Session 17

Fairly There

Final Presentations

In This Session:

A) Fair Choices (60 minutes)
- Student Handout: Solutions Showcase
- Student Handout: Mini-Engineering Fair
- Student Handout: Intel ISEF- Affiliated Fair
- Student Reading: Intel ISEF Finalists
- Student Reading: Interview

B) Design Your Display (90 Minutes)
- Student Handout

Fairly There helps students prepare for the fair. Before beginning the session, facilitators should read through the session and decide what type of fair they wish to have the students do: a Solutions Showcase or a Mini-Engineering Fair. They should also familiarize themselves with the Intel International Science and Engineering Fair (Intel ISEF).

In the first activity, *17A: Fair Choices*, students learn from past fair participants and an engineer about the benefits of participating in a science fair. This introduces fairs to the students, and they organize committees to begin planning for the event. The second activity, *17B: Design Your Display*, is a work session where students prepare display boards for the fair.

Supplies

- Science/engineering fair forms
- 3-panel display boards
- Scissors
- Colored paper
- Rubber cement
- Markers
- Scrapbooking supplies
- Glue sticks
- Other art materials

Session 17, Activity A

Fair Choices

Goal
Learn what is needed to participate in a science/engineering fair and begin to plan for participation.

Outcome
Students begin preparing for the fair that they are going to participate in.

Description
Here's an opportunity to become inspired by former Intel International Science and Engineering Fair (Intel ISEF) participants and a young woman whose science camp and science fair experiences inspired her to pursue a career as an engineer. After students hear from these young engineers, they plan their own fair.

Supplies
Science/engineering fair forms

Preparation
Decide which fair(s) you would like to prepare for. More information on each of these is available in Participating in Fairs .

- Intel ISEF-affiliated fair
- Solutions Showcase for parents and community members
- Mini-Engineering Fair for younger students and peers

In advance, conduct research on science and engineering fairs to determine which fairs your students could participate in. These might be regional, local or even school fairs. It is important to note that all participants who attend the Intel International Science and Engineering Fair (Intel ISEF) must participate in and be selected by their local Intel ISEF-affiliated fair. Each affiliated fair can send two individual project finalists and one team project to compete in the Intel ISEF. More information about Intel ISEF-affiliated fairs is available at Science Service, www.sciserv.org/isef/aff_fairs*. Also, be aware that participating in an Intel ISEF-affiliate fair with an engineering project will require some adaptations to fit the scientific methodology.

Prepare copies of necessary paperwork for the science/engineering fair.

If possible, invite a local science/engineering fair representative to answer students' questions about the fair.

Procedures
What Is a Science/Engineering Fair?

1. Ask students if any of them have participated in a science fair. If so, have them share their experiences.

17A: Fair Choices (continued)

2. Discuss the purpose of science fairs—conduct a brainstorm of students' ideas.

Science/Engineering Fair Testimonials

1. Have students read *17A Reading: Intel ISEF Finalists*, which profiles three projects:

    - Crayon Creations
    - Recycled Plastic
    - To Live or Not to Live? A Machine to Test for Signs of Life in a Chicken Egg

2. Students can also see more Intel ISEF student and project profiles at Intel ISEF Profiles of Success, www.intel.com/education/isef/profiles.htm.

3. Discuss these examples and what students think made these projects Intel ISEF finalists.

4. Ask students what the participants gained from their experience.

5. Have students read and then discuss *17A Reading: Engineer's Inspiration: Interview With Jenna Burrell*. Ask students to consider influences, both people and events, in their lives. Do they have a mentor? What is the value of mentors?

6. Now refer to one of the following (depending on which you plan to have your students prepare for).

A Solutions Showcase for Parents and Community Members

1. Consider having a volunteer student committee plan the details of the event, such as guest speakers, common dress or standard of dress, snacks, sequence of events, and room arrangement.

2. Students might like to make individual invitations for family, friends, and their mentors. Have the details of date, time, place, and duration of the event on display for them to copy.

3. A chalkboard or chart pad in the presentation area should be set up so students can write or illustrate key points of their presentation as they talk.

4. Assign photography duties to a parent volunteer, and ask that they photograph each student during presentations.

5. Optional: Make a computer slideshow, with a few slides for each student. The slideshow can serve as a backdrop for each student during his or her presentations. It might

17A: Fair Choices (continued)

include a drawing or photograph of the design, design specifications, or other information that supports the presentation.

