

The Girls Creating Games Guide to Pair Programming

LESSON PLANS

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≧ How We Did It ≦

Look for these boxes throughout the lesson plan that describe what we did in the *Girls Creating Games* program.

Pair Programming Rationale & Analysis

Purpose: The purpose of this activity is to introduce the concept of pair programming, provide students with a rationale for why they will work in pair programming partnerships and have students begin to construct their own understanding of the roles and rules for good pair programming.

Time required: 30 minutes

Materials:

- Video (available at programservices.etr.org/gcgweb) or Role Play scripts
 - Blank chart paper labeled “Driver’s Job”
 - Blank chart paper labeled “Navigator’s Job”
 - Blank chart paper labeled “Rules for Good Pair Programming”
 - “Rules for Pair Programming” master list
- Role play props: computer monitor, mouse, keyboard, one binder with flowcharts (available at programservices.etr.org/gcgweb)
 - Scratch paper (1 per student)
 - Pens or pencils (1 per student)
 - Large color markers

Set-up

- 1) Position the props necessary if doing the role plays.
- 2) Hang the three wall charts that will be used for the Establishing Roles and Rules part of the activity. Place the large markers in a handy location.
- 3) Make sure every participant has access to scratch paper and a pen or pencil.

Pair Programming Rationale

- 1) If your students have been using informal pair programming, remind them of this paired work they’ve been doing on the computers. Also remind them that they will be working in pairs throughout the program. Explain that these pairs will rotate for a few sessions, so that program leaders can observe them working with different people. Finally, explain that soon they will get a permanent partner with whom they will design and build IT project.
- 2) Explain to students that the way they work together in pairs on the computer in your program is special, and is different from how they might share a computer in a class at school. Explain that in your program, working on the computer with a partner is called Pair Programming. Point out that in pair programming, both partners have important jobs to do. Explain to them that in pair programming, both partners need to be actively engaged and both need to use good teamwork.
- 3) If your students have been using “informal” pair programming, remind them that in an earlier session they were introduced to the basics of pair programming.

≧ How We Did It ≦

Before the first time students worked on the computer with a partner, program leaders gave them the following guidelines regarding their roles as pair programmers:

- There are two pair programming roles: “driver” and “navigator.”
- The driver operates the keyboard and the mouse.
- The navigator is in charge of watching what the driver is doing in order to prevent mistakes.
- The navigator is in charge of all printed resource materials, especially flowcharts
- Partners each take turns being the driver and the navigator.

- 4) Present students with a *rhetorical* question. “Why do we use pair programming when there are plenty of computers for everyone?” Tell students the reasons why we use pair programming:
- Having a partner gives you a built-in helper.
 - Many people find computers more fun and less lonely/isolating if they get to work with someone else.
 - Learning to work with computers is like learning a foreign language; there are lots of new words and special codes that computers understand, called programming languages. It is easier to learn these new words and codes if you have someone to talk to about them, just like it is easier to learn a foreign language if you have somebody to converse with.
 - Working with a partner helps you develop good teamwork skills, which are good things to have for school, future jobs and careers (Being able to work with others is one of the top things employers look for) and for life in general.

Video or Role Plays

If using video:

- 1) Explain to students that the purpose of today’s activity is for them to learn more about how to be good pair programming partners. Explain that, rather than lecturing them on the jobs of the driver and navigator, or on the rules to follow when pair programming, you want them to come up with these things.
- 2) Tell students that you are going to show them a short video. In the video they will see two different pairs of young women practicing pair programming. Tell students that you want them to watch the videos and look for the things that happen in it that they think are examples of good things to do when pair programming, and also look for things that they think are examples of bad things, or things not to do when pair programming. Tell students that they can use their scratch paper to write down what they see.
- 3) Show the video.
- 4) Move among the students and help them record observations on their scratch paper.
- 5) Follow next part of plan below titled “Establishing Roles & Rules.”

If using role plays:

If you are unable to use the digital video for some reason, you can do the activity as a skit using the role play script (see pages 5-9). It is not necessary for the role-plays to be rehearsed and polished. Deliberately emphasizing certain behaviors, even if it comes across as “corny” is effective.

- 1) Tell students that you and another program leader are going to do two skits. In the skits, the two of you will be pair programming partners. Tell students that you want them to watch the two skits and look for the things that happen that they think are examples of good things to do when pair programming, and also look for things that they think are examples of bad things, or things not to do when pair programming. Tell students that they can use their scratch paper to write down what they see.
- 2) Perform the first role play which models “bad teamwork/bad pair programming/things not to do.”
- 3) Perform the second role play which models “good teamwork/good pair programming/things to do.”
- 4) Follow next part of plan below titled “Establishing Roles & Rules.”

Establishing Roles and Rules

- 1) Once students have viewed the video/role plays, explain that their observations are going to be recorded on the chart paper on the wall. Explain to them that their ideas will become the set of rules they should follow when working with their pair programming partners.
- 2) Get students to volunteer to be “recorders” who will write comments on the wall charts.

- 3) Ask them to tell you what the job or assigned tasks should be for the Driver and for the Navigator based on what they saw in the video/role plays. Have recorders write responses under corresponding wall charts.
- 4) Facilitate a discussion of what students observed. If possible, check students' ideas for rules and new assigned tasks or jobs against your copy of the Jobs & Rules for Pair Programming master list (see pages 10-11). If students are missing important rules or jobs, use strategic questioning to try to get them to articulate similar rules or jobs. Don't change the wording of what students say. Using students' own words will maximize students buy-in, and ownership of the practices presented on the list.
- 5) If students are too focused on what the young women in the video or adults role playing were "not" doing, or "negative" aspects of pair programming, help them translate their criticisms into statements of what pair programming partners should do to avoid these bad practices, or what the good practice would be to replace the bad practice.
- 6) Close the activity by explaining to students that the program leaders will take their ideas and create an official wall chart of the "Jobs & Rules for Pair Programming" that students came up with. Explain that in the meantime, you are going to hang the existing charts in the computer lab so they will be able to refer to it when working with their partners. Emphasize that each time they are at the computer with a partner they need to choose roles at the beginning, switch so that each get equal time in each role, and remember to practice the rules just learned.

