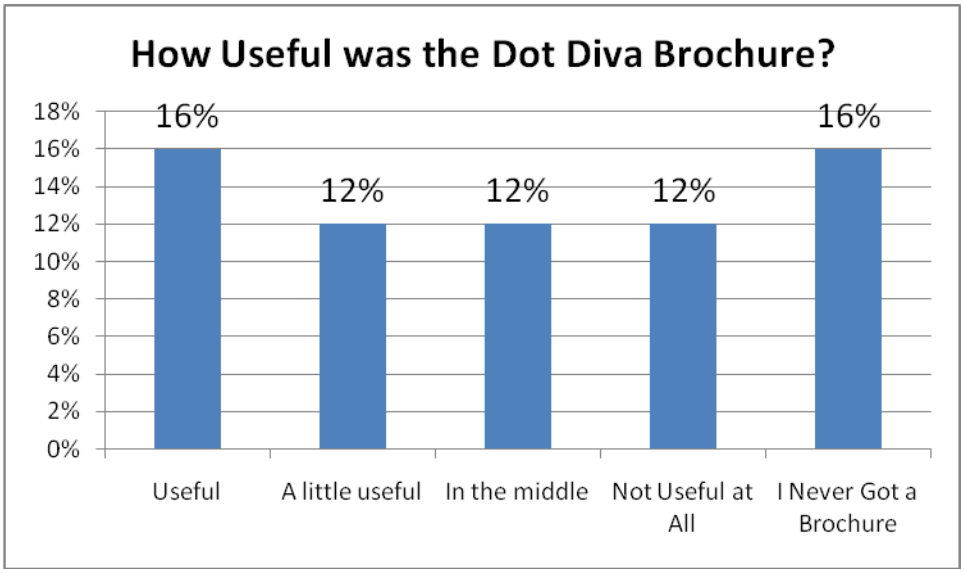
While there were no criticisms posted on the page, one individual expressed confusion over how to "become a *Dot Diva*:"

- *On the website it says "become a Dot Diva"... what does this mean exactly? & how do you do that?*

***Dot Diva* Brochure**

Students reported on the usefulness of the *Dot Diva* brochure. More than one-quarter (28%) reported that the brochure was at least a little useful or useful to them. Twelve percent were unsure how useful the brochure was. Another 12% reported that the brochure was not useful. Sixteen percent reported that they never received a brochure, although teachers assured us that the brochures were distributed to students in all of the pilot test classrooms.

[9] On the facebook website, members indicate their favorite sites through a mechanism called "liking." Each time a user indicates they like a facebook site, they receive regular updates from the site and may participate in online discussions with other members who also like the site.



Note: Eight students did not answer this question.

Figure 18. Reported usefulness of the *Dot Diva* brochure.

Students told us:

- *It explained Dot Diva and what it was about.*
- *It was interesting to read and the presentation of it was good.*
- *It is good information to know but I do not think that I will be capable in a computer career.*
- *It helped a little but wasn't amazing.*

Guest Speakers

Only 4 students recalled listening to a guest speaker from MIT who worked on mobile sensing applications for environmental and health monitoring. Two other students weren't sure if they listened to this speaker. Of the 4 students who recalled the speaker, two reported the speaker made them more interested in computing. The other two students reported that their interest level did not change. One student said, "She made me realize that different jobs that involve computing can help the environment and much more."

Eight students recalled the second guest speaker, a computer scientist from a company that designs and builds ships. Five of the 8 students reported that this guest speaker made them more interested in computing. Two reported that their interest level did not change, while 1 student reported that they had less interest in computing after hearing the speaker. Students told us:

- *She made it sound more fun and interesting to do.*

- *She was awesome! My dad works on computers so I knew about a lot of the cool stuff. I always wanted to do something with computers. I mean one of my electives is drawing ENGINEERING, so yeah.*
- *It seemed a bit more interesting, but it didn't change my whole career choice.*
- *She wasn't very clear on how she did anything, or anything technical about her program.*

Only one student reported that she heard the third guest speaker, from MITRE. The student reported that the speaker made her more interested in computing: "I became more engaged and open to the idea that as I learn new skills, I will find a passion. If I find a passion which includes math or science, I will be open to many opportunities for careers."

We were surprised at the number of students who did not recall listening to the guest speakers. CEG observed students attending the events, and teachers recalled taking their students to the presentations. After doing some follow-up with a teacher on this issue, she attributed students' lack of recall to not wanting to take the survey, or given their focus on everything else, simply not remembering enough to give feedback.

From the teacher's perspective, the guest speakers were the best part of the program based on how she thought the speakers made a connection with the kids and how kids seemed engaged. CEG also observed that most of the students appeared to be engaged for at least two of the three speakers.

Posters

None of the students reported seeing the *Dot Diva* posters, despite the fact that we observed the posters hung in the school and teachers confirmed that they were posted (each teacher placed the posters at the front of their classrooms). Therefore, we have no findings to report with respect to student feedback on the posters.

