Girls Gather for Computer Science

Year 1 – Evaluation Report
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Evaluation Procedures

The evaluation of this study utilized a mixed-method approach, with the following in mind as the ultimate aims of the project: 1) precipitating needed change; and 2) contributing to informed decision-making and more enlightened change.

The following questions, aligned with the project goals, guided the development of all assessment measures:

1) Have the camp curriculum and the instructors' methods instilled in student participants an understanding and appreciation of women as leaders in science? How has this impacted the students?

2) Have the activities of the grant served to increase students' confidence and skills? What is their long-term effect? Have they impacted students' career plans guiding them toward science, particularly computer science?

3) Has the establishment of a learning community been effective in meeting the other project goals?

4) Has the project leadership disseminated the results of the project effectively through both traditional and innovative means?

The pre-/post-Camp assessment was designed in alignment with the grant goals and specifically refined to provide data on achievement of the curriculum objectives during the four week-long modules.

Data has been gathered both quantitatively and qualitatively; the pre-/post-camp surveys provided numerical data on changes as a result of the workshops as reported separately by students and their parents. 'Two Minute Papers' were used daily to assess the students' perspectives of the strengths of the day's lessons and instruction as well as any issues, lack of clarity, or recommendations from the campers. The 'Two Minute Papers', along with pre- and post-survey open-ended questions and a student follow-up longitudinal study all provide a qualitative view of the interaction between the learners, instructors, and contexts, as well as the long-term impact of the experience. All electronic surveys and results are available at SurveyMonkey.com.

This annual evaluation report is based on the following data collection protocols:

Students:	Parents
Pre-Camp Survey Post-Camp Survey (at end of camp) Follow-up Survey (6 months later) Two-Minute Papers (daily during camp) Field Trip Evaluation	Pre-Camp Survey Post-Camp Survey Follow-up Survey

Daily Two-Minute Evaluations

At the end of each day of camp, students were asked to write a very brief evaluation of the day's activities, using the following questions:

1. Describe what you liked best today.
2. Describe what you think we should have done differently.
3. Describe what you learned today that will be useful in your future.
4. Is there anything else you want us to know?

A compilation of each day's responses is included in Appendix I. In general, the following statements summarize the responses.

Most commonly mentioned curriculum activities *to keep* for next year were: PB&J, Lego Robots, and Alice. Other highlights included bridge-building, yarn G^2CS design, and dismantling the computers, printers, phones, and other hardware. Several commented positively on the binary numbers and router activities. They all loved the Flip cameras, making and editing videos, and giving and listening to presentations. Using Elgg to post blogs was very popular. They clearly loved the camp and the entire staff! There were numerous comments each day along the lines of: "This has been the best camp ever!" "I ♥ G^2CS!" "I'm sad that we're approaching the last day."

Another strong trend was that they enjoyed the Pacific University food; one or several mentioned this daily during all four weeks of the camp.

The Field Trips were very popular; they definitely recommended keeping the field trips for next year, although the Galois field trip was rated as the least interesting. From comments on the Vernier Field Trip, it is clear they enjoyed using the range finder and other interactive sensors, riding the Segway, hearing about what engineers do, learning about the pH scale, and using the strength-controlled cars. Regarding the OPB Field Trip, the most comments were about enjoying the process of interviewing the staff and reporting to the whole group; also very popular was the opportunity to observe in the studio as a video clip was filmed for television airing that evening.

At Intel, they were impressed with the Clean Room, computer safety, learning about silicon chips, and making songs and cookies. The trip to the coast was certainly a highlight of the camp. They commented in particular about learning about tides, wave power, oceanography, anemones, sharks, and the inner working of an aquarium. At OMSI they particularly enjoyed the OmniMax film, the gaming exhibit, and the freedom to visit the exhibits that interested them.

In terms of what they learned that will be most helpful in their future, there were two prevalent themes: they learned the power of working together as a team, and they learned the value of persistence – not giving up when the project doesn't work right away.

The most common suggestion for next year: No OPB! (They were tired of being filmed by the OPB cameras.) Some suggested having something to do on the bus during field trips. There were also suggestions to allow more time for individuals to work on their preferences and for more choices, such as letting the girls choose their own computer buddy for the last week.

Student Pre- and Post-Camp Survey results

The pre- and post-camp surveys were analyzed using a *t-Test* for comparison of means for each survey item, using a pre-established level of significance ($p < 0.05$).

Part I. Student Inventory
None of the items in this section showed statistically significant changes from pre- to post-surveys. However, some of the items are of interest for further discussion.

The following items showed slight positive gains (more agreement) from pre- to post-surveys:

21. If I have problems using the computer, I can usually solve them one way or another.
23. Once I start to work on the computer, I find it hard to stop.
25. I have a lot of self-confidence when it comes to working with computers.

The following items, which were worded in the negative, showed declining means (more disagreement) from pre- to post-surveys:

4. I often feel that I am doing badly in math.
14. When problem-solving, I prefer to work alone.
22. Computers are difficult to use.
24. I'm no good with computers.
26. I don't think I could do advanced computer work.

These items suggest some concern, due to the declining means (more disagreement with the statement), even though not statistically significant:

3. It is easy for me to do well in math.
10. I feel I am doing well in science.
11. I am a good science student.
12. I get good grades in science if I want to.
13. I use computers regularly throughout school

II. Attitudes Toward Computers
In this section, five items resulted in statistically significant changes in means ($p < 0.05$) from pre- to post-survey; these two items had increased means (more agreement):

6. To get a computer job, you have to work really hard.
16. I would like a job working with computers or technology.

These two items, which were worded in the negative, resulted in statistically significant decreases in means ($p < 0.05$) from pre- to post-survey (more disagreement):

2. People who have "computer jobs" sit in front of a computer screen all day.
3. Working with computers means working on your own.

This item resulted in a statistically significant increase in means ($p < 0.05$) from pre- to post-survey (more agreement):

4. Most computer scientists are men.

There were several items based on gender; while none of the following differences were statistically significant, the results were generally favorable:

8. Girls are as good as boys when learning to use a computer. (More agreement)
10. I think technology is mainly for boys. (Less agreement)
13. Girls can do technology as well as boys. (More agreement)

But one gender-based item provided conflicting results:

7. In general, boys are better than girls at using computers. (More agreement)

III. Career Goals
In this section, there was only one item which resulted in statistically significant ($p < 0.05$) changes from pre- to post-survey (more agreement):

1. People who work with computers make really good money.

Although not statistically significant, the following items resulted in positive changes from pre- to post-survey (more agreement):

2. In high school I intend to take a math class every year.
3. In high school I intent to take a computer science class.
7. In college I intend to major in computer science.

Although not statistically significant, the following items resulted in decreases from pre- to post-survey (less agreement):

4. In high school I intend to take biology, chemistry and physics.
6. In college I intend to major in math.
8. In college I intend to major in science.
10. I intend to get an advanced degree in math, science, or computer science (A Master's Degree or PhD)

IV. Parental Attitudes
None of the items in this section resulted in statistically significant changes from pre- to post-survey. However, some of the items provide interesting trends.