Pair Programming Analysis Role Play Scripts

“BAD” Pair Programming Role Play

GIRL 1 = DRIVER **GIRL 2 = NAVIGATOR**

GIRL 1	Okay, we’re going to start the first skit. This skit shows bad pair programming, so watch carefully to see what NOT to do. I’m going to start as the driver and Shannon is going to be the navigator.
GIRL 2	<i>(NAVIGATOR is sitting or standing directly in front of the keyboard and mouse. This will make it difficult for DRV to reach.)</i>
GIRL 1	Hi Shannon...
GIRL 2	Hi Jill...
BOTH	<i>(Both of them wait for several uncomfortable moments, not looking at each other.)</i>
GIRL 1	Ummm... Shannon, could I be the driver first today?
GIRL 2	Okay
BOTH	<i>(DRIVER turns the computer so she can see it, then starts adjusting the keyboard and mouse. While she is adjusting, the NAV turns the computer back so it is facing her. This computer “tug of war” goes on a few more times, until finally the DRV gives up.)</i>
GIRL 1	<i>(NAVIGATOR doesn’t move, so DRIVER has to reach across her body to use the keyboard and mouse.)</i> All right, I’m ready. <i>(to NAV)</i> I missed the last session. What do I need to build in the game today?.
GIRL 2	<i>(Stares at the ceiling, looks at nails, watches other people)</i> I dunno...
GIRL 1	<i>(Angrily)</i> You’re so stupid. <i>(Reaches across further to get the pair’s binder)</i>
GIRL 2	<i>(Still staring at the ceiling, looking at her nails, watching some other girls)</i> <i>(Under her breath)</i> WhatEVER...
GIRL 1	Let’s see... <i>I</i> need to put a button on my Welcome page. <i>(Starts clicking away-she’s opening the library and looking at buttons)</i> <i>(To herself)</i> That one is ugly... That’s nice...ugly... cool. So it’s the pretty green button or the cool flashing one... I like the flashing one. <i>(Clicks some more, placing the button on the stage)</i> <i>(Half to herself)</i> Wouldn’t it would be cool if the buttons on our game looked like people, so when I click them I could hear them

	tell ME what MY choices are? <i>(Looks at NAVIGATOR, then shrugs.)</i>
GIRL 2	<i>(Gets up from her seat and walks over to audience...)</i> Hey, are you going to the movies tonight? <i>(Waits for an answer. If girls in the audience don't respond, NAV shrugs her shoulders and says...)</i> What EVER ... <i>(Turns and starts paying a LITTLE more attention to DRV)</i>
GIRL 1	<i>(To herself)</i> Now I'VE got to put ActionScript on the button to make it go to MY credits page...
GIRL 2	No STUPID, you have to make a new layer first! Here, let ME do it! <i>(Leans in and takes over the mouse and keyboard. She adjusts the computer equipment and "boxes out" her partner.)</i>
GIRL 1	<i>(Under her breath)</i> What EVER ...
ADULT	Okay, its time to switch roles. Drivers become navigators and navigators become drivers.
GIRL 2	<i>(Talking to the adult)</i> We already switched...
GIRL 1	But I didn't get my full turn --
GIRL 2	What EVER ...
END	

“GOOD” Pair Programming Role Play**GIRL 1 = DRIVER** **GIRL 2 = NAVIGATOR**

GIRL 1	Okay, now we're going to do the second skit, and show you GOOD pair programming. <i>(Carrying BINDER, she walks up to her partner)</i> <i>(In a friendly tone)</i> Hi Shannon!
GIRL 2	Hi Jill. <i>(Concerned)</i> Where were you on Tuesday?
GIRL 1	I was sick.
GIRL 2	Bummer. Well, why don't you drive first today. <i>(Moves over so her partner can sit in front of the computer. The mouse and keyboard are STILL in FRONT of her.)</i>
GIRL 1	<i>(Sits down in front of the monitor.)</i> Cool.
GIRL 2	Let's put the keyboard and the mouse where you can reach them, okay? <i>(She moves the mouse and keyboard over to her partner.)</i>
GIRL 1	<i>(Positions the keyboard in front of her and makes sure that the mouse is on the side AWAY from the navigator.)</i>
GIRL 2	Is my chair okay here? I want to show you what I did on Tuesday.
GIRL 1	Yeah, that's fine. LET'S turn the screen so you can see... <i>(Adjusts screen.)</i> How's that?
GIRL 2	Good.
GIRL 1	Oh, and here, I got our binder out of the closet. <i>(Hands the binder to G2/NAV)</i>
GIRL 2	Thanks. <i>(G2/NAV opens up the binder to the flowchart)</i> Here, LET'S open it to the flowcharts for right now...
GIRL 1	<i>(Gives an affirmative nod)</i>
GIRL 2	...but help me remember that I wrote some ideas in our design notebook that I want to show you later, okay? <i>(Alternately pointing at the screen and looking at her partner)</i>

	<p>Go ahead and open our game file...no, that folder... yeah.</p> <p>See how on Tuesday I made a new scene for us and called it “welcome,” ‘cause it’s going to be the first scene that someone will see when they play our game.</p> <p><i>(Alternately pointing at the screen and looking at her partner)</i></p> <p>See how I typed in the direction for our game? I used the text that they gave us. I put it on its own layer and I called it “directions.”</p>
GIRL 1	<p><i>(Alternately looking at the screen and at her partner)</i></p> <p>How come you didn’t just call it “text” like we did before?</p>
GIRL 2	<p>Well, see, that’s one of my ideas.</p> <p><i>(Alternately pointing at the screen and looking at her partner)</i></p> <p>Look at what I wrote in our design notebook. Since the directions are the same for everybody’s game, I thought it would be cool if WE made our directions <i>DO</i> something, you know, like flash different colors or something?</p> <p>I thought would make sense to put the directions on a separate layer from other text, like the title of OUR game.</p>
GIRL 1	<p>I like it. So what are we doing on OUR game today?</p>
GIRL 2	<p>Let me look at the assignment sheet...</p> <p>WE have to put a button on OUR welcome page. WE’RE going to make it so when someone clicks on the button, it takes them to OUR credits page, where they can see OUR names, because WE’RE the fabulous builders of this game!</p> <p>Let me get out the flowchart about buttons from Tuesday.</p> <p><i>(Alternately pointing at the screen and looking at her partner)</i></p> <p>Okay, so WE need to go up to windows and click, no click and hold it down, yeah, like that. Now click on common libraries and then on buttons. Now WE can click on any of these buttons...</p> <p>No, on the little symbol there... yeah... and WE can see what they look like. When WE find one we like, WE can drag it on to the stage.</p>
GIRL 1	<p>Okay, I’m clicking on different buttons to look at them...</p> <p><i>(Clicks and shows several buttons.)</i></p> <p>How about this one? <i>(Points to the screen)</i></p> <p>It looks just like a button on an arcade game. See the shading, it looks real.</p>
GIRL 2	<p>I don’t like the color. How about the same button, but in red?</p>

GIRL 1	I like the green one better, but...okay. How do WE put it on the stage?
GIRL 2	Just click on it... no click and hold... now drag the button on to the stage.
GIRL 1	Okay, I'm clicking, holding... dragging...
	<i>(Looks at her partner when she asks the question.)</i>
	How about here?
GIRL 2	That's pretty good. WE can just drop it and we'll move it later.
GIRL 1	Okay, I'm dropping it --
GIRL 2	<i>(Interrupts)</i> Wait, wait, wait! WE forgot to create a new layer!
GIRL 1	Ohhh, that's right. Okay, I'm inserting a new layer and then WE'LL name it "button..."
GIRL 2	Good job!
ADULT	Okay, its time to switch roles. Drivers become navigators and navigators become drivers.
BOTH	<i>(Get up out of their seats, high five and switch places.)</i>
GIRL 2	Okay, now WE can drag the button on to OUR stage...
	<i>(Starts clicking, then stops)</i>
	Hey, you didn't get to finish.
	Do you want to drive a little longer?
GIRL 1	No, its okay, I'll get another chance later, or... <i>(casually)</i> whatever...
END	

Jobs & Rules for Pair Programming

DETAILED

The following set of rules should be reflected in instructional materials provided and displayed to promote good pair programming practices, including participant's list of rules or "do's and dont's."