Comprehension of the Dot Diva Concept

At the end of the pilot test, when we asked students to describe in their own words what they thought a *Dot Diva* was, we found that most students (56%) had grasped the concept:

- *A "Dot Diva" is a girl with a strong passion to make a difference.*
- *A Dot Diva is a female who breaks stereotypes. She also inspires other females. Dot Diva creates something in computing that is utilize in a daily basis of someone's life.*
- *A Dot Diva is a pioneering woman in a technology-heavy field who is inventive and a minority.*
- *A woman passionate about changing the world through technology.*
- *A Dot Diva is a woman who is able to open up to the careers stereotyped for men and stand up for the capabilities of females.*
- *Girls who design technology that will help the future.*
- *A girl that can do anything she puts her mind to in a man's world.*
- *Young women interested in computer related professions.*

- *Someone that wishes to help those less fortunate with the help of computers.*

But other students (31%) described *Dot Diva* as a program:

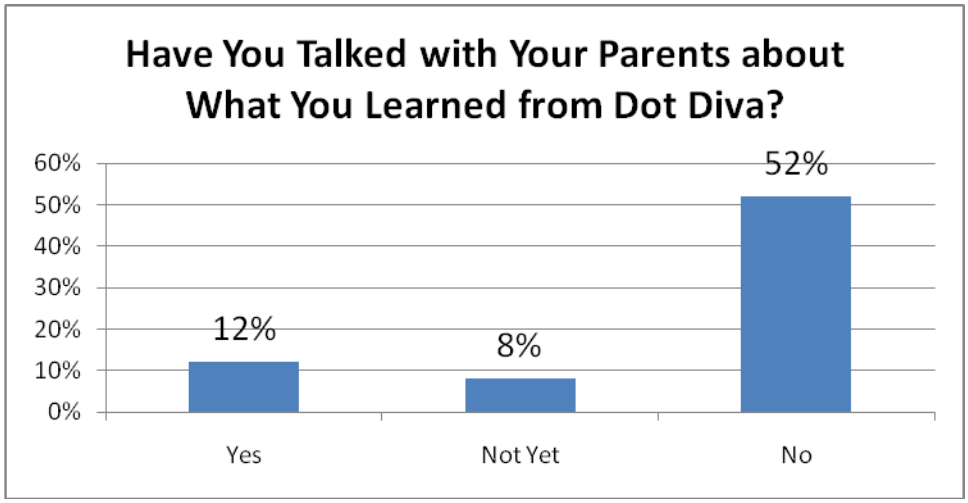
- *Dot Diva is a program that works to develop a fun and positive experience for high school girls working with computing.*
- *The Dot Diva is a company that is involved with computer technology and explaining what careers involved in computer do.*
- *A program that anyone could do to do things they are interested in involving computers.*
- *A program to get girls into the tech field.*
- *Dot Diva is an organization that wants to create a more positive perception about computing careers to high school girls.*

Only a couple students (13%) did not understand what a *Dot Diva* was:

- *I have no idea.*
- *I still have no idea exactly.*

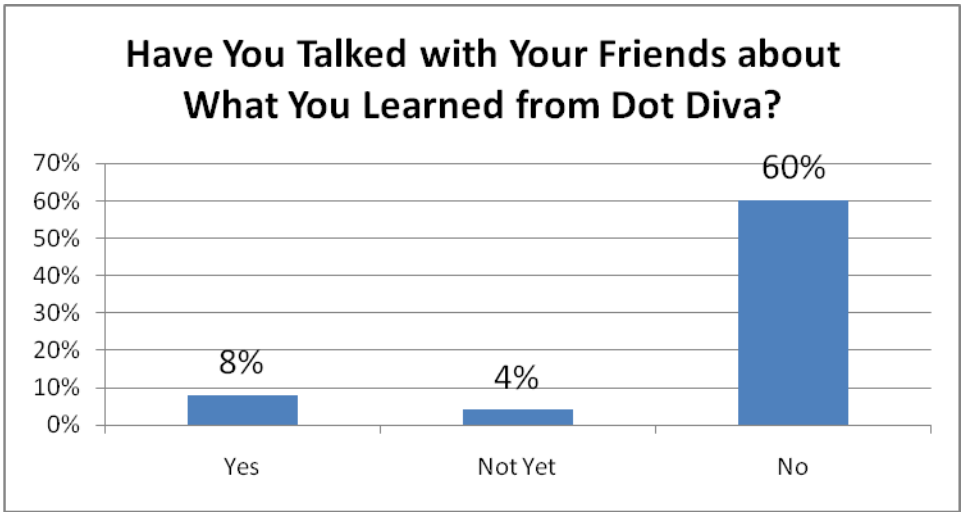
Other Feedback on Dot Diva

We asked students to report whether they had discussed what they learned from *Dot Diva* with family members or their friends. As shown in the following two figures, very few students (fewer than 12%) reported talking about what they learned with others. We should note that we do not know how many of the students in our sample typically discussed career choices with others in their lives.