A Mini-Engineering Fair for Younger Students and Peers

The Audience

1. Discuss who will be invited to the engineering fair. This may be decided by the leader, or in some cases, by the students.

2. Possible audiences include peers, younger students in a similar program, community members, and parents.

The Format

1. Discuss the format of the event, including the time, length, and location—these may be predetermined.

2. Explain the purpose of the event:
    a. To recognize students' hard work and celebrate their accomplishments
    b. To share engineering expertise with others
    c. To practice presenting projects to an audience in a similar format as an Intel ISEF-affiliated fair
    d. To get feedback on their projects: display boards, prototypes, and presentations
    e. To participate in a service project

3. Consider inviting a keynote speaker to the event. This might be a community figure or an engineer, for example.

Committees

1. For more efficient planning, divide students into the following committees to plan the engineering fair.

    - Logistics: This committee is responsible for room layout, student assignments/rotations, organization, prizes, and food.
    - Advertising: This committee is responsible for promoting the event. This may take the form of flyers, newsletter/newspaper articles and advertisements, posters, emails, or a bulletin on the school TV network.
    - Engineering activities: This committee is responsible for selecting and structuring the engineering activities for the visitors. These may include scaled-down versions of some of the activities done during *Design and Discovery*, such

17A: Fair Choices (continued)

as *1A: Build a Better Paper Clip*, *2D: SCAMPER and Backpack*, or *5C: Gears, Cranks, Crankshafts, and Belts*. Younger students may want to choose some activities from the PBS program, Zoom Into Engineering*, www.asce.org/150/zoom.html*. This group is responsible for getting the material list to the leader.

- Passport Scavenger Hunt: This committee is responsible for planning and creating the Passport Scavenger Hunt. A passport is given to each visitor and includes specific questions about each project. When the visitors ask the questions, they get a stamp from each project. Each visitor with a complete passport gets a prize. This group will need to collect and compile questions from all the groups. If there will be different age groups of students at the fair, they may need to prepare different age-appropriate passports. They can get creative with the passports—include photographs of the projects, and so forth.

2. All groups: Set aside 5 minutes at the end of the session for each committee to share their plans. Tell students that they need to write up questions about their project for the passport scavenger hunt. Depending on who is invited to the fair, students may need to write different questions for different age levels.

An Intel ISEF-Affiliated Fair

1. Having already decided which fair you would like students to participate in, distribute the forms for students to fill out. This may require them to get parent signatures. Also, they may want to wait awhile until they are absolutely sure about their project before completing the forms. Review the forms in detail.

2. If possible, invite a local fair representative to answer questions about the fair.

3. Be sure that local fair dates and deadlines are clearly communicated.

4. Have students complete the handout.

5. Note that it is highly recommended that, even if students prepare for an Intel ISEF-affiliated fair, you still have a culminating fair for *Design and Discovery*.

Wrap Up
Allow time for students to ask questions about the science/engineering fair.

Follow With
In *17B: Design Your Display*, students create their display boards.

Solutions Showcase

Handout: Session 17, Activity A

You will have the exciting opportunity to share your ideas with an audience. The group will decide who to invite.

The details of the showcase are:

Date:

Time:

Location:

1. What committee are you on? What does your committee need to do?
2. You may be asked to prepare a slide for a slideshow. If so, plan it with storyboards in your notebook.

Mini-Engineering Fair

Handout: Session 17, Activity A

In order to prepare for the Mini-Engineering Fair, you will join a planning committee. Depending on the committee you are on, your responsibilities are the following:

Logistics
This committee is responsible for planning the organization of the event.

1. Room layout: How will the room be arranged? Where will the display boards be? Where will the engineering activities take place?
2. Student assignments/rotations: What assignments will there be, such as greeters, activity leaders, and so forth?
3. Organization: What will be the order of activities for the event? How will everything be organized?
4. Prizes: What type of prizes will there be? Where will you get them? You may want to consider trying to get prizes donated from a business.
5. Food: Will you serve food? If so, what?

Advertising
This committee is responsible for promoting the event. This may take the form of invitations, flyers, newsletter/newspaper articles and advertisements, posters, emails, or a bulletin on the school TV network.

Engineering Activities
This committee is responsible for selecting and structuring the engineering activities for the visitors. These may include scaled-down versions of some of the activities done during *Design and Discovery*, such as *1A: Build a Better Paper Clip*, *2D: SCAMPER and Backpack* , or the crankshaft toy for example in *5C: Gears, Cranks, Crankshafts, and Belts*. Younger students may want to choose some activities from the PBS program, Zoom Into Engineering*, www.asce.org/150/zoom.html*. Be sure to give a materials list to the leader so that he or she can get the materials for the event.