1. Driver's basic job(s):
 - a) The driver operates the key board and mouse.
2. Navigator's basic job(s):
 - a) The navigator follows what the driver is executing on screen and prevents mistakes.
 - b) The navigator is in charge of Flash reference materials, including flowcharts and reference books.
 - c) The navigator is also in charge of project design materials like story path sheets and the game design notebook. The navigator records ideas and problems in the game design notebook.
3. Driver position:
 - a) The driver is in front of the keyboard with the mouse in hand.
 - b) The mouse is positioned on the side of the keyboard furthest away from the navigator.
4. Navigator position:
 - a) The navigator positions her chair and the monitor so that she can clearly see the screen and reach it to point.
 - b) The navigator has Flash reference materials and game design materials organized on the desk or table space to ensure easy access.
5. Partners physically get up and move positions when switching roles.
6. Partners pay close attention to each other when pair programming, including:
 - a) Looking at each other when talking.
 - b) Listening carefully.
7. Partners work hard to make sure each person understands what is being co-created, including:
 - a) Driver checks for agreement on operations before or after executing on the screen.
 - b) Partners point at the screen to support clear communication.
 - c) Drivers describe what they are doing while executing on the screen.
 - d) Navigators show notes recorded in the design notebook to the driver to check for accuracy and agreement.
 - e) If one partner is absent for a session, then in the subsequent session, that partner gets a full description of the work completed while she was absent.
 - f) A partner who was absent during the previous session starts off as driver in the next session.
8. Partners are respectful of each other, including:
 - a) Navigators do not handle the mouse or keyboard.
 - b) Drivers do not grab for reference materials or game design materials.
 - c) Disagreement is natural and should be resolved respectfully.
9. Partners share ownership over the project.
10. Partners help each other, create opportunities for each other to learn, promote trading off of pair programming roles and share the creation of their project.

Jobs & Rules for Pair Programming

ABBREVIATED

DRIVER

- Operates key board & mouse
- Sits in front of keyboard with mouse
- Doesn't grab flowcharts or binder
- Checks for agreement on what they are doing in Flash
- Talks to navigator (including checking for agreement) about what they are doing on the computer.

NAVIGATOR

- Follows what driver is doing on screen and prevents mistakes.
- In charge of flowcharts, binder, game design materials and books (organizing, holding, reading)
- "Notetaker" when necessary
- Doesn't handle mouse or keyboard

RULES for BOTH

- Respect each other
- Switch roles without arguing
- Look at/pay attention to each other
- Talk to each other about what they are doing (esp. driver)
- Listen to each other
- Point at the screen
- Catch partner up when absent
- Angle screen so both can see and navigator can point
- Disagreement should be handled respectfully
- Share ownership over the project
- Help each other

Pair Programming Poster & Matching

Purpose: The purpose of this activity is for students to review their understanding of the specific responsibilities of the Driver and Navigator roles in a pair programming partnership.

Time required: 10 minutes

Materials:

- Pair Programming Matching activity sheet (1 per student)
- Pair Programming Poster)
- Pencils (1 per student)

≧ How We Did It ≦

The Pair Programming Poster was created specifically out of the rules and jobs that the students listed (with assistance from program leaders to include key elements of pair programming) in the previous Pair Programming Analysis activity. Each implementation, the same poster template was used for all groups, but the specific roles and language would change.

Review

- 1) Have students sit next to someone who is not their pair programming partner.
- 2) Explain to students that you have posted the jobs and rules for good pair programming that they came up with (see page 13). If you added critical tasks, jobs or rules, inform them that you have done this and that you will point out the new additions as they review the poster.
- 3) Tell them you expect them to use this poster as a guide for learning to be good pair programmers.
- 4) Ask volunteers to read each rule and job for driver and navigators from the poster. If you have added rules from the master list that they did not generate, point these out to them as you come to them.
- 5) Remind students that they will switch driver/navigator roles at specific times and that you, or a designated signal, will everyone when to switch.

Matching Activity

- 1) Explain that the purpose of this activity is to remind ourselves of the different jobs and tasks performed by each of the two pair programming roles.
- 2) Explain the activity steps:
 - a) Tell students that each of them will complete an activity sheet – helping each other as needed. Read the directions at the top of the sheet (see page 14).
 - b) Explain that when everyone is finished, they should sit next to their partner, check their answers against each others' sheets, and discuss any differences and come to an agreement so that their sheets match.
- 3) Check for understanding and answer any questions.
- 4) Hand out activity sheet and pencils and have them begin. Rotate through pairs and assist as needed.

Optional: Instead of having students compare their answers, program leaders can lead a review of the correct answers in a large group or small groups. You can make this a self-guided activity by providing an “answer key” sheet for students to use to check their answers

The Navigator's job is to:

- Direct the Driver.
- Read the flowcharts.
- Move the computer so both partners can see it.
- Follow the rules for good pair programming

A Good Navigator DOESN'T:

- *Grab the keyboard & mouse.*

The Driver's job is to:

- Move the mouse and run the computer.
- Help in decision making.
- Communicate with the Navigator.
- Follow the rules for good pair programming

A Good Driver DOESN'T:

- *Make it so the Navigator can't see the screen.*

Rules for Good Pair Programming

- ◆ Help each other
- ◆ Listen to each other
- ◆ Don't goof off
- ◆ Pay attention to your partner
- ◆ Do your best
- ◆ Share the computer
- ◆ Be cooperative
- ◆ No name calling



Pair Programming

Pair Programming Matching Activity

Directions: Draw a line from the role in the pair programming team (driver or navigator) to each of the jobs that person is responsible for doing while working at the computer. In some cases, both roles are responsible for the same job, so there will be lines drawn from both roles to that job!

Jobs:

Operates the computer keyboard

Observes during programming to prevent mistakes

Makes decisions about what should be programmed

Actively listens to her partner

Operates computer mouse

Refers to flowcharts

Observes during programming to anticipate problems with the design

Doesn't grab at the mouse or keyboard

Is polite and respectful of her partner

“Driver”



“Navigator”



Pair Programming Direct Instruction & Checklist

Purpose: The purpose of this activity is increase students' understanding of good- and poor pair programming practices through a demonstration and a pen-and-paper analysis of that demonstration.