Note: Seven students did not answer this question.

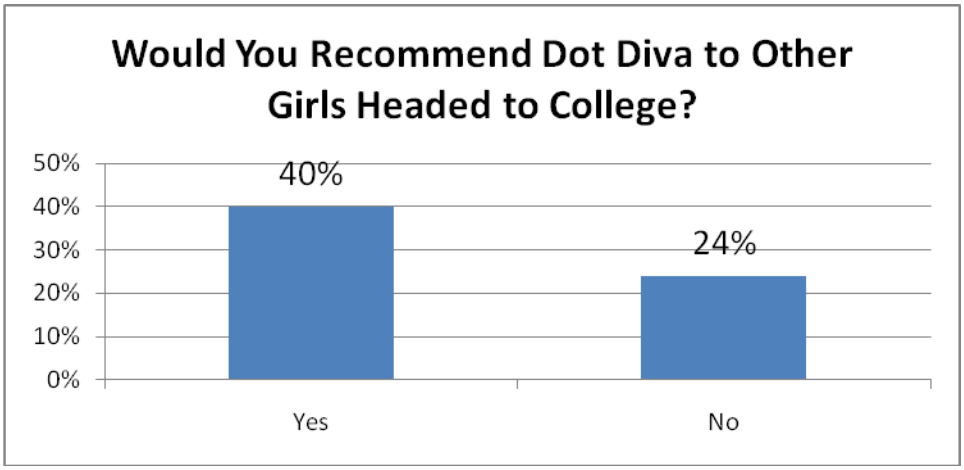
Figure 19. Percent of students who discussed *Dot Diva* with their parents.



Note: Seven students did not answer this question.

Figure 20. Percent of students who discussed *Dot Diva* with their friends.

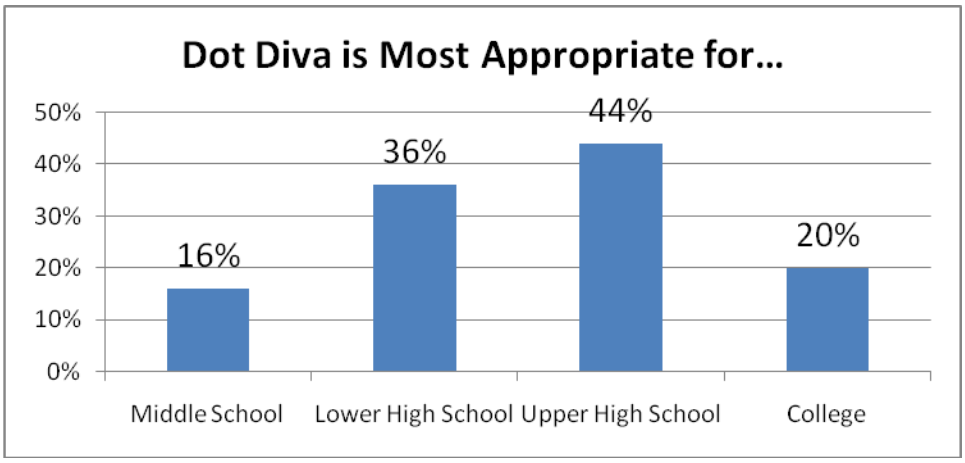
Almost half of the students (40%) reported that they would recommend *Dot Diva* to other female students who are planning to attend college.



Note: Nine students did not answer this question.

Figure 21. Percent of students who would recommend *Dot Diva* to other students.

When asked to describe the most appropriate age group for the *Dot Diva* resources, most students (44%) told us they thought *Dot Diva* was more appropriate for upper high school age students (11-12th grades). This was followed by lower high school (9-10th grades) (36%) and middle school (16%). Twenty percent of students felt that *Dot Diva* was most appropriate for female students who were already in college.



Note: Students could pick more than one choice.

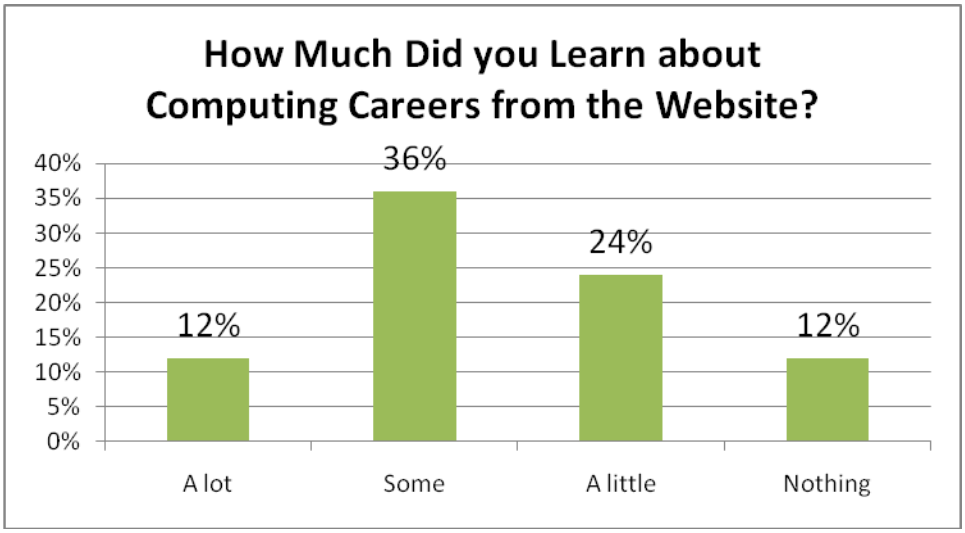
Figure 22. Student perceptions of the appropriateness of *Dot Diva* for different age groups.