1. They would be disappointed if I got a job working with computers or technology. (More agreement)
2. They want me to get a job right after HS instead of going to college. (Less agreement)
3. They would be surprised if I went to college. (More agreement)
4. They expect me to go to college. (Less agreement)
5. They would be excited if I decided to become an engineer or computer scientist. (More agreement)

V. Peer and Teacher Attitudes
None of the items in this section resulted in statistically significant changes from pre- to post-survey; the means were essentially unchanged from pre- to post-survey on all items.

VI. Computer Science Tasks
Only one item in this section resulted in statistically significant changes from pre- to post-survey ($p < 0.05$). This was a decreasing value (*less* agreement on post-survey than on pre-survey).

3. I am interested in providing technical help to the police to catch people who break into the Internet.

Discussion of Student Pre- and Post-Survey quantitative results:

Due somewhat to the small sample size (n = 29), very few of the items resulted in statistically significant changes in mean scores. The other items reported are only for the purpose of discussion but are not essential components of the project's evaluation.

The changes in mean scores suggest that the campers learned that working on computer science tasks is hard work, but they also showed an increased interest in computer science careers. There was an increased awareness that people who work with computers make high salaries. Generally, the campers appear to have learned that working in computer science is not a solitary task but done in collaboration as part of a group.

Although the campers felt that "most computer scientists are men" even more strongly after camp than before, they did tend to suggest that girls are just as capable as boys in performing computer science tasks.

Qualitative Analysis of Attitudes Toward Computers, Question #1

Question #1 asked students to "Describe what you think a typical computer scientist does at work each day". This was a free-response format which allowed for a variety of answers. These have been summarized in the table below, indicating the number of responses in each category by pre- and post-survey.

Table 1: Attitudes Toward Computers Q#1

Categories	Pre-Survey Results	Post-Survey Results
Write computer programs/software/code	17	10
Study/design/build computers; hardware	9	12
Improve efficiency of computers/chips	9	9
Problem-solving	9	13
Fix computers	3	0
Improve lives and productivity	4	5
Graphics and presentation software	2	2
Research and gathering information	2	3
Websites and web pages (design/build)	2	3
Robotics	1	4
Teach	0	5

Discussion:

There were major differences between the responses from the student pre- and post-surveys. In the post-survey, students tended to be more descriptive of computer scientist's work, suggested multiple roles (rather than naming just one), and provided more examples of responsibilities. Several mentioned that computer scientists rarely work in isolation but are more likely to work with colleagues or part of a team; none in the pre-survey said anything about working alone *or* with others. Several in the post-survey noted that there really is no such thing as a 'typical' computer scientist because they have such a broad range of skills and tasks. None in the pre-survey had recognized the role of teachers of computer science.

Parent Pre- and Post-Survey results

None of the 20 items on the parent pre- and post-surveys produced any results which were statistically significant; generally, the means on the pre- and post-survey were nearly identical. One did provide a curious result, however (but statistically non-significant). Item #12 had an increase in means (from 1.26 to 1.59, with '1' being Strongly Disagree), suggesting slightly more agreement with the statement.

12. I positively do not want my daughter to have a job that uses a lot of technology.

Item #21 was an open-ended question which asked: "List at least three goals you have for your daughter as a result of the G^2CS camp?" The following table (Table 2) lists the responses parents provided on the pre- and post-camp survey.

Table 2: Parents Survey – Item #21

Categories	Pre-Survey Results N = 36	Post-Survey Results N = 38
Have fun; enjoy herself; socialize with other girls with similar interests	23	18
Learn about careers in computer science and others using technology	14	11
Become comfortable with and knowledgeable about computers and technology	12	12
Learn about STEM* and be encouraged to learn more math and science	8	6
Learn the basics of computer programming and computer components	8	2
Learn what computer science is and understand applications of technology, including downsides	8	5
Develop confidence and positive self-image	7	11
Gain hands-on experience with technology	7	8
Work with STEM* professionals and leaders	3	4
Gain interest in taking HS math/science, attending college, and developing her future	3	4
Looks good on resumé and college applications	3	1
Learn to problem-solve, collaborate, and other real-world skills	0	8

*Science/Technology/Engineering/Mathematics

Discussion:

Q#21 on the parent survey asked parents to list at least three goals for their daughter as a result of the G^2CS camp. In the surveys conducted both before and immediately after the camp, the same three goals emerged most frequently: 1) To have a good time and socialize with girls of similar interests; 2) to learn about computers and technology; 3) to gain knowledge about careers. Unfortunately the wording of the Parent Q#21 was not appropriate for the post-camp survey; it could easily have been changed to ask them what they think were the most valuable lessons or activities their daughter had gained *as a result* of the camp rather than ask again what they hoped the camp would provide.

In the post-survey results there was *less* emphasis on programming, with *more* emphasis on problem-solving/collaboration/real-world skills and on developing confidence and positive self-image.

Even with the wording of the question as it was, parents often added comments beyond what was asked. *Many*, for example, added supplementary remarks – that their daughter had enjoyed the camp, had met new friends, had benefited from the careful planning, and enjoyed every day.

Field Trips

Evaluation of Field Trips by campers – Summary of results (1 = Best). Complete results are in Appendix II.

Location	Rating
OMSI	2.04
Newport Aquarium	2.86
Intel	3.46
Vernier Software and Technology	4.11
Hatfield Marine Science Center	4.38
OPB	5.14
Galois	5.46

Discussion:
As indicated earlier, the field trips were a very popular and inspiring component of the month-long camp. (At one point during the Vernier field trip, it appeared that every girl was going to apply to work there.) The Galois field trip was the least popular but only two campers indicated it should be eliminated from the program. In several instances, particularly at OMSI and at the aquarium, campers noted that they would have liked to have more time. There were also several negative comments about the early wake-up hour at the tide pool, but they did understand that the schedule was dictated by the tides, not by the organizers.

Follow-up Surveys:

Student Post-Camp Survey –
Approximately six month following the camp, the participants were surveyed electronically regarding their attitudes toward the camp, its content, and the overall experience with items based on the ISTE NETS standards (Appendix VI). Complete results from this survey may be found in Appendix IV. Of the 24 quantitative items in the post-camp survey, these are the four items in which participants reported the most change as a result of the camp. (Total frequency is reported for those rating the item either as "More" or as "Much More".)

18. I exhibit a positive attitude toward using technology that supports collaboration, learning and productivity.
More/Much More 84.0%

20. I exhibit leadership for digital citizenship. (Legal/ethical issues)
More/Much More 84.0%

11. I evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
More/Much More (as a result of camp) 83.3%

12. I process data and report results.
More/Much More (as a result of camp) 83.3%

While a large group of participants reported 'More' or 'Much More' on a few items, there several reported 'No Change'. The two which follow had the most responses in this category:

Item #6 - I communicate information and ideas effectively to multiple audiences using a variety of media and formats. (44 % 'No Change')

Item #23 – I trouble-shoot systems and applications. (40% 'No Change')

Several items were open-ended; what follows are typical quotes which are representative of the most common responses. Complete responses may be found in Appendix IV.