Time required: 10 minutes

Materials:

- Pair Programming poster
- Good Pair Programming Checklist (1 per student)
[Created to match student-generated roles/rules]
- Pencils (1 per student)
- Computer, LCD projector, screen, skill instruction diagrams (i.e., flowcharts)

Instructions

5 minutes

- 1) Tell students that the instruction today is going to be done using pair programming. Explain that one student will be selected to be the Driver during instruction.
- 2) Hand out the Good Pair Programming Checklist (see page 16) and pencils – 1 to each Driver.
- 3) Explain that the checklist is the list of skills for successful pair programming that they came up with for the Pair Programming poster.
- 4) Tell students that the Driver in their partnership is going to make observations of what they see happening between the Driver in the demonstration (student) and the adult program leader, who will be acting as the Navigator. Instruct the student with the checklist to focus on the pair programming in the demonstration and mark on the checklist the good practices that they observe.
- 5) Instruct the Navigator for each student pair to focus on the skill instruction so that they can help the Driver practice the skill later. Instruct them to have their flowcharts out and to follow along with the written document.
- 6) Explain that the purpose of this demonstration and their observations/evaluation with the checklist is to help them become better pair programmers.
- 7) Explain that when the instruction is done, the group will discuss their observations.
- 8) Ask students to read through the list before getting started. Give the students a few minutes to read the checklist silently or lead them in a read-aloud.
- 9) Bring up the pre-selected student to pair program with an adult.

Checklist Debrief

5 minutes

- 1) After the skill instruction is finished, give students a few minutes to complete checklist.
- 2) Remind them to only check off what they DID see happening.
- 3) Lead a brief discussion of the demonstration. Ask students:
 - *What did you notice that the demonstrators did well as pair programming partners?*
 - *What did you check off?*
 - *What is something you think the demonstrators could do to improve their pair programming?*

Pair Programming Checklist

Directions:

Identify the good pair programming practices you see during instruction by putting a check mark in the box beside each thing that you see the pair do well.

If the pair doesn't do something well, DO NOT check the box beside that practice.

Use the space at the bottom to describe specific things that the pair did well, or things that they should improve.

1. Did not grab things from each other
2. Driver didn't "hog" the screen.
3. They helped each other
4. Showed respect to each other
5. Navigator directed the Driver
6. Asked for the other person's opinion
7. Listened to each other
8. Made decisions together
9. Pointed at things on the screen.....
10. Navigator read the flowchart.....
11. Navigator didn't grab the keyboard or mouse.....

What is one thing they could improve?

Can you think of anything they did well that is not on the checklist?

Pair Programming Partner Check-in & Goal Check

Purpose: The purpose of these activities is to support students to increase the quality of their collaboration with their partner and to improve their pair programming practice. The first purpose is pursued by partners sharing formal feedback about what they are doing well when pair programming, as well as how each partner would like to see the other improve. The second purpose is pursued by students setting, working on and achieving specific and measurable goals for improvement.

Time required: 30 minutes

Materials:

- Pair Programming Partner Check-in activity sheets (1 of each sheet – Driver or Navigator – per pair)
- Examples of filled out activity sheet
- Small stickers (10 per student)
- Activity instructions written on chart paper
- Laminated Goal cards (6 copies of each card)
- Goal Check activity sheets (1 per student)
- Pencils (1 per student)
- Erasable pens (6)
- Masking or scotch tape
- Personal folders (1 per student)
- Students' Goal Cards from most recent Pair Programming Check-In activity

Instructions

5 minutes

- 1) Remind students that they have been working with their pair programming partners for a couple of sessions now.
- 2) Explain that part of good teamwork is giving feedback. Tell students: "Giving feedback means telling a partner what they are doing well and also telling them if there are things they could do differently that would make the team work better. Starting today, you are going to do an activity approximately once a week to give feedback to your pair programming partner."
- 3) The feedback activity you are going to do is called the Pair Programming Partner Check-in.
- 4) Show the Pair Programming Partner Check-in activity sheets (see pages 20-21).

≡ How We Did It ≡

The Pair Programming Partner Check-in Activity Sheets and Goal Cards (see below) were not customized according to the student-generated roles and rules for good pair programming. These were created ahead of time from the Jobs & Rules for Pair Programming list (see pages 11 and 12).

- 5) Using instruction steps on chart paper as a guide, review how to complete forms:
 - a) Get a check-in sheet that matches the job your partner did most today, that is, if he or she was mostly the Driver, choose the sheet with "Driver" in the upper left hand corner of the chart and if he or she was mostly the Navigator, choose the sheet with "Navigator" in the upper left hand corner of the chart.
 - b) Get a sheet of 10 stickers.
 - c) Write your partner's name in the space provided in the upper right hand corner of the sheet.
 - d) Place 1 sticker in each row to rate how well your partner did on that job when he or she was acting in his or her Pair programming role (Driver or Navigator). Acknowledge a very good performance using the "Did this a lot" column. Acknowledge okay work that could use more effort with "Did this, but I would like you to do it more."
 - e) If there is something your partner is doing as a pair programming partner not listed on this sheet, you can write it in on the chart where it says "Other" and evaluate your partner on it.

- f) Write your partner a personal message at the bottom. It can be a compliment, encouragement, a request improvement or anything else you want to tell them.
- g) When you are both finished, exchange sheets.
- h) Read the sheet your partner filled out about you.
- i) Choose one of the jobs/tasks for which you DID NOT get a “Did this a lot” rating to try to improve over the next few sessions. Indicate your choice by placing a sticker or making a mark in the box for this job/task in the “Will try to improve” column.
- j) In the box at the bottom of the sheet, write a sentence that explains what you are going to do to try to improve on the job/task you chose.

≧ **How We Did It** ≦

Students often experienced difficulty describing specific changes in their behavior that would lead to improved performance. Program leaders reviewed what students wrote about how to work towards their goal and assisted them in understanding the difference between “setting” a goal and “describing what they were going to do” to reach that goal.

- k) When both you and your partner have completed the sheet, read the goal-statements you wrote in the grey box at the bottom of your sheet out loud to each other.
- l) Find the Goal Card (see page 22) that matches the job/task you have chosen to try to improve. Tape it to the computer where you are working each session to help remind you of the goal you’re working on. Write your name or initials on goal cards with erasable marker.

Conduct Check-in
15 minutes

- 1) Tell students: There will probably be at least one, if not more areas where both you and your partner had ratings of “Did this, but I would like you to do it more.” “This is okay and does not mean that either of you did a bad job. You are new to pair programming and you’re learning how to do it as you go. It is important to be honest with each other about what each of you needs to improve as a pair programmer so you can each work on getting better. Honest feedback will help you both become the best pair programming team that you can be.
- 2) Have students start activity.
- 3) After 8 minutes, inform students that they should finish their writing and exchange sheets
- 4) After 13 minutes, inform students that they should have chosen a goal and written something at the bottom saying how they are going to try to achieve the goal. They should wrap up the activity by getting a laminated goal card that matches the pair programming job/task that they’ve chosen to try to improve.
- 5) Close by telling them to keep this feedback and their goal of improvement in mind when they work on the computers together. Tell them that their goal cards will be a visible reminder of the pair programming job that they’re trying to improve.
- 6) Have them store these activity sheets in their notebooks.