Parents

Before we summarize the results of the parent surveys, we should note that we found that slightly more than half the parents (56%) were unaware of *Dot Diva* until we asked them about it in the post-test survey, even after teachers distributed brochures for students to take home. Six parents (24%) reported that they learned about *Dot Diva* from their daughters, two reported that they learned about *Dot Diva* from the brochure, and one reported that their daughter's teacher told them about *Dot Diva*. So, it appears that the *Dot Diva* resources intended for parent use never reached the parents during the course of the pilot test.

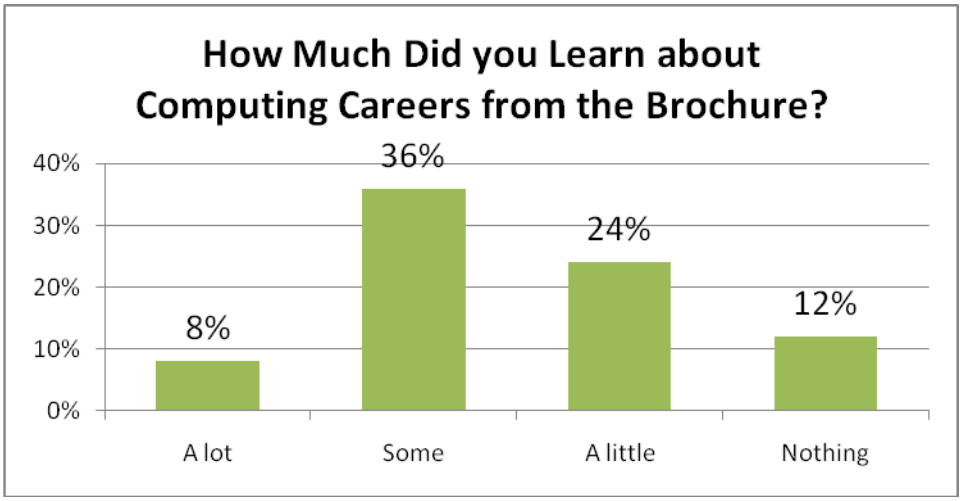
So, at the end of the pilot test, we asked those parents who were unfamiliar with any of the *Dot Diva* resources to review the website, webisode, and brochure so that we could gather their feedback on those resources.

Most parents reported that they learned something from the *Dot Diva* website (72%) and brochure (68%) about computing careers (see figures below). Only 12% reported that they did not learn anything.



Note: Four parents did not answer this question.

Figure 23. How much parents reported learning about computing careers from the website.



Note: Five parents did not answer this question.

Figure 24. How much parents reported learning about computing careers from the brochure.

Parents who reported that they learned from the *Dot Diva* resources told us:

- *(The website) offered interesting jobs that are connected to computer science.*
- *(The website) gave me some ideas (of things to discuss) if she has an interest in this area.*
- *(The website) outlined some different areas and how computers are used.*
- *Catchy name, hip and friendly website, very appealing to teenage girls. Nice graphics.*
- *(The brochure was) easy to read, concise, and on point.*

- *(The brochure) helped to familiarize (students) with the many career choices.*
- *The brochure is presented very positive and would get the attention of my daughter.*
- *The brochure was succinct and had graphics of girls that she (her daughter) could relate to. It was well-laid out and easy to read.*

Another parent told us:

- *It did not occur to me that I should talk to her about computing specifically. She has her own interests. She's good with math, but was not interested in joining the math club when I suggested it during her middle school years.*