Item #25 - Explain how your experience with G^2CS has changed your understanding of women as leaders in science.

To be a leader in science takes great knowledge and understanding of not only what is in front of you, but all around you.
I've learned that women can be just as good as men in science – or better!

Item #26 - How has your experience with G^2CS affected your confidence in your ability to use technology?

G^2CS has given me more confidence in using technology – now I'm not afraid I will mess everything up if I make one little mistake.
I've learned that technology isn't as big and scary as I expected – and I can tackle it!
Now I don't give up if I don't find what I am looking for right away.

Item #27 - Has your experience with G^2CS had an effect on your future career plans? Please explain.

This camp has opened new doors for me!
G^2CS has helped me understand the variety of choices there are in STEM careers.

Parent Post-Camp Survey –
The parents were given a survey at the final reunion, nearly seven months following the completion of the camp. This was an open-ended survey which asked the following three questions. Responses are summarized here, and organized in order of the frequency of each type of response. The complete set of responses may be found in Appendix V.

1. **As you think back to last summer's camp, what do you think was the most valuable aspect of the camp for your daughter?**

    Promoting a career in STEM (12)
    Building confidence and a sense of responsibility (8)
    Fun (2)

2. Do you remember which activities, lessons or field trips impressed your daughter the most? If so, please list them.

> Parents identified the overnight trip to the coast and the Intel visit as the most popular field trips. They also cited Hardware, Robotics, the Flip Cameras and Programming Alice as highlights of the camp. One parent stated: "There was not a single thing that wasn't interesting and impressive to her."

Other Findings:

In addition to attracting more girls to science, mathematics and computer science coursework and careers, another objective was to expand the number of girls coming from a variety of ethnicities. Conversations with tribal councils, unfortunately, did not result in girls attending from Native American reservations. Nevertheless, there was substantial diversity represented among the attendees. (See Appendix III)

Teacher Self-Evaluation on ISTE Standards:
Middle School and High School teachers were involved in the camp as both instructors and as learners. A set of national standards for teachers in the use of technology in the classroom was used with descriptors in five categories. (Appendix VII) The teachers self-evaluated their progress in each category based on their experience with the camp, using the following scale: 1 (Not at all) to 5 (A great deal) Results follow:

Table 3: Teachers Self-Evaluation Results on ISTE Standards for Teachers

ISTE Standards	Teacher A	Teacher B	Teacher C	Teacher D	Mean
1. Facilitate and Inspire Students' Learning and Creativity	5	4	2.5	4	3.9
2. Design and Develop Digital-Age Learning Experiences and Assessments	5	4	2	3	3.5
3. Model Digital-Age Work and Learning	5	3	5	3	4.0
4. Promote and Model Digital Citizenship and Responsibility	4	3	5	3	3.7
5. Engage in Professional Growth and Leadership	5	4	5	4	4.5

Dissemination

Dissemination about this project began almost immediately and has continued, although the first year of the project was only recently completed. OPB staff have filmed a series of interviews and have developed a 15-minute video, posted on the website (G^2CS); DVDs were distributed to the campers at the final camp reunion.

PI Khoja has prepared several presentations: PI National Meeting, Association of Computing Machinery (ACM), National Center for Women in Technology (NCWIT). She and one of the curriculum developers attended the Grace Hopper conference in November, 2011.

Plans are being made for 2012 presentations at Oregon Science Teachers Association and Oregon Council of Teachers of Mathematics/NW Math conferences. Khoja is also considering doing a workshop at the Consortium for Computing Science in Colleges (CCSC) fall workshop. One of the G^2CS board may present at the Computing Science Education Legacy: Innovative and Future Trends (July 3 – 5, 2012 - Israel). http://www.iticse12.org.il/htmls/page_771.aspx?c0=533&bsp=498

PI Khoja's poster was accepted for the Special Interest Group for Computer Science in Education in March.

On the Pacific University G^2CS website can be found a video of the 2011 camp, interactive games, and soon in the "Run a Camp" section will be the camp curriculum and information on starting up a similar camp.

Word of this remarkable camp is already spreading through the electronic media. For example, this article was found at:
http://www.mpict.org/ict_educator_resources_diversity_g2cs.html

> **Information and Communication Technologies (ICT) Educator Resources - ICT Diversity - Girls Gather for Computer Science (G^2CS)**
>
> Girls Gather for Computer Science (G^2CS) is a non-residential summer camp for 7th and 8th grade girls. The goal of the camp is to change the way that girls from all ethnic and class backgrounds can experience the field of computer science. The project is a partnership between Pacific University and Oregon's nationally recognized public broadcasting station, Oregon Public Broadcasting (OPB). Other partners include the Berglund Center for Internet Studies at Pacific, the Intel Corporation, the educational media company Flying Rhinoceros, Vernier Software & Technology, leaders from tribal groups, local Latino community representatives, and local school district heads. The outcomes of the project include video coverage of the camp, featuring young scientists and their mentors at work, game-like "interactives" for the camp web site, and a broad collection of media tools.

And this one at: http://www.womenleadingtheway.com/womens-leadership-news.html

> **Girls and Technology**
> Fourteen year old, Tristan Spraker brings this to our attention - a remarkable program that reveals the individual/collective connection. "Girls Gather for Computer Science" is a four week, non-residential camp for 7th and 8th grade girls. The goal is

> to provide an opportunity for girls to think of themselves as scientists. The camp will be run by all-female instructors from Pacific University, middle schools involved and undergraduate computer science students. For the thirty girls who are selected, the camp is free. It is sponsored by the U.S. National Science Foundation and will be held at Pacific University in Oregon. So a collective effort makes possible opportunities for individual girls to step up and learn new skills, develop new self-concepts, and enhance the contributions they will make to our society.

And a recent article in OregonLive.com described the camp and its goals: (http://www.oregonlive.com/washingtoncounty/index.ssf/2012/01/even_in_washington_countys_sil.html):

> Pacific University has spent years trying to change the perception that science, especially technology, is not just a male domain. Physics professor **Juliet Brosing** ran an all-girls science camp between 1992 and 2000. Last year, Khoja started **Girls Gather for Computer Science** for middle schoolers. Funded by the **National Science Foundation**, Khoja and her colleagues will keep tabs on the girls for 10 years. "Research has shown that through elementary school, girls and boys are equally interested in math, science and technology," she said." At middle school, that is where they start deciding what to do in life. They start forming biases."

OPB Role:

Oregon Public Broadcasting has been a partner in the G^{2}CS project and has played a major role in the dissemination of information about the grant and about women in computer science. OPB has produced an excellent informational video about the 2011 camp which is now posted on the G^{2}CS website: http://www.g2cs.org/diy/video/ In addition, each of the 2011 campers were given a DVD copy of the video which will serve as a superb recruitment tool for future camps.