Pair Programmer Goal Check
10 minutes

≧ **How We Did It** ≦

After students completed the Pair Programming Partner Check-in once, they did Goal Checks after every Check-in that followed.

- 1) Have students refer to the Goal Card that they selected and displayed during the work session.
- 2) Hand out 1 pencil and Goal Check activity sheet to each student (see page 23).
- 3) Review sheet with students.
- 4) Tell them that if they think they should set a new goal they will have an opportunity to do that next session when they do pair programming check-in again.
- 5) Again, remind students that learning how to be a good pair programmer is an ongoing process.
- 6) Have students complete sheet and ask for suggestions from partner and put it in their personal folder.

Pair Programming Partner Check-in for:

Partner's Name: _____

<i>Today, while working as the DRIVER you...</i>	Did this a lot.	Did this, but I would like you to do it more.	<i>DRIVER will try to improve (mark one):</i>
Actively looked for programming mistakes			
Actively looked for problems with our design			
Helped figure out what should be programmed			
Actively listened to me, your partner			
Came up with new ideas			
Helped me improve my computer skills			
Was friendly and respectful towards me, your partner			
Complimented me on my ideas and my teamwork			
Used my ideas in creating things with the mouse and keyboard			
<i>Other:</i>			

Write your partner a message: _____

From _____ **Date** _____

*When I'm **DRIVER**, my goal is to try to improve in the area marked above.
I'm going to try to achieve this goal by:*

Pair Programming Partner Check-in for:

Partner's Name: _____

<i>Today, while working as the NAVIGATOR you...</i>	Did this a lot.	Did this, but I would like you to do it more.	NAVIGATOR <i>will try to improve (mark one):</i>
Actively looked for programming mistakes			
Actively looked for problems with our design			
Helped figure out what should be programmed			
Actively listened to me, your partner			
Came up with new ideas			
Helped me improve my computer skills			
Was friendly and respectful towards me, your partner			
Complimented me on my ideas and my teamwork			
Used my ideas in creating things with the mouse and keyboard			
<i>Other:</i>			

Write your partner a message: _____

From _____ **Date** _____

When I'm **NAVIGATOR, my goal is to try to improve in the area marked above.
I'm going to try to achieve this goal by:**

GOAL CARDS

Print, laminate and cut out into individual cards.

Treating your partner with respect.

Catching your partner up when she is absent.

Talking to your partner, describing the
Thing you're doing as driver or navigator.

Not grabbing the mouse/keyboard
when you're navigator or the binder/design
papers when you're the driver.

Moving, without arguing, when it
is time to switch roles.

Not "hogging" the screen.

Listening to your partner.

Coming up with new ideas and sharing them.

Making decisions together with your partner
And compromising over disagreements.

Doing your job: operating the
keyboard/mouse when you are driver and
preventing mistakes/solving problems
when you are navigator.

How Did I Do on My Pair Programming Goal?

My Name: _____

My Goal This Week Was to Improve: _____

How I Did on my Goal:

I improved **a lot**.

I think I should set
a **new** goal



I improved **a little**.

I think I should keep
working on **this** goal



I **didn't improve** at all

I think I should keep
working on **this** goal



Suggestion(s) for improvement from my partner: _____

How Did I Do on My Pair Programming Goal?

My Name: _____

My Goal This Week Was to Improve: _____

How I Did on my Goal:

Suggestion(s) for improvement from my partner: _____

Draw What I Say

Purpose: The purpose of this activity is to help students develop collaborative skills relevant to IT project work and applicable to pair programming. In particular, students will increase their use of descriptive language, precision in the use of descriptive language, capacity to utilize codes for completing tasks and their ability to communicate “position” related to text and objects.

Time required: 20 minutes

Materials:

- Copies of the model drawings (1 of each model per pair)
- Role responsibilities on chart paper
- Debrief questions on chart paper
- Scrap paper (for drawing and debrief)
- Labeled workspaces for each pair
- Pair names and workspaces on chart paper
- Binders
- Timer
- Pencils (1 per student)

Introduction & Instructions

5 minutes

- 1) Tell students that they are going to do an activity where they get to problem-solve and practice teamwork to build communication skills with their partner. Reinforce the idea that teamwork is very important to their goal of co-creating a project on the computer.
- 2) Have students sit with their partner at their assigned workspace (refer to chart paper). Have them use their binder as a screen to create a “blocked off” / “secret” area.
- 3) Tell them the name of the activity is “Draw What I Say.”
- 4) Explain that in their pairs or partnerships there will be 2 roles. 1 person who is the “Describer” and the other person is the “Drawer.” Refer to posted roles on chart paper and explain the roles:

“Describer’s” role:

- To select one of the pre-made drawings (see page 26).
- After selecting a drawing you will have approximately 12 minutes to describe to your partner how to draw an exact copy of the structure that you have in your “secret area.” Your partner might also ask you questions that you need to answer.
- Describer cannot do any hands-on drawing.
 - No pointing to, or touching, the paper or pencil.
 - Can only use words to describe or give instructions.
 - Is allowed to look at what the drawer is drawing to help describe and correct.

“Drawer’s” role:

- To try to draw an exact copy of the model that your partner chose in his or her “secret area” by:
 - Using pencil and paper.
 - Listening to your partner.
 - Asking clarifying questions.
- 5) Ask students: *“What other roles does this remind you of?”* (Answer: Navigator = Describer; Driver = Drawer).
 - 6) When the Describer is finished giving directions, and the Drawer feels that he or she is finished drawing take down the binder barrier and compare the master design with the one just built. *Switch roles* and try designing and duplicating another pattern.

- 7) Remind students:
- Get as far as you can, it's okay if you don't finish.
 - This is a team project – both roles are very important. The goal is for the Drawer to copy the Describer's model as closely as possible by following directions and asking questions.
 - The Describer can begin choosing a model as soon as he or she receives the photocopies.
- 8) Ask if there are any questions before they begin activity. Briefly answer any questions that arise. If a few students are especially confused and need extra help, get the remainder of the group started and help those students individually.

Conduct Activity
15 minutes

- 1) Have each pair get a set of model drawings, find their workspace and begin.
- 2) When all the pairs have selected a model, set the timer for 5 minutes.
- 3) Facilitators rotate around the room to monitor and help as needed. Prompt pairs to communicate as necessary to complete at least one drawing.
- 4) When the timer goes off, have pairs switch roles and do another round of the activity using a new model drawing. Describers can choose an easier model if the pair started with something too difficult, or a more difficult model to increase the challenge.