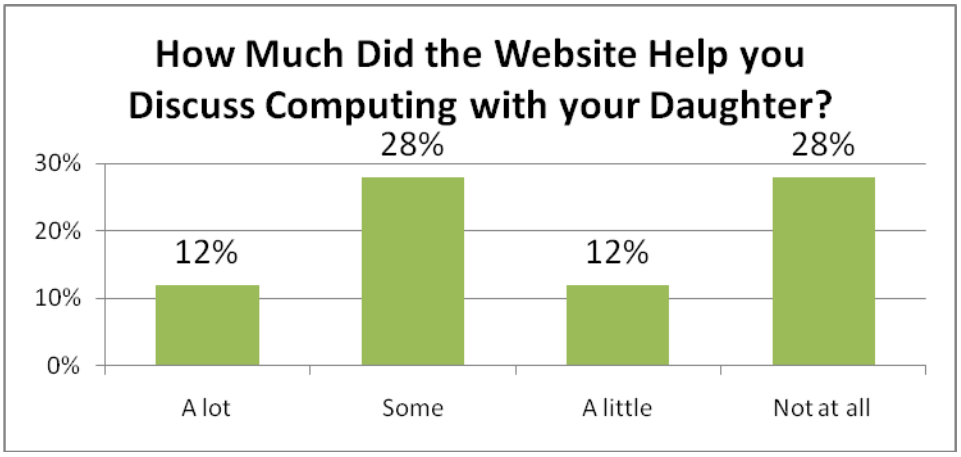
One parent who did not find the website helpful reported:

- *The video was a waste of my time.*

The *Dot Diva* resources seemed to have had an impact on parents' self-efficacy around discussing computing with their daughters (i.e., the degree to which parents felt capable of discussing computing careers). We measured self-efficacy by asking parents to indicate on a 5-point scale their agreement with two items:

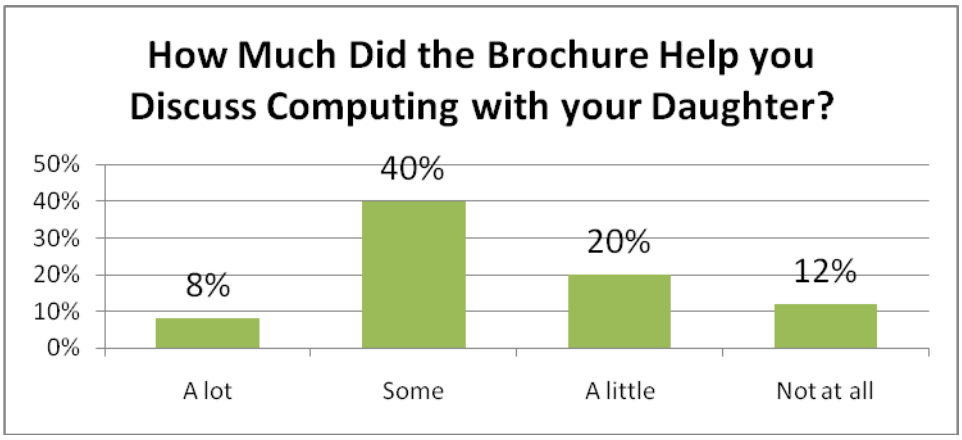
- I know how to discuss computing careers with my daughter.
- I know which courses my daughter should take if she is interested in a career in computing.

Thus, the maximum self-efficacy score was 10 at pre-test and at post-test. We found that the average pre-test self-efficacy score was 5.95 (standard deviation = 1.83). The average post-test self-efficacy score was 6.57 (standard deviation = 1.78). This increase over time was statistically significant ($t_{(20)} = -2.146$, $p = .022$), meaning that it appears that parents became significantly more comfortable with their ability to help their daughters prepare for computing careers as a result of using the *Dot Diva* resources. In fact, many parents told us that the website (52%) and the brochure (68%) both helped them, at least a little bit, to discuss computing with their daughters (see figures below).



Note: Five parents did not answer this question.

Figure 25. Whether the website encouraged parents to talk with daughters about computing.



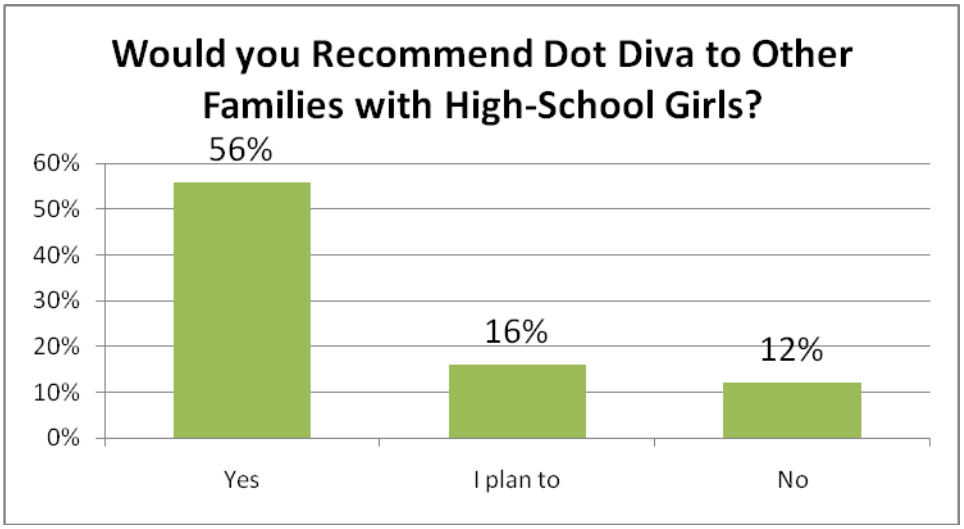
Note: Five parents did not answer this question.