Other OPB productions: at the website are found interactive games; in the future the website will also contain video profiles of professional women in computer science.

Teacher Dissemination:

Teacher 'A':

Teacher A shared what she had learned with her principal and other teachers. She developed the curriculum for a new course for the middle school – 'Preparing for High School'. Within this course, she was able to use some of the resources from the camp to introduce her students to computer science. She also prepared a PowerPoint presentation outlining each week of the camp and made a presentation to her science department.

AVID -- Achivement Via Individual Determination, is a program available to students in her district; this program provides support for middle-achieving students who will be 1st generation HS or college attendees. She plans to introduce them to computer science as a possible career.

Teacher 'B':

B did a presentation to her science department describing the camp and its curriculum. She suggested that her fellow teachers encourage girls to take an interest in CS by promoting this camp.

Teacher 'C':
C gave a presentation to her local HS Physical Science teachers; she shared websites that had been used as part of the G^2CScamp. The computer science teacher was glad to get websites and resources as well. She will do a presentation to the MS teachers in the spring.

Teacher 'D':
D has a group of STEM teachers she meets with regularly within her school district. She shared the CWIT handout/statistics and camp resources. She invited a local robotics team to demonstrate at her middle school and do a presentation for her teaching team. She and her team plan to interview the girls in the math and science classes about their interest in computer science as a career. She will share with the girls the DotDIVA.org website.

Conclusions:

Reviewing the initial research questions, this evaluator has sufficient data to draw various conclusions regarding the first year of the G^2CS camp.

1) Have the camp curriculum and the instructors' methods instilled in student participants an understanding and appreciation of women as leaders in science? How has this impacted the students?

> *Yes, the camp instilled in the participants an understanding and appreciation of women as leaders in science. The strongest evidence for this comes in the post-camp participants' surveys as well as in the parent post-camp survey.*

2) Have the activities of the grant served to increase students' confidence and skills? What is their long-term effect? Have they impacted students' career plans guiding them toward science, particularly computer science?

> *Yes, the camp activities and curriculum have increased the students' confidence and skills in using the computer but beyond that as well. Some of the typical post-camp quotes were " It has made me much more comfortable using a computer and trouble-shooting" and "Now I don't give up if I don't find what I am looking for" and "Computers and technology are not scary any more. " Over time, we will be able to learn whether there has been a long-term effect past six months.*
>
> *On the post-camp survey, students demonstrated an increased interest in math and computer science as career opportunities. Essentially all of them indicated an interest in STEM fields and/or Computer Science along with the recognition that no matter what career they choose, effective use of computers will be an essential part of their career.*

3) Has the establishment of a learning community been effective in meeting the other project goals?

The girls responded very favorably to the camp curriculum, to the instructors' methods, and to the instructors themselves. They appreciated having all-female leaders/organizers and demonstrated an increased interest in math and computer science as career opportunities. They reported an increased awareness of the value of collaborating within a team in order to problem-solve effectively, and an increase in persistence in order to complete a difficult task. These collaborative efforts should be viewed as components of the broader learning community. In addition, they valued the social networking opportunity, but at this point, it is unknown whether the latter contributed to the overall effectiveness of the project.

4) Has the project leadership disseminated the results of the project effectively through both traditional and innovative means?

Yes – even in the first year of the grant project there have been numerous presentations and many more are planned. The G^2CS website is an outstanding tool for dissemination, containing a video of the first annual girls' camp, interactive games, and (soon) information about the curriculum and starting up a similar camp. OPB has played a significant role in the dissemination activities, especially in developing the video and in the preparation of an additional video containing interviews of professional female computer scientists. Several brief articles have appeared in print and electronically describing the camp nationally. In addition, the middle school teachers associated with the project are sharing knowledge gained and curriculum ideas with other teachers.

Recommendations for Subsequent Years' Camps

Based on the analysis of data from the 2011 camp, the following recommendations are provide by the evaluator.

Blog Posts: The campers certainly appreciated the 'special' social networking site (elgg) that was established just for them; they used it daily. One of the faculty used it to provide instructional resources, but it could be incorporated into the curriculum more effectively. In order to make it a more meaningful opportunity and to facilitate the learning community, use it next year with more explicit instructions, such as homework assignments.

Surveys:
Eliminate the following items from the student surveys (because they don't provide valuable information):

I. Student Inventory	Items # 1, 6, 16, 17.
II. Attitudes Toward Computers	Item #5.
III. Career Goals:	Item #1.
IV. Parental Attitudes:	Items #1, 3, 6, 7, 8, 9, 10.
V. Peer and Teacher Attitudes:	Eliminate all.
VI. Computer Science Tasks:	Eliminate all.

Change Parent **Post**-Survey to ask what were the most valuable lessons, or ideas, or activities their daughter gained *as a result* of the Camp.

Student Input: Review this year's comments on surveys and Two Minute Papers. Some of the student suggestions should be considered for future years' camps, such as providing activities during the lengthy bus rides on field trips, accommodating the students request to select their own 'computer buddy' during the last week of camp, and using a timer or a reminder to be sure each girl has equal opportunity on the computer they share as a team.

Curriculum:
Do not make any significant changes in the curriculum and instruction since they were dramatically effective this year.

For next year, consider using a rating scale for applications and teacher recommendations. There will probably be so much demand that you will *need* this additional information to determine who to select.

Also, consider having them do a final individual or team presentation. The advantage is that it gives the entire month a targeted purpose; it could also be used to guide them in improving their presentation skills. If each girl has just five minutes or so, it could be done the last afternoon, and viewed as a 'dress rehearsal' for demonstrating to their parents (and others) what they had learned.

During the 2012 camp, be more explicit about using the ISTE NETS Performance Indicators for Students ((NETS•S) (Appendix VI) and the ISTE NETS Performance Indicators for Teachers (NETS•T) (Appendix VII) in evaluating the curriculum and student progress during the workshop.

In addition, make use of the O-TOP in order to profile (not evaluate) the type of instruction the teachers provided during camp. (Appendix VIII)

Cameras – Arrange for the participants to keep their cameras permanently, since they had been so motivating and popular.

Target students who will be confident, will take on leadership role, but may not have had extensive opportunities for camps, resources, etc. Also target 1 or 2 girls in each MS, one 7^{th}, one 8^{th}.

Two-Minute Daily Evaluation

Themes are summarized and listed in order of comment frequency.

Week 1/Day 1

Most frequently mentioned::

PB&J activity was almost unanimously popular.

Lunch and snacks and games and meeting girls were fun. (Food very exciting – not like *school* food!)

Flip Camera is very popular as well as making notebook cover and decorating water bottle.

Do differently:

More info how to do blog post, their binder covers (for those who need additional instruction)

Several thought spending 45 minutes on the expectations/behaviors was excessive.