Debrief
10 minutes

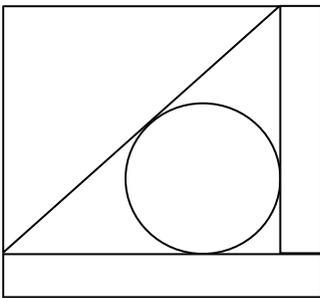
- 1) Bring the group back together and pass out more scrap paper and pencils as needed. If you have a large class and more than one program leader, split up class into smaller groups of 6-8 students.
- 2) Ask pairs to, as a team, take *2 minutes* to write down answers to the following questions that are posted on chart paper:
 - *What things did you do that helped you create exact copies of the model drawings?*
 - *What kinds of words or terms did you come up with to draw the right shapes in the right place?*
- 3) *After 2 minutes*, ask all pairs to report out their answers to the 1st question and then the 2nd question. If time allows, ask the following optional debrief question.
 - *In your pairs, have any of you invented new words or terms for working with _____ (the software used in your students IT program) that help you, as pair programmers, explain to each other what you're trying to do? (If none of them have created their own terms yet, ask them to make up a new term right now.)*
- 4) Summarize activity by saying the following: It is important for you to develop a language for precisely describing things you do in _____ (the software used in your students IT program.). This way you and your partner can understand one another and be successful in pair programming and completing your IT project. You also need to use good teamwork skills like being patient with one another, respecting each others' efforts while each of you are learning new skills and roles. Help each other by being a good navigator.

Draw What I Say

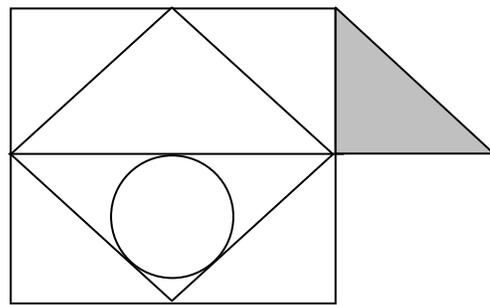
DRAWING MODELS

(enlarge; 1 per page)

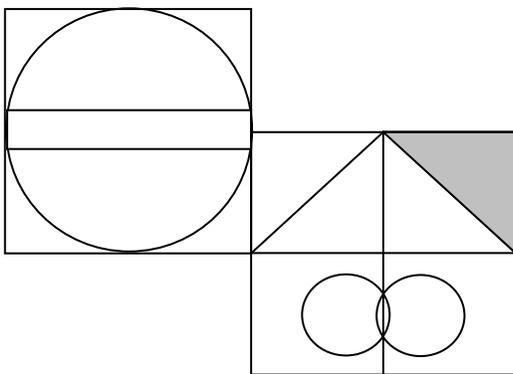
Easy model



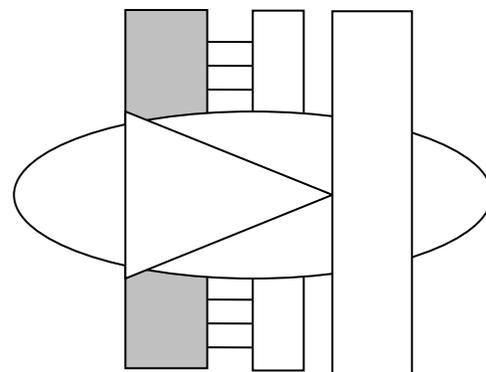
Medium difficulty model



Difficult model



Very difficult model



Pattern Blocks

Purpose: The purpose of this activity is to help students develop collaborative skills relevant to IT project work and applicable to pair programming. In particular, students will increase their use of descriptive language, precision in the use of descriptive language, capacity to utilize codes for completing tasks and their ability to communicate “position” related to text and objects.

Time required: 30 minutes

Materials:

- Labeled workspaces for each pair
- Ziploc bags of Pattern Blocks: 2 identical sets with ~15 pieces each per pair
- Timer
- Binders
- Role responsibilities on chart paper
- Debrief questions on chart paper
- Pair names and workspaces on chart paper
- Scrap paper
- Pencils

≧ How We Did It ≦

GCG used plastic math manipulative pattern blocks/pieces in different geometric shapes and colors: red trapezoids, yellow hexagons, orange squares, etc.

Introduction & Instructions

5 minutes

- 1) Tell students that they are going to do an activity where they get to problem-solve and practice teamwork to build communication skills with their partner. Reinforce the idea that teamwork is very important to their goal of co-creating a project on the computer.
- 2) Have students sit with their partner at their assigned workspace (refer to chart paper). Have them use their binder as a screen to create a “blocked off” / “secret” area.
- 3) Tell them the name of the activity is “Pattern Blocks.”
- 4) Explain that in their pairs or partnerships there will be 2 roles. 1 person who is the “Designer” and the other person is the “Builder.” Refer to posted roles on chart paper and explain the roles:

“Designer’s” role:

- To design and build a mosaic in 2 minutes using the pieces in their Ziploc bag.
 - The mosaic should not be seen by your partner – it must remain in the “secret design area”
 - There is no “right” design – it’s your own creation.
 - You don’t have to make your design flat on the table – you stack them or stand them up.
 - Use all the pieces.
- After designing & making the mosaic you will have approximately 10 minutes to describe to your partner how to build an exact copy of the mosaic that you have in your “secret design area.” Your partner has a Ziploc bag with the exact same pieces in it. They might also ask you questions that you need to answer.
- Designer cannot do any hands-on construction.
 - No pointing to or touching the pieces.
 - Can only words which pieces to use and how to put them together.
 - Can look at what the Builder is making to help describe and correct.
- No changing of the mosaic in the “secret design area” once you begin describing the mosaic to your partner.

“Builder’s” role:

- To make an exact copy of the mosaic that your partner designed and built at the “secret design site” by:
 - Using a bag of identical pieces.
 - Listening to your partner.
 - Asking clarifying questions.
- 5) Ask students: “*What other roles does this remind you of?*” (Answer: Navigator = Designer; Driver = Builder).
 - 6) If the Designer is finished giving directions, and the Builder agrees that she is finished building, take down the binder screen and compare the master design with the one just built. *Switch roles* and try designing and duplicating another pattern.
 - 7) Remind students:
 - Get as far as you can, it doesn’t matter if you finish.
 - It is a team project – both roles are very important. The goal is for the Builder to copy the Designer’s design as closely as possible by following directions from the Designer and asking questions.
 - The Designer can begin making their mosaic as soon as they receive the pieces.
 - 8) Ask students if they have any questions before they begin. Briefly answer any questions that arise. If a few students are especially confused and need extra help, get the remainder of the group started and help those students individually.

Conduct Activity**15 minutes**

- 1) Have each pair get a set of bags with blocks, find their workspace and begin.
- 2) When all the pairs have started set the timer for 1 minute.
- 3) When timer goes off, give Designers 1 more minute to finish making their pattern and then tell them to start describing their pattern to their Builder. Set timer for 10 minutes.
- 4) Facilitators rotate around the room to monitor and help as needed. Prompt pairs to communicate as necessary to achieve success in duplicating the pattern.
- 5) When timer goes off, have pairs *switch roles* and start the activity of designing and duplicating a new pattern.