Figure 26. Whether the brochure encouraged parents to talk with daughters about computing.

In addition to knowledge about computing careers, we measured parent attitudes towards computing careers with the same 12-item scale given to the students before and after exposure to *Dot Diva*.[10] The average pre-test attitude score was 44.24 (standard deviation = 5.13) and the average post-test attitude score was 43.90 (standard deviation = 4.58). This difference was not statistically significant, which essentially means that parental attitudes towards computing did not change over time. This is not surprising, given that so many parents did not recall seeing or using any of the *Dot Diva* pilot test resources.

[10] Internal consistency coefficient for the parent attitude scale was .711.

Finally, we asked parents whether they would recommend *Dot Diva* to other families with college-bound high school daughters. More than half (56%) reported that they would recommend it, and an additional 16% reported that they intended to. Only 12% reported that they would not recommend *Dot Diva*.



Note: Four parents did not answer this question.

Figure 27. How much parents reported learning about computing careers from the brochure.

Parents told us:

- *I believe it was a good idea to create Dot Diva because many people do not know enough about computing.*
- *If parents have daughters who are interested in computing it is a great site.*
- *It's well designed and I think would encourage girls to go into computer related fields.*
- *It is presented very positive and upbeat. It is clear reading so easily understood.*

Teachers

One of the outcomes we were interested in exploring was the effect of *Dot Diva* on the degree to which teachers felt comfortable helping students understand what is required for a computing career (teacher self-efficacy). To that end, we asked teachers to indicate on a 5-point scale their agreement with two items:

- I know how to describe computer careers to girls.
- I know which courses students should take if they are interested in a career in computers.

We observed that three of the four teachers reported gains in their self-efficacy. One teacher's self-efficacy score stayed the same (see the table below).

Table 10:

Teacher Self-efficacy Scores

Pre-test Self-efficacy Scores	Post-test Self-efficacy Scores	
	Score = 4	Score = 7
Score = 4	1 teacher	1 teacher
Score = 5	n/a	1 teacher
Score = 6	n/a	1 teacher

We also measured teacher attitudes towards computing to see if we would observe any changes in attitudes over time that could be a result of participating in the pilot test. We assessed attitudes towards computing with the same 12-item scale that we administered to students and parents.[11]

As shown in the table below, we did not observe any changes in attitudes over time. Two teachers' scores increased, while two teachers' scores decreased—resulting in a net gain of zero change. Because teacher attitudes were already positive to begin with, we assume that there was little room for improvement.

[11] We did not compute an internal consistency coefficient for the teacher scale due to the small sample size.

Table 11:

Teachers' Attitudes towards Computing

Pre-test Attitude Scores	Post-test Attitude Scores			
	Score = 44	Score = 46	Score = 47	Score = 48
Score = 42	n/a	1 teacher	n/a	n/a
Score = 45	n/a	n/a	n/a	1 teacher
Score = 48	1 teacher	n/a	n/a	n/a
Score = 50	n/a	n/a	1 teacher	n/a

When we asked teachers to describe how the *Dot Diva* resources were used and to summarize their usefulness, we found that teachers made very minimal use of the resources (for example, most did not have time to do the recommended post-speaker activities with the students). Teachers posted the posters in their classrooms, handed out the brochures to all of their female students, and brought their classrooms to listen to at least one guest speaker. But, in general, teachers did not have time to discuss the materials in class or to allow female students to use the website during classroom time.

Teachers described their roles as "messengers of the material" rather than "active participants. As one teacher explained, teachers didn't integrate the resources into their instruction because they likely didn't see a good place to fit it into the curriculum. In addition, scheduling was a major problem: "The program would have been better as an afterschool program or club...We would never in class actually (have the time) to show this webisode. I personally liked what was there (website and webisode)....but if it doesn't apply to class, we all put it aside."

That said, teachers did see value in the *Dot Diva* program and three of the four teachers reported that they would recommend it to other schools and would use the resources again.

All of the teachers reported learning at least a little from the website about computing careers; one teacher reported learning a lot (see figure below). One teacher told us: "I like the personal accounts of actual computing jobs on the website. Here, students can see real life possibilities."