Week 1/Day 2

Most frequently mentioned::

Binary numbers and router activity.

Lunch and snacks; several comments about the good vegetarian food; making new friends.

Making and editing videos on the Flip camera.

Posting blogs.

Being outside.

Do differently:

Some would like more info on using elgg.

One didn't care for the router activity (but still indicated she had learned a lot about binary numbers and computer communication). Another suggested the router activity would have been more interesting if it had been constructed as a competition to see who could deliver the message faster. And one suggested a bigger computer/router map so more girls could join in the activity.

A couple indicated there was too much free time when they'd rather have more lessons.

Some said more reminders needed to be sure the time on the computer was approximately half each.

One suggested more opportunities to ask questions.

Week 1/Day 3

Popular:

OMSI invention – writing robots.

Slow marble race.

Food continues to be a highlight.

Several mentioned that learning vocabulary today was very helpful.

Simple and compound machines.

Quite a few suggested that they learned persistence – not giving up when the project doesn't work right away.

Several commented that they appreciate working as part of a team.

Do differently:

Several suggested you allow more time for construction of pen-writing robots. (More time was a common theme.) One suggested that there should have been one less lesson so the day didn't seem so rushed.

A couple suggested that 'transitions' be done differently, without identifying the issue.

<u>Week 1/Day 4</u>

<u>Most frequently mentioned:</u>
'Playing' with robots, using sensors.
Using the motion detector (range-finder) and matching the distance graph.
Making and eating ice cream.
Riding the Segway.
Strength-controlled cars.
Several mentioned they learned a lot about what engineers do.
Using a Vernier caliper.
Learning about the pH scale.

<u>Do differently:</u>
More time on the Segway.
One suggested smaller groups so everyone can hear well.
More time to ask/answer questions; but some others.

<u>Week 1/Day 5</u>

<u>Most frequently mentioned:</u>
HTML and CSS to make a website; formatting webpages. (Nearly unanimous)
My friends.
Volleyball.

<u>Do differently:</u>
Have Mrs. Haberman stay!
Give us more time to work on the website. (One said 'less free time')
More time for questions.

<u>Most common for the week:</u>
I ♥ G^2CS!
Pacific University serves great food!

<u>Week 2/Day 1</u>

<u>Most frequently mentioned:</u>
Building the robots (Design, Build, Test). (Unanimous)
I learned the importance of working together and sharing ideas. (Very frequent)
Don't worry if you don't succeed on the first try. Patience is key.
The water/spit game. (?)
Most continue to love the food! (But one wants to bring her own lunch.)

<u>Do differently:</u>
One group worked faster than others and didn't like being held back. Have extra 'challenges' for those who work fast; or pair up experiences people.

<u>Week 2/Day 2</u>

<u>Most frequently mentioned:</u>
Field trip to OPB.
Interviewing and reporting.
The Lego robot and programming.
Watching Geoff Norcross get taped for evening broadcast.
Study the subject/content; don't worry about the technology because it's always changing.
Live broadcasting.

<u>Do differently:</u>
Make sure directions are accurate so we don't get lost.

Do the OPB tour in smaller groups.
Have something for us to do on the bus besides just talking.
It would be awesome if we could do some sort of forecasting (broadcasting?) ourselves; a different team each day would prepare the G^2CS news report.

Week 2/Day 3
Most frequently mentioned:
Learned about wave power and sea anemones.
Going to the beach and getting wet and swimming in the pool.
The inner workings of an aquarium.
The bus ride with my friends was great.
Do differently:
Go to the pool first, then dinner.
Spend more time at the Hatfield Marine Center.
Movie was boring.

Week 2/Day 4
Most frequently mentioned:
Tide pooling!
The aquarium.
Understanding tides and their cause.
Seeing the sharks, anemones, sea sponges, jellyfish and other animals; oceanography.
Swimming with everyone in the pool.
Surprise party with cake and T-shirts.
Cooking dinner.
The girls really enjoyed the coast trip and appreciated the efforts that went into planning it.
Do differently:
More careful scheduling; seemed chaotic at times.
The lab that we did was too much and required too much reading on such a long day.
The video was long and boring but would have been more interesting if we had seen it *before* we went tide-pooling.
Let us go to the gift shop.
Don't wake us up so early (but I understand that is controlled by the tide).
Plan some activities or games so the bus ride isn't so long and boring.
Need more structure in the tidepooling activity; we didn't use the book because we didn't know how.
Two girls mentioned the groups – one that would have preferred being able to choose by themselves; another indicated that learning to get along with people who aren't their friends will be valuable in their future.
Two said the early morning was too rushed; could have prepared better the night before.
Add a scavenger hunt for finding sea creatures.
One said more food!
Approximately the same number said 'more free time' as those indicating 'less free time'.

Week 2/Day 5
Most frequently mentioned:
Programming the robots. (Nearly unanimous)
Presenting our robot projects and seeing others.

Team work is important
Snack break was important so we could come back fresh to tackle the robot programming.
Problem-solving; don't give up.
Do differently:
More time to work on robots.
Have public safety discussion earlier on in camp.
Trip should have been a different week so we could continue working on robots.

Other Comments:
I ♥ my Flip Camera!
Thanks for letting us know what to do on the bus.
Be patient and don't give up.
Don't change anything – it's perfect as is.

Week 3/Day 1
Most frequently mentioned:
Alice! (Nearly unanimous)
Working as a team.
Kickball was awesome.
Do differently:
More time on Alice. (Many mentioned this, but one said *less* Alice and more break.)
Make sure we are taking turns (Alice) by setting some guidelines, like 'every two slides' or something.
Give a more general introduction on how to do some things.
Comments:
I loved the programming.
I learned to respect gaming programmers – it's hard work.
I loved how the girl is saving the guy this time.

Week 3/Day 2
Most frequently mentioned:
OMSI – and the freedom to do what we wanted.
The Omnimax movie.
Galois and cryptography and Enigma machines.
Learning about the different stages of a baby when it's in the womb. (Several)
Do differently:
More time at OMSI, especially in the gaming exhibit.
Don't bother going to Galois. (Only one)

Week 3/Day 3
Most frequently mentioned:
Alice! Creating my own story. (Nearly all said this)
Working with a partner.
Making bracelets.
Don't give up – keep trying and you will solve the programming problem.
Do differently:
More time on Alice. (Nearly unanimous)
Comment:
"This camp isn't long enough!"