Passport Scavenger Hunt
This committee is responsible for planning and creating the Passport Scavenger Hunt. A passport is given to each visitor and includes specific questions about each project. When visitors ask the questions, they get a stamp from each project. Each visitor with a complete passport gets a prize. This group will need to collect and compile questions from all the groups. Depending on the age of the visitors, you may need to create different passports for different age groups. Be sure to make enough copies of the passports for all the intended visitors. Feel free to get creative with the passports.

Everyone
Develop questions about your project to include in the passport. You will need to write different questions for the different ages of children who will be at the fair. Give questions to the Passport Scavenger Hunt committee.

An Intel ISEF- Affiliated Fair

Handout: Session 17, Activity A

Science/engineering fairs offer an opportunity for you to share your ideas, be recognized for your hard work, and compete for prizes. Participating in a fair requires advanced planning and being aware of and closely following the guidelines. Complete the following information to help you get started with the planning process.

1. What is the date of the local fair?
2. Where is it held? What is the address?
3. Who can I contact if I forget or need more information?

   Name:
   Phone Number:

4. I have completed the following forms:
5. The name of my adult sponsor is:
6. I have a pretty good idea of what more I have to do to be ready for entering the local science fair. Here are the things I still need to do:

Intel ISEF Finalists

Reading: Session 17, Activity A

Crayon Creations
Meghan
Malvery, Arkansas, U.S.A.

The Inspiration
Meghan is an Intel ISEF "old timer," having competed for two years. In her first year, Meghan designed "Crayon Creations" to recycle old crayons. Her dad is an art teacher at an elementary school for the deaf, and she felt the students wasted too many crayon bits in his class. She wanted to devise a way to melt the broken pieces of crayons into new shapes using a simple machine and invented Crayon Creations.

The Original Crayon Creation Machine
In her first year, Meghan invented a chrome crayon machine that:

- Melted crayon bits into interesting new shapes
- Used safe heat from a light bulb
- Could be completed in a day
- Was easy enough for young children to use
- Made crayons that kids would actually choose to use again

Overcoming Roadblocks
Meghan notes, "I had one teacher who did not think the idea was worth pursuing. She was a roadblock. But I knew it was a good idea and kept at it. When I won at state she finally said, 'Good job.' My dad supported me. I've had a lot of fun. It's meant a lot of long nights, and hard work, but it's been a really good payoff."

17A Reading: Intel ISEF Finalists (continued)

Design Improvements
In her second year, Meghan wanted to continue her research on Crayon Creations. She wanted to make improvements to the machine from the prior year. The modifications include:

- Three "hoppers" and feeding tubes so that more crayons can be melted at a time
- Plastic tubing for feeding tubes instead of brass so that it is possible to tell how full the machine is (and to give the machine more visual appeal)
- Pop rivets to attach the hoppers to the machine instead of a metal epoxy, to make the machine more durable
- Addition of a dimmer switch to control heat from the light bulb and air temperature inside the machine
- Addition of a thermometer to measure the inside temperature of the machine

Definition of Success
"I wanted a two-year-old to be able to use it and I've done that this year. I have a friend that has a two-year-old son and he plays with it and he loves it!"



Recycled Plastic: The Building Blocks of Tomorrow Phase II
Amanda
Moultrie, Georgia, U.S.A.

The Product
Amanda set out to produce a replacement for conventional bricks. The new bricks are made of recycled plastic soda bottles and will lessen plastic's impact on landfills. Amanda is now 15 years old yet first thought of her idea two years ago. To make her "Building Blocks" the first year at Intel ISEF, Amanda mixed cement, sand, and recycled plastic soda bottles. In her second year, Amanda's goal was to find an aggregate to replace sand that would increase the strength of the bond between the plastic and cement. She tested her new bricks for strength and

17A Reading: Intel ISEF Finalists (continued)

durability. The tests performed included: water and sound absorption, thermal conductivity, and compression strength. Her product met or exceeded industry standards for conventional brick and concrete blocks in all tests that were performed—now that's a success story!