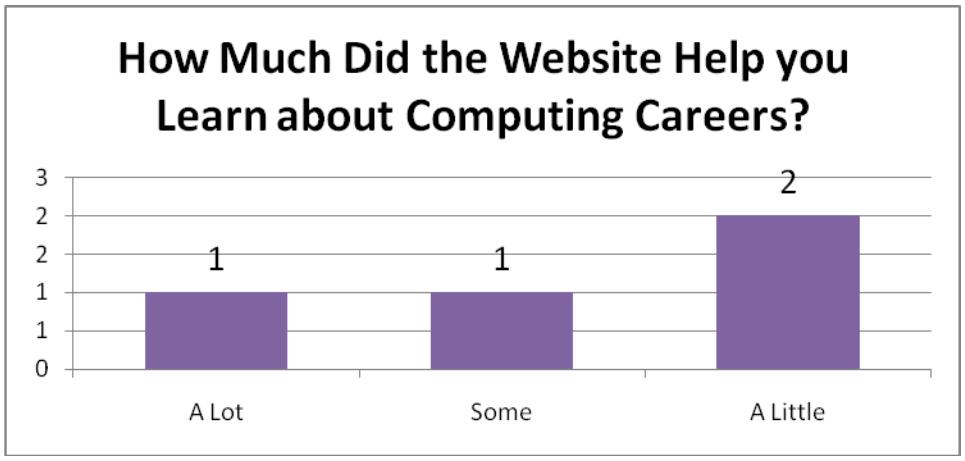


Figure 27. Number of teachers who reported learning about computing careers from the website.

Teachers also reported that the website appeared to be easy for their students to read and understand. Teachers were less enthusiastic about the webisode and the brochure. Two teachers reported learning "a little" from the webisode, while two teachers reported that the webisode did not teach them anything about computing careers. The teachers reported that they found the brochure to be only moderately helpful, but most didn't know what their students did with it or thought about it after they handed it out to them.

Teachers reported that the guest speakers were interesting and useful. Two teachers reported that one of the guest speakers actually made them more interested in computing after listening to her speak. The teacher who coordinated the guest speakers reported that the Guest Speaker Guide was useful. The Guide "explained the process, and provided a helpful introductory note and thank you letter."

Finally, teachers reported that the teacher training webinar offered at the beginning of the pilot test was only minimally helpful (see figure below).

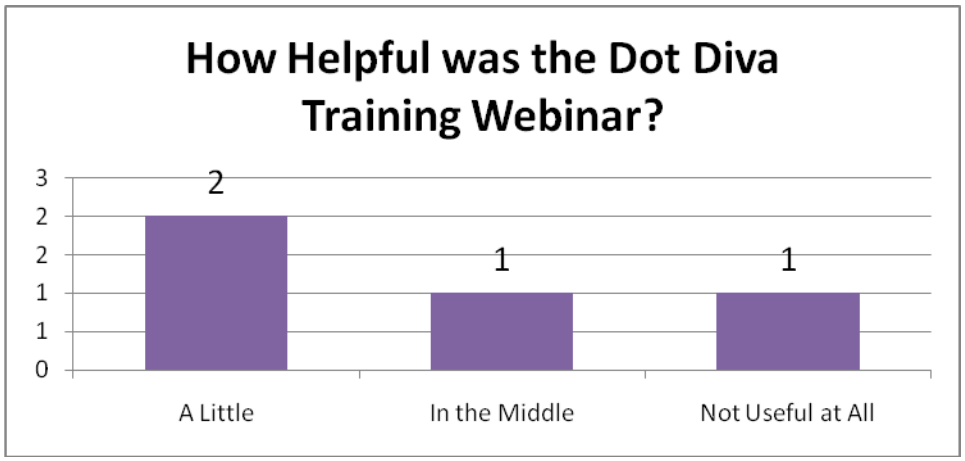


Figure 28. Number of teachers who found the training webinar to be helpful.

As one teacher explained, she thought the training webinar was fine, but not that practical for in-class environments given their schedules. A discussion of how to implement the materials and program in their school would be better suited for an afterschool club or computing class where this program could be the focus. She (and she suspects the other teachers) just thought the training didn't apply to their circumstances as in-class teachers with a curriculum to teach.

Teachers offered the following recommendations or cautions about the program:

- One teacher echoed the concerns we saw posted on the *Dot Diva* website about the webisode: "Focus less on the 'girly' aspects of how females can use computer science and more on how it is interesting/challenging."

- When discussing the issue of "girliness," one teacher countered that she did not think the program was too "girly," but she did caution that the message in the program might have the opposite of the desired effect on girls already interested in computing --- her specific example was that girls might be put off by "girly" girls finding a connection between fashion and computing. However, she did not think the brand of *Dot Diva* was overly "girly" and thought there was a good balance.

- Another teacher echoed online users' and students' concerns that the webisode did not provide enough detail about the coding work that the girls were doing: "The webisode is funny, but I fail to see any connection to computing. I would like to see the actual work that the girls are doing."

- One teacher argued that the biggest issue is "implementing this in our curriculum." She believed that most teachers would recommend it *because they see its potential* in an afterschool club or computing class. That said, there weren't enough "hands on activities" so the program could "...stick in students' heads." She said, "The pamphlet will fall to the bottom of (the girls) bag." And, even if they notice a poster, they won't remember it. "It isn't the number of materials that's important, it is the number of hands-on experiences." Career days, more guest speakers, online activities, *in the context of a curriculum or club that can really focus on the program*, will likely stick with girls better.