Week 3/Day 4
Most frequently mentioned:
Finishing our movie and seeing others' movies. (Unanimous)
Working as a team is helpful.
Making presentations – some said scary, others said it's not as hard as they thought.
Do differently:
Need more time on the movies. (Nearly unanimous)
Don't invite OPB.
Comment
Never give up! (From many)
Things turn out better when you work together.
Programming takes forever!
One important lesson I learned today was to get started and getahead to avoid rushing at the end.
Today was fantastic! (Several)

Week 4/Day 1
Most frequently mentioned:
Making the cookie. (Definitely the most comments)
Computer safety
The Clean Room
The whole Intel tour; making circuits; seeing the giant keyboard.
Making the songs and cookies.
Learning about silicon chips.
Do differently:
More of a tour at Intel. (Many commented that they would have liked to have a tour and more time at Intel.
Less time at lunch and more activities.
More women speakers.
Comments:
I ♥ G^2CS! I'm sad we only have a few days left.
This camp isn't long enough!
Thank you for all the wonderful trips we went on during the camp.
I suppose you saved the best field trip for last!
I don't want G^2CS to end! I've had so much fun working with so many girls who are just like me! I realize now just how much the world is in need of female workers. It has really motivated me to try my best.

Week 4/Day 2
Most frequently mentioned:
Dissecting the hardware – radio, phone, iPod, and other gadgets. (Unanimous)
Wikilinks.com
Do differently:
Shorter snack break so we have more time for websites.
Show us the wiki pages earlier.
Let us choose our partners. (One)
You need more tools. (One)
Comments:
Today was so cool -- and dangerous.

Week 4/Day 3

Most frequently mentioned:
Taking apart the computer. (Unanimous)
Painting the bench. (Nearly unanimous)
Playing outside; soccer, ultimate frisbee (a few).
Free time.

Do differently:
Sometimes let us choose our partners.
I would have liked to learn more about the motherboard.
Next year, extend the days.
A couple said 'less lecture' while others said they enjoyed learned about the motherboard, RAM, etc.

Comments:
Today was perfect! (Several)

Week 4/Day 4

Most frequently mentioned:
Bridge-building
Asking questions and getting answers.
Working with Alice.
Putting together our presentation.
The yarn G^2CS design.

Do differently:

Comments:
"This has been the best camp ever!" (Many)

Additional Comments:

The following statements were either illegible or I didn't understand them:
Do not make us give back our nametag halves we switched with someone else. (Week 2/Day 5)
We should have pictures at a different area because the people kept getting in my picture and they had to use a circular mirror thing to give off light. (Week 3/Day 4)
Actually tell us that we were supposed to tell us we were supposed to talk to the ladies during lunch – tell us at the start of lunch. (Week 4/Day 1 regarding the Intel tour)

Final Evaluation Comments:

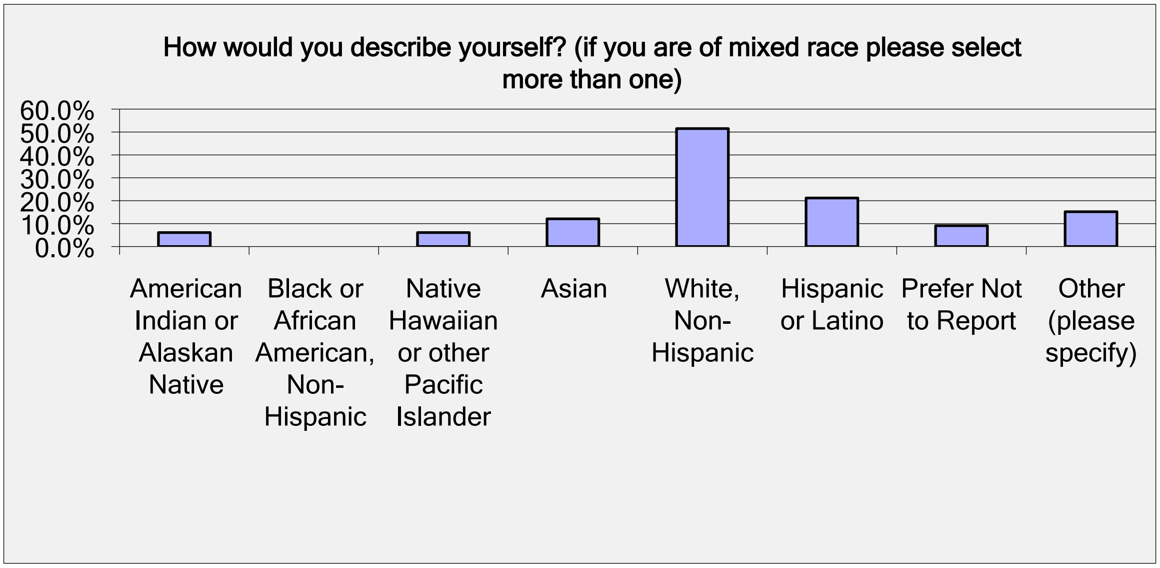
Most commonly mentioned *to keep* for next year were: Robots and Alice. There were many other comments, often contradictory with others, so no particular trends. (Some said 'start earlier in the day', while others recommended a shorter day.) However, they clearly loved the camp and the entire staff! The most common suggestion for next year: No OPB!
More time for individuals to work on their preferences; more choices.
Something to do on the field trip bus.
Let the girls choose their computer buddy for the last week.
Not enough time.
Presentations were terrific.
Loved the Flip cameras.
Have extra activities prepared for faster students.
Keep the field trips! (Intel and the Coast were mentioned most.)

FIELD TRIPS SURVEY

Appendix II

Please rank the G^2CS field trips from better to worse (1 is best, 4 is worst). You can only use each number once, so you can't have multiple field trips with rank 1.

Survey #	Vernier	OPB	Hatfield M S C	Newport Aq	OMSI	Galois	Intel
1	5	7	4	2	1	3	6
2	1	6	5	4	2	7	3
3	7	6	2	4	1	3	5
4	5	6	4	1	2	7	3
5	5	6	4	3	1	7	2
6	1	7	4	3	2	6	5
7	3	7	4	2	1	6	5
8	5	3	1	7	2	4	6
9	6	5	7	2	3	4	1
10	4	6	5	3	2	7	1
11	7	6	5	3	1	4	2
12	5	3	6	2	4	7	1
13	4	6	3	1	2	7	5
14	5	6	4	3	1	7	2
15	4	5	7	3	2	6	1
16	6	4	3	2	1	7	5
17		2	5	4	1	6	3
18	4	6	5	3	2	7	1
19	6	5	4	3	2	7	1
20	5	4	3	1			2
21	2	4	5	6	1	7	3
22	2	6	3	4	1	7	5
23	3	5	7	2	4	1	6
24	1	4	2	5	7	3	6
25	3	6	7	1	4	2	5
26	4	5	6	2	1	7	3
27	5	3	7	3	2	4	2
28	3	4	3	3	1	5	
29	4	6	2	1	3	5	7
Total	115	149	127	83	57	153	97
Average	4.11	5.14	4.38	2.86	2.04	5.46	3.46



Answer Options	Response Percent	Response Count
American Indian or Alaskan Native	6.1%	2
Black or African American, Non-Hispanic	0.0%	0
Native Hawaiian or other Pacific Islander	6.1%	2
Asian	12.1%	4
White, Non-Hispanic	51.5%	17
Hispanic or Latino	21.2%	7
Prefer Not to Report	9.1%	3
Other (please specify)	15.2%	5
	answered question (Some with more than one answer)	33
	skipped question	0

<u>Participant Post-Camp Evaluation</u>

Six months after the camp was completed, student participants were asked to complete an electronic survey in which they reported on the long-term effects of the camp as based on the ISTE NETS Standards (Appendix VI).