Lightbulb Moment
"I was watching a home improvement show, and I saw that they were creating boards for decking. They'd used Styrofoam*, taking out the air and mixing it with sawdust. So they had this new board that wouldn't warp and absorb water. The next day the show was about mortaring brick and the brick-making process. I thought if there was some way that you could combine these two, it'd be a very good thing for the environment. I began to research this project and noticed that landfills were overflowing with garbage. Eleven percent of the weight and 24 percent of the volume in landfills is plastic. Type I plastic, the kind used in soda bottles, is the most common plastic in landfills, so it's the most accessible. If you're going to take some of that out you can prolong the life of the landfill. I decided to use plastic as the recyclable material in my bricks."

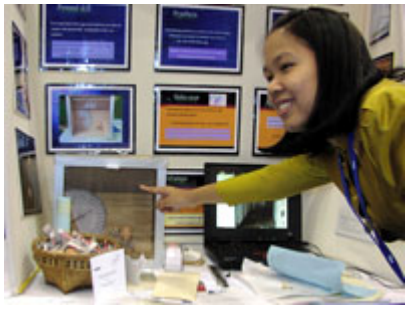
"Building Block" Benefits

- Prolongs the life of landfills by reducing the amount of plastic disposed
- Manufacturers can receive tax incentives from the government for producing recyclable products
- Recyclable products are in demand by the public
- Superior sound absorption makes the product ideal for retaining walls near freeways

This Year's Breakthrough
Amanda explained that last year the plastic and the cement did not stick to each other well. This year she thought of using clay. Because it has the same chemical composition as sand but is finer, the brick's components adhere much better. About her breakthrough idea, Amanda says: "My dad was taking me home from school and on the highway they were building a technical college. As we passed it, he looked over and said, 'there's a lot of red clay right there.' I wondered if that would work instead of sand. It was out of the blue. We went to get some clay, tried it, and it worked!"

Support
"I had a lot of parental support because both my parents are teachers. My dad's a math teacher so he helped me out with the equations that I didn't understand.

17A Reading: Intel ISEF Finalists (continued)



To Live or Not to Live? A Machine to Test for Signs of Life in a Chicken Egg
Atchavadee
Nakhon Ratchasima, Thailand

Invention Inspiration
"We live in the city but we have a hen and a rooster at our home. I wanted to test the eggs to see which to incubate."

The Problem
Atchavadee explained: "At present, testing whether the embryo in a chicken egg has developed and is alive, is done by visual inspection, by holding the egg against a light source and observing how well the tissue has developed. This method can only be used reliably during the first 3-15 days after the egg has been laid and its accuracy depends to a large degree on the expertise of the inspecting individual."

Invention Design
"Our machine is based on the observation that a living embryo is moving continuously. The egg is placed onto a spring that is set in motion by the embryo's movement. An attached needle makes these vibrations visible, and a sensor converts them into digital signals that are fed into a computer for visual display and further processing."

"Tests have shown that our machine can be used reliably from the twelfth day after the egg has been laid onwards. Being portable, it is well suited for practical applications, and it can easily be enlarged to handle many eggs at a time."

Support
"My father is in the Department of Livestock—he helped me with biology—and my mother is a teacher."

Path to Intel ISEF and Future Plans
Atchavadee was the winner in Thailand of Intel ISEF and has applied for a patent for her invention in Thailand. In the future, she may study math or engineering because it's fun and because she enjoys making and designing things.

An Engineer’s Inspiration: Interview with Jenna Burrell

Reading: Session 17, Activity A


Who Is Jenna Burrell?
Jenna Burrell is a young woman who is an Applications Concept Developer for Intel's People and Practices Research (PaPR) group. The group is composed of engineers, designers, psychologists, anthropologists, and social scientists who give Intel a fresh perspective on designing technology that meets real world needs. They do so by engaging in ethnography; the study of people to observe what people really do in their daily lives. In doing so, they are looking for new concepts to develop things that people can use. Essentially, the group provides insights into the relationship between human behavior and technology.

Here's what Jenna Burrell has to say about the work she does.

People and Practices Work Group at Intel
We are in charge of going out and exploring environments, lifestyles, and the work processes of people. We don't necessarily think about technology, but just look at people and how they do their jobs, you know, how they keep themselves entertained, even in other countries. For example, other people in the group have studied families in Europe and recently studied people in Latin America.

After interviewing and exploring an environment, the next step is to take the needs people have—needs they may not even be aware of—and see if there are ways that technology can aid those work processes or help people in those different environments. We are trying to find new places for computing technology in a way that makes sense.