Debrief**10 minutes**

- 1) Bring the group back together and pass out scrap paper and pencils. If you have a large class and more than one program leader, split up class into smaller groups of 6-8 students.
- 2) Ask pairs to, as a team, take *2 minutes* to write down answers to the following questions that are posted on chart paper:
 - *What things did you do that helped you create exact copies of the model drawings?*
 - *What kinds of words or terms did you come up with to draw the right shapes in the right place?*
- 3) *After 2 minutes*, ask all pairs to report out their answers to the 1st question and then the 2nd question. If time allows, ask the following optional debrief question:
 - *In your pairs, have any of you invented new words or terms for working with _____ (the software used in your students IT program) that help you, as pair programmers, explain to each other what you’re trying to do? (If none of them have created their own terms yet, ask them to make up a new term right now.)*
- 3) Summarize activity by saying the following: It is important for you to develop a language for precisely describing things you do in _____ (the software used in your students IT program.). This way you and your partner can understand one another and be successful in pair programming and completing your IT project. You also

need to use good teamwork skills like being patient with one another, respecting each others' efforts while each of you are learning new skills and roles. Help each other by being a good navigator.

Telephone Architects

Purpose: The purpose of this activity is to help students develop collaborative skills relevant to IT project work and applicable to pair programming. In particular, students will increase their use of descriptive language, precision in the use of descriptive language, capacity to utilize codes for completing tasks and their ability to communicate “position” related to text and objects.

Time required: 35 minutes

Materials:

- Ziploc bags of K'Nex pieces: 2 identical sets with ~15 pieces each per pair
- Labeled workspaces for each pair
- Binders
- Timer
- Role responsibilities on chart paper
- Debrief questions on chart paper
- Pair names and workspaces on chart paper
- Scrap paper
- Pencils

≧ How We Did It ≦

GCG used K'Nex brand building sets for this activity. A standard building set includes multiple rods, connectors and wheels in different colors and sizes that can be used to build three dimensional structures. These manipulatives worked well for the focus of the activity on descriptive language and “position.”

Introduction & Instructions

5 minutes

- 1) Tell students that they are going to do an activity where they get to problem-solve and practice teamwork to build communication skills with their partner. Reinforce the idea that teamwork is very important to their goal of co-creating a project on the computer.
- 2) Have students sit with their partner at their assigned workspace (refer to chart paper). Have them use their binder as a screen to create a “blocked off” / “secret” area.
- 3) Tell them the name of the activity is “Telephone Architects.”
- 4) Explain that in their pairs or partnerships there will be 2 roles. 1 person who is the “Architect” and the other person is the “Builder.” Refer to posted roles on chart paper and explain the roles:

“Architect’s” role:

- To design and build a three-dimensional structure/sculpture using the pieces in their Ziploc bag.
 - The three-dimensional structure/sculpture should not be seen by your partner – it must remain in the “secret design area.”
 - There is no “right” design – it’s your own creation.
 - Use all the pieces.
 - The Architect has 5 minutes to build it. We will set a timer.
- After designing and making the structure you will have approximately 10 minutes to describe to your partner how to build an exact copy of the three-dimensional structure/sculpture that you have in your “secret design area.” Your partner has a Ziploc bag with the exact same pieces in it. They might also ask you questions that you need to answer.
- The Architect cannot do any hands-on construction.
 - No pointing to or touching the pieces.
 - Can only describe in words which pieces to use and how to put them together.
 - Can look at what the Builder is making to help describe and correct.

- No changing of the structure in the “secret design area” once you begin describing it to your partner.

“Builder’s” role:

- To try to make an exact copy of the three-dimensional structure/sculpture that your partner designed and built at the “secret design site” by:
 - Using a bag of identical pieces.
 - Listening to your partner.
 - Asking clarifying questions.
- 5) Ask: “*What other roles does this remind you of?*” (Answer: Navigator = Architect; Driver = Builder).
 - 6) If the Designer is finished giving directions, and the Builder agrees that she is finished building, take down the binder screen and compare the master design with the one just built. *Switch roles* and try designing and duplicating another three-dimensional structure/sculpture.
 - 7) Remind students:
 - Get as far as you can, it doesn’t matter if you finish.
 - It is a team project – both roles are very important. The goal is for the Builder to copy the Architect’s design as closely as possible by following directions from the Architect and asking questions.
 - The Architect can begin making their structure as soon as they receive the pieces.
 - 8) Ask students if they have any questions before they begin. Briefly answer any questions that arise. If a few students are especially confused and need extra help, get the remainder of the group started and help those students individually.

Conduct Activity

10 minutes

- 1) Have each pair get identical pairs of bags with pieces, find their workspace and begin.
- 2) When everyone has their pieces, set timer for 4 minutes.
- 3) When timer goes off, give Architects 1 more minute to finish structure and start describing structure to Builder.
- 4) When all the pairs have started set the timer for 10 minutes.
- 5) Facilitators rotate around the room to monitor and help as needed. Prompt pairs to communicate as necessary to achieve success in duplicating the pattern.
- 6) When timer goes off, have pairs *switch roles* and start the activity of designing and duplicating a new structure.

Debrief

10 minutes

- 1) Bring the group back together and pass out scrap paper and pencils. If you have a large class and more than one program leader, split up class into smaller groups of 6-8 students.
- 2) Ask pairs to, as a team, take *3 minutes* to talk with their partner about the following question posted on chart paper. Tell them you will ask them to report out so they should take notes if they want to.
 - *What did you and your partner do to be successful at duplicating your structure?*
- 3) *After 3 minutes*, ask as many pairs as time allows to report out their answers to the question. If time allows, ask the following optional debrief question:
 - *In your pairs, have any of you invented new words or terms for working with _____ (the software used in your students IT program) that help you, as pair programmers, explain to each other what you’re trying to do? (If none of them have created their own terms yet, ask them to make up a new term right now.)*

- 4) Summarize activity by saying the following: It is important for you to develop a language for precisely describing things you do in _____(the software used in your students IT program.). This way you and your partner can understand one another and be successful in pair programming and completing your IT project. You also need to use good teamwork skills like being patient with one another, respecting each others' efforts while each of you are learning new skills and roles. Help each other by being a good navigator.

The Three P's

Purpose: The purpose of this activity is to help students build a mental model of the three concepts of piece, properties and position and how it relates to IT tools.

Time required: 10 minutes

Materials:

- Questions on chart paper

≧ How We Did It ≦

Three activities (Draw What I Say, Pattern Blocks and Telephone Architects) help students develop many different collaborative skills, some of which are particularly relevant to IT project work. In these activities, students develop communication skills that involve precise, descriptive language, which helps pairs to develop their own coded language for completing the task. For example, in Telephone Architects, students often create their own shortcut “codes” to describe different kinds of pieces to their partner. The development and use of code is analogous to the programming codes students are likely to use in IT work, such as html or Java. Precise descriptive language also helps students learn to communicate “position.” For example, students must communicate to their partner about the position of lines, shapes and component parts in two- and three-dimensional space. Again this is similar to using computer code where the correct placement of commands and punctuation, or “syntax,” is essential to successful code-writing.