In the 24 Likert-scaled section of the survey, these are the four items in which participants reported the most change as a result of the camp.

11. I evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
    More/Much More (as a result of camp) 83.3%
12. I process data and report results.
    More/Much More (as a result of camp) 83.3%
18. I exhibit a positive attitude toward using technology that supports collaboration, learning and productivity.
    More/Much More 84.0%
20. I exhibit leadership for digital citizenship. (Legal/ethical issues)
    More/Much More 84.0%

On a few items in which the vast majority of participants reported 'More' or 'Much More' as a result of camp, several reported 'No Change'. The two which follow had the most responses in this category:

Item #6 - I communicate information and ideas effectively to multiple audiences using a variety of media and formats. (44 % 'No Change')

Item #23 – I trouble-shoot systems and applications. (40% 'No Change')

The post-camp survey also contained three open-ended questions. The following responses to each question have been paraphrased, summarized, and grouped by frequency.

25. Explain how your experience with G^2CS has changed your understanding of women as leaders in science.

Women can do science and technology effectively; these are not just male careers. (9)
It is important for women to have the knowledge I gained from G2CS about computers, computer science and STEM fields. (6)
It is important to encourage girls in STEM fields. (6)
There are fewer women in science than I thought. (3)
There are more women in science than I thought. (2)

26. How has your experience with G^2CS affected your confidence in your ability to use technology?

I gained so much knowledge from G^2CS – new ways of doing things and more effective ways. (12)
It has made me much more comfortable using a computer and trouble-shooting. (6)
Now I don't give up if I don't find what I am looking for. (2)
Computers and technology are not scary any more. (2)
My projects at school have improved so much because of my G^2CS experience. (2)
G^2CS inspired me to be a leader and stand out in the computer world. (1)

27. Has your experience with G^2CS had an effect on your future career plans? Please explain.

I do not plan to be a computer scientist but now I know how important computers will be in my career. (10)
Computers are more interesting now; I am considering a CS career. (7)
G^2CS has helped me understand more about the choices of STEM careers. (7)
I used to want to be an actress, but this was so interesting that I don't know now. (1)

<u>Parent Post-Camp Survey:</u>

At the Post-Camp Reunion, 7 months after completion of the camp, parents were asked to complete a survey in which they rated the camp and provided a variety of comments. The following responses have been grouped by category.

As you think back to last summer's camp, what do you think was the most valuable aspect of the camp for your daughter?

<u>Promoting a career in STEM</u> (12)
She began considering CS as a career – something she hadn't even considered before.
She learned of the great diversity of career options and the importance of technology in so many of them.
It encouraged her interest in math, science, and computers.
She began talking about choosing a college and a career in science/computer science.
It opened her eyes to the various fields of science.
Definitely had a positive impact on her attitude toward math and science.
Valuable exposure to such a wide range of professional women.
She is now motivated toward a CS career.
Most valuable was seeing so many women working in science fields.
Camp was very motivational since she already had some interest in a career in a science field.
She was already interested in a career in math or science, and the camp solidified that interest as she learned about so many career opportunities.
Now she is thinking more about an engineering career.

<u>Building confidence and sense of responsibility</u> (8)
The camp promoted her sense of responsibility – having to travel to campus on her own, meet new people, and work as part of a group.
The greatest impact was in the development of her confidence.
Many positives aspects of the camp; most valuable was her increased confidence.
The camp helped her grow in confidence and leadership.
Her confidence has definitely improved.
It opened her eyes to the fact that you don't have to be a genius to study science.
It taught her that she is smarter than she thought.
Her confidence in her math skills developed as a result of the camp.

<u>Fun (2)</u>
For sure she had fun!
She definitely had fun and made new friends.

<u>Other</u>
It had an impact in her wanting to apply herself in school.
She likes to know how things work so this was perfect for her.
Too soon to know if there was a long-term impact; we'll see the effects by high school.

Do you remember which activities, lessons or field trips impressed your daughter the most? If so, please list them.

Field trips:
- Intel (11)
- Overnight field trip to the coast (11)
- Vernier (3)
- OPB (2)
- Galois

Hardware; she liked knowing about the inner workings of the computer. (3)
Robotics; building and programming the robot. (3)
Programming Alice
There was not a single thing that wasn't interesting and impressive to her.
Cameras and making videos

Please rate the G^2CS camp compared to other summer opportunities your daughter has participated in. (Rating ranges from 1 to 5. 1 being Not Worth Attending and 5 as Truly Outstanding.)

Of 22 responses, 100% rated the camp as Truly Outstanding.

Please share any other comments or concerns or recommendations you have for future camps.

<u>Outstanding Camp</u>

I would fully recommend girls to join this camp.
This is probably one of the best summer programs around.
You are doing a great job with young girls to explore and use their potential.
I hope you receive future funding to continue your program for other girls.
Keep up the great work. Try to keep this going for many years.
I think it was just the right level of exposure and fun. What a wonderful experience.
My husband and I were very impressed with the organization of this camp from the beginning ceremony. This was an amazing opportunity. Thank you!
I was very impressed with the planning of the camp.
Great job and thank you for giving this opportunity to learn and explore.
Overall, it was great experience that she enjoyed and we enjoyed hearing about.
It was terrific. I wish she could do it again. Now she is starting to plan for college.
Too bad there isn't funding to do t his more than 3 years. This was so valuable we would have been willing to pay for the experience.

<u>Constructive Criticism</u>

We think it would be beneficial to the girls if you would open the dorms for the girls to stay in overnight Mon-Fri; it would make the commute easier and lessen travel time.
On-campus living during the week for those living far away would be helpful.
Conceptualize how an education in CS can help "supplement" other fields of professional interest that may be less conventional; eg. architectural, CAP, digital production, criminal science, etc.
Don't be bashful about making a tactful pitch to consider Pacific fan college. Discuss scholarships and criteria.
I would have loved for there to have been a summer follow-up for all the girls.
Arrange short-term industrial internships to expose to the actual CS career fields.
It would be terrific to have a follow-up camp next year for the current campers.
Perhaps more first-day meeting interactive, bonding activities since it was awkward not knowing anyone at first.

The ISTE NETS and Performance Indicators for Students (NETS•S)

1. Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
Students:
a. apply existing knowledge to generate new ideas, products, or processes.
b. create original works as a means of personal or group expression.
c. use models and simulations to explore complex systems and issues.
d. identify trends and forecast possibilities.

2. Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
Students:
a. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
b. communicate information and ideas effectively to multiple audiences using a variety of media and formats.
c. develop cultural understanding and global awareness by engaging with learners of other cultures.
d. contribute to project teams to produce original works or solve problems.

3. Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.
Students:
a. plan strategies to guide inquiry.
b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
c. evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
d. process data and report results.

4. Critical Thinking, Problem Solving, and Decision Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
Students:
a. identify and define authentic problems and significant questions for investigation.
b. plan and manage activities to develop a solution or complete a project.
c. collect and analyze data to identify solutions and/or make informed decisions.
d. use multiple processes and diverse perspectives to explore alternative solutions.

5. Digital Citizenship
Students understand human, cultural and societal issues related to technology and practice legal and ethical behavior.
Students:
a. advocate and practice safe, legal, and responsible use of information and technology.
b. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
c. demonstrate personal responsibility for lifelong learning.
d. exhibit leadership for digital citizenship.

6. Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.
Students:
a. understand and use technology systems.
b. select and use applications effectively and productively.
c. troubleshoot systems and applications.
d. transfer current knowledge to learning of new technologies.

Source:

http://www.iste.org/Libraries/PDFs/NETS_for_Student_2007_EN.sflb.ashx

1. Facilitate and Inspire Student Learning and Creativity

Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments. Teachers:

a. promote, support, and model creative and innovative thinking and inventiveness.
b. engage students in exploring real-world issues and solving authentic problems using digital tools and resources.
c. promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes.
d. model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments.

2. Design and Develop Digital-Age Learning Experiences and Assessments

Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S. Teachers:

a. design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity.
b. develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress.
c. customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources.
d. provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching.

3. Model Digital-Age Work and Learning

Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society. Teachers:

a. demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations.
b. collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation.
c. communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats.
d. model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning.

4. Promote and Model Digital Citizenship and Responsibility
Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices. Teachers:

a. advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources.

b. address the diverse needs of all learners by using learner-centered strategies providing equitable access to appropriate digital tools and resources.

c. promote and model digital etiquette and responsible social interactions related to the use of technology and information.

d. develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools.

5. Engage in Professional Growth and Leadership
Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources. Teachers:

a. participate in local and global learning communities to explore creative applications of technology to improve student learning.

b. exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others.

c. evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning.

d. contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community.

Source:
http://www.iste.org/Libraries/PDFs/NETS_for_Teachers_2008_EN.sflb.ashx

Oregon Teacher Observation Protocol (OTOP)
Outcomes Research Study

This instrument is to be completed following observation of classroom instruction. Prior to instruction, the observer will review planning for the lesson with the instructor. During the lesson, the observer will write an anecdotal narrative describing the lesson and then complete this instrument. Each of the ten items should be rated 'globally'; the descriptors are **possible indicators**, not a required 'check-off' list.

1. This lesson encouraged students to seek and value various modes of investigation or problem solving.
(Focus: Habits of Mind)

Not Observed ◄——► **Characterizes Lesson**

Teacher/Instructor:
- Presented open-ended questions
- Encouraged discussion of alternative explanations
- Presented inquiry opportunities for students
- Provided alternative learning strategies

Students:
- Discussed problem-solving strategies
- Posed questions and relevant means for investigating
- Shared ideas about investigations

2. Teacher encouraged students to be reflective about their learning.
(Focus: Metacognition – students' thinking about their own thinking)

Not Observed ◄——► **Characterizes Lesson**

Teacher/Instructor:
- Encouraged students to explain their understanding of concepts
- Encouraged students to explain in own words both what *and* how they learned
- Routinely asked for student input and questions

Students:
- Discussed what they understood from the class *and* how they learned it
- Identified anything unclear to them
- Reflected on and evaluated their own progress toward understanding

3. Interactions reflected collaborative working relationships and productive discourse among students and between teacher/instructor and students.
(Focus: Student discourse and collaboration)

Not Observed ◄——► **Characterizes Lesson**

Teacher/Instructor:
- Organized students for group work
- Interacted with small groups
- Provided clear outcomes for group

Students:
- Worked collaboratively or cooperatively to accomplish work relevant to task
- Exchanged ideas related to lesson with peers and teacher

4. Intellectual rigor, constructive criticism, and the challenging of ideas were valued.
(Focus: Rigorously challenged ideas)

Not Observed ◄——► **Characterizes Lesson**

Teacher/Instructor:
- Encouraged input and challenged students' ideas
- Was non-judgmental of student opinions
- Solicited alternative explanations

Students:
- Provided evidence-based arguments
- Listened critically to others' explanations
- Discussed/Challenged others' explanations

L. Flick, P. Morrell, C. Wainwright – 2007

5. The instructional strategies and activities probed students' existing knowledge and preconceptions.
(Focus: Student preconceptions and misconceptions)

Not Observed	**Characterizes Lesson**
◄	►

Teacher/Instructor:
- Pre-assessed students for their thinking and knowledge
- Helped students confront and/or build on their ideas
- Refocused lesson based on student ideas to meet needs

Students:
- Expressed ideas even when incorrect or different from the ideas of other students
- Responded to the ideas of other students

6. The lesson promoted strongly coherent conceptual understanding in the context of clear learning goals.
(Focus: Conceptual thinking)

Not Observed	**Characterizes Lesson**
◄	►

Teacher/Instructor:
- Asked higher level questions
- Encouraged students to extend concepts and skills
- Related integral ideas to broader concepts

Students:
- Asked and answered higher level questions
- Related subordinate ideas to broader concept

7. Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence. (Focus: Divergent thinking)

Not Observed	**Characterizes Lesson**
◄	►

Teacher/Instructor:
- Accepted multiple responses to problem-solving situations
- Provided example evidence for student interpretation
- Encouraged students to challenge the text as well as each other

Students:
- Generated conjectures and alternate interpretations
- Critiqued alternate solution strategies of teacher and peers

8. Appropriate connections were made between content and other curricular areas. (Focus: Interdisciplinary connections)

Not Observed	**Characterizes Lesson**
◄	►

Teacher/Instructor:
- Integrated content with other curricular areas
- Applied content to real-world situations

Students:
- Made connections with other content areas
- Made connections between content and personal life

9. The teacher/instructor had a solid grasp of the subject matter content and how to teach it.
(Focus: Pedagogical content knowledge)

Not Observed	**Characterizes Lesson**
◄	►

Teacher/Instructor:
- Presented information that was accurate and appropriate to student cognitive level
- Selected strategies that made content understandable to students
- Was able to field student questions in a way that encouraged more questions
- Recognized students' ideas even when vaguely articulated

Students:
- Responded to instruction with ideas relevant to target content
- Appeared to be engaged with lesson content

10. The teacher/instructor used a variety of means to represent concepts.
(Focus: Multiple representations of concepts)

Not Observed	**Characterizes Lesson**
◄	►

Teacher/Instructor:
- Used multiple methods, strategies and teaching styles to explain a concept
- Used various materials to foster student understanding (models, drawings, graphs,

concrete materials, manipulatives, etc.)

Add Appendix VIII