Burrell's Current Project
I am looking at alternative environments for technology. Right now I'm doing a study on computing in agriculture. We [the People and Practices Research group] spend some time visiting local vineyards and interviewing vineyard managers, workers, and wine makers. Out of that we've come up with an idea for a way of sensing information in the vineyard. I've been responsible for programming these little sensing devices to detect temperature and keep track of that kind of information over time and to communicate wirelessly. The hardware for the device was originally designed at UC Berkeley, and we are trying to take it to the next step—from hardware to something that actually has an application.

17A Reading: An Engineer's Inspiration: Interview with Jenna Burrell

Burrell's Role in Her Work Group
I do just about every part in the process: interviewing, concept or idea development, and programming. I have a bachelor's degree in computer science, but I tried to structure my undergraduate program so that it was very interdisciplinary because I was also interested in social science and art. I also took a lot of psychology and organizational behavior classes.

I got my start working in manufacturing at Intel as an intern. I spent a summer studying fabrication technicians (the people wearing the "bunny suits" in the manufacturing "clean rooms") and their work process and how automation technology was or wasn't supporting that work process.

Working in a Group
As a group we all try to cross-pollinate and share ideas and talk about the themes we think are interesting. All day long, people are constantly emailing links to news articles or things like that. I think a lot of my projects come out of my personal interest. Since I am a woman in engineering, I think it's great that I'm able to take what interests me, bring it in, and try to open other people's eyes to what's interesting or valuable about that trend or technology.

What's to Love About the Job
I love the diversity and flexibility of my job. I pretty much pick my own projects so I can figure out what I'm interested in and go after them. We try to accomplish something significant in a three-month time frame but then, if it's going well, I might pick a second stage of the project and continue for another three months.

Early Influences on Career Choice
We always had a computer in the house. I had unrestricted access to computers my whole life and I got a lot out of it. I programmed and designed Web pages early on. It was always a hobby that I was really passionate about.

I was also involved in a number of different programs: I did science fairs in middle school. I liked them, although it was always hard picking a topic, but once I got going it was always really interesting. I liked being self-directed and pursuing my own questions and structuring a whole study. For the eighth-grade science fair, I was looking for evidence of ice age floods in a local nature preserve. I did all sorts of data gathering in the field and took pictures. I had a science teacher who said, "This is really good. You should consider pursuing science further in high school and as a career." I liked that project but don't think I took it that seriously until he made that comment.

The summer between eighth and ninth grade, I participated in Pacific University's science camp for girls. This was another experience where I said to myself "Oh, people think I should pursue science and I like it and maybe that makes sense, I mean, it's certainly a practical thing to do—there are good job prospects..." At the science camp, I got along well with all the girls involved, and it was rewarding in that sense. We did a lot of fun interesting projects. For instance, we built a telescope out of cardboard and some little lenses and stayed at the beach for the weekend to look for tide pools. We also worked with computers. At that point, I think I realized I had above-average knowledge of computers. I already knew how to work with databases and spreadsheets

so I thought "Okay, I guess this is an aptitude that I have—that's good to know."

Two professors ran the camp. They were both women, and one was a physics professor. In fact, everyone involved in teaching and running the program was in science. That was valuable.

School Choices
In high school, my parents encouraged me to take science classes so I took physics and advanced chemistry and biology.

When I decided to go to college I was interested in art and computer science about equally. I thought computer science sounded like a bit easier path in life because after graduating there would be no question that I'd have somewhere to go. I continued to feel like I had an aptitude for computer science in my early college computer science classes. Some people were struggling yet I seemed to be doing fine, so I kept going.

Recent Graduate of Cornell University
I graduated in 2001 from Cornell University. I grew up in Oregon, went away to school, and now I'm back. I don't consider myself to be purely an engineer just because I do so much of this other work. I think that it is a really good fit for me because I've got broad interests. I like engineering, but I also like talking to people, exploring vineyards, or wandering around Intel fabrication sites!

Mentors Important in Career Development
I benefited from a lot of great mentors. The summer I spent as an intern with Intel, I had a manager who understood my interests and my abilities. He was the person who asked me to do the project studying the fabrication technicians and their work process. He was very sensitive to the kind of person I was and what my interests were and was able to find me the position within Intel that really fed that interest.