- Another teacher echoed the concern about the amount of materials and the lack of intensity of the experience for the students: "This was not enough to make a change in student behavior."

Summary and Recommendations

What Worked?

What Worked for Students

- Students exhibited more interest in computing careers after using the *Dot Diva* Resources.
- Most students (56%) reported that *Dot Diva* exposed them to new career choices.
    - More than half of the students (56%) reported that they learned something about computing careers from the *Dot Diva* website.
    - Almost half (44%) of students reported that the webisode helped them learn about computing careers.
- Many students (48%) reported that *Dot Diva* helped them see that they could express themselves through computing.
- Many students (36%) reported that they learned that *Dot Diva* could be applied to their career passions—regardless of what field they were interested in.
- Almost half of students (40%) reported that *Dot Diva* inspired them to become more interested in computers.
- Students and teachers reported that the guest speakers were informative and did cause some students and teachers to become more interested in computing.
- Most students (56%) grasped the concept of the *Dot Diva*.

"...you can have a computing career no matter what area your passion is in."
-Student

"If I find a passion which includes math or science, I will be open to many opportunities for careers."
-Student

What Worked for Parents

- Most parents reported that they learned something from the *Dot Diva* website (72%) and brochure (68%) about computing careers.
- We observed that parents became significantly more comfortable with their ability to help their daughters prepare for computing careers as a result of using the *Dot Diva* resources. In fact, many parents told us that the website (52%) and the brochure (68%) both helped them to discuss computing with their daughters.
- More than half (56%) reported that they would recommend *Dot Diva* to other families with college-bound daughters, and an additional 16% reported that they intended to.

"(The website) gave me some ideas (of things to discuss) if she has an interest in this area."
-Parent

What Worked for Teachers

- We observed that three of the four teachers reported gains in their self-efficacy (in other words, their self-assessed ability to help students prepare for computing careers).
- Three of the four teachers reported that they would recommend it to other schools and would use them again.
- All of the teachers reported learning at least a little from the website about computing careers; one teacher reported learning a lot.
- Teachers also reported that the website appeared to be easy for their students to read and understand.
- Teachers reported that the guest speakers were useful. Two teachers reported that one of the guest speakers actually made them more interested in computing after listening to her speak. The teacher who coordinated the guest speakers reported that the Guest Speaker Guide was useful. The Guide "explained the process, and provided a helpful introductory note and thank you letter."

"I like the personal accounts of actual computing jobs on the website. Here, students can see real life possibilities."
-Teacher

What Might be Improved?

We would recommend that WGBH consider dropping from *Dot Diva* those resources that either didn't get used or were reported to have limited usefulness in the pilot test. This would include the brochures and the posters.

We also recommend that WGBH try to identify ways to reach parents other than through their daughters or their daughters' schools.

With respect to the *Dot Diva* program, as a whole, we recommend that WGBH consider: (1) developing a program that could be used in after-school programs and provide a more intensive focus on the messages contained in the initiative, or (2) developing a program that would more easily "plug into" existing high school math or science curricula so that teachers can better integrate the resources into their daily lessons, and/or (3) including hands-on activities that teachers could do with students in the classroom. Doing so should enable teachers to offer students a richer experience with a deeper exploration of the different fields associated with computing and a better explanation of how to prepare for such careers.

With respect to the website and the webisode, we recommend the following:

- Provide more detail about computer-related jobs and the responsibilities expected of individuals in those professions. Students, parents, teachers, and online users all commented that there were insufficient technical details provided on the website.
    - *I did not feel a learned actual context about jobs.*
    - *It did not contain the specific details I was looking for.*

- *It was very entertaining, but there was nothing truly educational aside from a bit of influence to open to careers based on math.*

- Related to the previous point, we recommend that WGBH include a lot more discussion of, and demonstrations of, technical issues (e.g., code and how code is used in different career settings) in future webisodes. Some students failed to even see a connection between the webisode and computing, and some webisode viewers commented that the lack of inclusion of technical information made the webisode uninformative.

- Some website users and some pilot test participants reported that they found the website and webisode to be too "girly." Others were "highly offended" at the way some of the women were portrayed and the lack of substance in the discussions presented. We would recommend that WGBH pilot test each webisode with both female students and female computing professionals to ensure that the intended message is not unintentionally overshadowed with mixed messages.

- While the humor was appreciated by many viewers, some took offense to the use of humor "at other people's expense" or at humor that actually seemed to reinforce stereotypes about female computer professionals (e.g., the woman who was confused with a man). We recommend that WGBH consider, in future webisodes, how humor might be used differently (because it is important) and in a way that relies less on taking jabs at others.

- Finally, to ensure widespread use of the resources, we recommend that WGBH offer the website in different languages and provide closed captioning for all videos. We should note that no one in the sample reported that the website was inaccessible—rather these were general suggestions offered by website users.