I also worked in a research lab at Cornell University, the Human Computer Interaction Lab. The professor that ran the lab was also really encouraging. For example, I did this project design "Location Aware Hand-Held Tour Guide," and she encouraged me to do things like write papers and submit them to conferences. Just having someone say "this is the next thing I think you should do," and "I think you can do it" helped a lot. In fact, I remember one day she came into the lab and said, "You should write a paper about this and submit it to the Universal Usability Conference" and handed me the guidelines. So I went home that weekend and wrote up what I'd been doing and what my findings were and submitted it to the conference. I got in, went to the conference, and presented my paper! Having that extra kick was really great.

Advice
Girls: Go where the boys are—more women are needed in computer science and engineering. I learned how to relate to guys really well because I didn't have any choice. There were just more men than women so I was around a lot of guys, not only in computer science, but in my math and science classes. I always thought, "this is stupid—there should be more women here", but I don't think I ever felt intimidated or out-of-place. From a social aspect though, it would have been nice to have more girls.

Session 17, Activity B

Design Your Display

Goal
To create presentation boards for the fair.

Outcome
Students summarize their projects on presentation boards. This work party gets students started on their presentation boards for the fair. In the process, students learn some graphic design principles.

Supplies
- 3-panel display boards
- Scissors
- Colored paper
- Rubber cement
- Markers
- Scrapbooking supplies
- Glue sticks
- Other art materials

Preparation
In advance, tell students to bring things they may want to put on their boards.

If possible, arrange for a graphic artist to visit, explain graphic design principles, and help with the boards.

Procedures

1. Each student (or project group) should be given a 3-panel display board.

2. Using a sample display (or other design samples), conduct a mini-lesson on design principles (or have a graphic artist present them.) Review the design principles on the handout, asking the junior designers to point out examples of the design elements on the sample.

3. Before beginning the display boards, suggest that students create a mock-up version to follow.

4. Discuss the purpose of the presentation boards and the types of pieces that can be included on the boards.

    - Typed description of the problem and solution
    - Photographs of different stages of the project
    - Graphs showing survey results
    - Project explanations (tests and revisions)

17B: Design Your Display

- Design brief
- Sketches

5. Now, have a work party for students to begin working on their displays. It is useful to have computers and printers available to make charts, do word processing, and so forth. You may need to show students how to make charts.

Wrap Up
Students will probably need to complete their presentation boards at home. Tell them that at the fair, they should be prepared to answer people's questions!

Follow With
In Session 18, *Dress Rehearsal*, students get ready for the fair.

Design Your Display

Handout: Session 17, Activity B

You will now design your display for the fair. If you are planning to participate in another science fair, this will give you an opportunity to practice and get feedback on your project and display. When designing your presentation board, it is important to keep in mind several design principles. Attention to the principles of graphic design will make your presentation more exciting and easier for others to use. Good design should attract viewers' attention to your project, and then guide their understanding of the information you wish to convey.

Consistency

- Establish a style for your display and stick to it. Too much variation will make your display seem disjointed. Be consistent with all the elements.

Clarity

- Keep questioning whether your message is being conveyed clearly. Do the illustrations and charts convey what they are supposed to?
- Think about the clarity of your visual presentation. Is it cluttered? Question any possible unnecessary elements like cute stickers, doodles, patterns, etc.

Attention to Detail

- Judges will notice if a display has grammar and spelling errors. Get people to proof your work.
- Make a checklist of the points you want to cover in your display and double-check that you present each.
- Make sure all your pieces are cut out with straight lines (use a ruler) as this will make your presentation look more polished and professional.

Elements of Your Design

Color

- Limit your color palette to two or three colors. Use tints and shades of these. A large number of colors make designs seem less planned and inconsistent.
- Determine how color will be used and why. For example, you might want all your headers to be one color and text blocks to be another, so the headers will stand out.
- Keep in mind that different colors have different connotations and a power of their own. For instance, red usually demands attention. It can be used effectively for this purpose, but only if used in moderation.

Type

- Pick only one or two fonts for the text so your display will look consistent and unified. A large number of fonts, like too many colors, can seem disjointed and confusing.
- Decide on one or two techniques for emphasis in your type style. Some possibilities are: bold, italic, all caps (capitalizing all the letters of a word), color, and choice of font.
- Don't use underlining if you have italic available. Underlining was designed to represent italic for typing since typewriters don't have italic.

17B Handout: Design Your Display

- Avoid writing words vertically (with the letters stacked) as this will minimize readability.
- All caps are less readable than standard text, so if you choose to use them, do so only with small quantities of text, such as titles.
- Narrow columns of text are easier to read than wide columns of text. Left-justified or full-justified text is easier to read than centered text (for longer items).