Based on this, The Three P's activity can be added to any or all of the previous 3 lessons (Draw What I Say, Pattern Blocks and Telephone Architects) to help students bridge the connection between what they learned from the activity and programming on the computer. Review “More on the 3 P's” on page 33 before conducting this activity.

Instructions

<5 minutes

- 1) Explain to students that you want them to compare what they needed to do to be successful in Telephone Architects to what they need to understand about using _____ (the software tool they are using to construct their IT project) to be successful.
- 2) Tell them that without knowing it, what they did to be successful in Telephone Architects consisted of understanding and using three concepts related to the use of IT tools. These concepts are what we call the “Three P's:” Piece, Properties and Position.
- 3) Explain what you mean by example: “long stick” describes the **piece**, color is a **property** of the piece, and “perpendicular to the table” describes the **position**)
- 4) Ask them to relate these concepts to their IT project. Post a chart paper sheet with 4 questions:
 - “If you think of your IT project as the sculpture you built in Telephone Architects, what are examples of things in the project that would be like a single building toy piece?”
 - “Where in _____ (the software tool they are using to construct their IT project) can we work with things like changing color?”
 - “Is there a tool in _____ (the software tool they are using to construct their IT project) that allows us to position pieces on the screen?”
 - “Is there anywhere in _____ (the software tool they are using to construct their IT project) where we use a special code to create pieces of our project? In what ways is the order of words or commands or the position of special characters or punctuation important to this code?”
- 5) Ask students to talk with their partner about one or all of the above questions. Tell them you will ask them to share their responses to *any* of the 3 questions.

Conduct Activity**5+ minutes**

- 1) After 2 minutes, take responses as time permits. Get at least one response for each question.
- 2) Help students make the connections with programming (see “More on the Three P’s” on page 34).

More on the Three P’s

To master IT, students need to build mental models for how IT tools work to help them make whatever project or software they are developing. The better their mental model of their tools, the more easily and effectively they can use these tools.

One mental model that was helpful to GCG students and is universal to almost every IT tool is a set of three concepts that we call the “Three P’s:” **Piece, Properties** and **Position**.

Piece: Students should understand what *piece, part or component* of their overall project they are building at any given time. For example, if they are building a digital game, are they working on the background graphics, the behavioral logic that an animated character will follow or the musical score that players will hear? If they are building a website, are they working on a text link or on a database that will store information about individuals who register as site users? Students should also understand how the pieces fit together to form the entire project. Pieces are not all of equal size and this concept can confuse students. However, they ultimately need to understand that a piece of an IT project can be large, like the animated main character in a digital game, or small, such as a single line of code that performs an important function in a routine.

Properties: Each piece of a project has properties, or performance characteristics that define the capabilities of that piece. In the game project example, the background has color, texture and can be dynamic or static. Properties of a piece are established through the IT tool being used to create the project. If the project developer is writing code to create the project, then the properties of different pieces will be determined by the syntax of that code. If the developer is using a software package, for example Macromedia’s DreamWeaver to build a website or Macromedia’s Flash to make an animated movie, then the various tools in that software package will allow the developer to determine the properties.

Position: Position describes where a *piece* and/or its *properties* can be found. Like the “size” of pieces, the fact that position can describe two different things can be a little confusing for students. Position is easily understood when we are talking about a piece that is visual – the location of a door that allows the main character in a video game to go to the next screen is easily located. However, students must also understand the concept of position in terms of the processes that produce the finished pieces of an IT project. One of the best examples in this sense is syntax in code-writing. For example, brackets are often necessary when writing html. If the brackets are not in the correct position, the website will not function properly.

Minefield

Purpose: The purpose of this activity is to help students develop collaborative skills relevant to IT project work and applicable to pair programming. In particular, students will increase their use of descriptive language, precision in the use of descriptive language, capacity to utilize codes for completing tasks and their ability to communicate “position” related to text and objects.

Time required: 45 minutes.

Materials:

- 60’ of tape, rope or other boundary
- Blindfolds (1 per participant)
- Plastic/foam toys, cups, plates, balls, etc. (at least 50 pieces)

Set-up:

- Minimum 10’x10’ square – Maximum 15’ X 15’ square, defined by tape or rope. (Be sure to secure the rope to prevent it becoming a tripping hazard.)
- On each side of the square, 2-3’ from the edge, stations/starting points should be marked out using tape “X’s” or another non-movable markers (e.g. foam squares).
- Place objects (“mines”) in strategic places in the minefield to block easy pathways. (Often, clear paths are inadvertently left along the edges of the field.) *Don’t make it too difficult in the beginning – you can always add objects to increase the difficulty.*
- Optional: Students can build the “minefield” at the beginning of the activity by placing the objects in the square field. If students place the objects, keep some in reserve to add before they start navigating the field. That will allow the program leader to obstruct any obvious or easy paths left by student placement of objects.
- An adult program leader or competent peer leader needs to be present as a “spotter” for each pair that is navigating a minefield.

Introduction & Instructions

10 minutes

- 1) Explain to students that this is an activity to move around, problem-solve and build teamwork. Teamwork is very important to the goal of co-creating your IT project in your pair programming partnership.
- 2) Ask the group to walk out to the room or space where the minefield is set up.
- 3) Tell students that they are going to work in their pair programming partnerships. If they have an uneven number because someone’s partner is missing, have the extra student act as a “spotter” until one pair is through. Then have them choose one student from that pair be their “talker.” (Adjust the time required for the activity accordingly, as this arrangement will require extra time.)
- 4) Tell students that the name of this activity is Minefield and explain how it works:
 - The object of Minefield is for 1 partner, called the “Talker” to navigate their partner, who is blindfolded and called the “Walker,” across the minefield to the side opposite from where they started. This needs to be done without the walker touching any of the objects or “mines.”
 - *If a walker touches a “mine” she must go back and start over. (A more advanced option is to have anyone in the field when the “mine” is struck go back and start over.)*
 - Talkers will choose 1 of the starting positions outside of the field to stand on and they *cannot move from that spot.*
 - When the 1st talker has successfully navigated her walker through the minefield, then the *partners switch roles* and navigate the field again.

- Point out people who are acting as “spotters.” Explain that they will often stand beside the walkers in the minefield to help if any of the walkers lose their balance. This will ensure that no one gets hurt.
- 5) Ask students if they have any questions before they begin. Briefly answer any questions that arise. If a few students are especially confused and need extra help, get the remainder of the group started and help those students individually.

How to be a Spotter in Minefield

Good spotting in Minefield is very important to the safety of students. As a spotter, please follow the guidelines below and instruct other spotters, especially students, in how to act as a safe and effective spotter:

- As soon as the Walker for whom you are responsible starts to navigate the Minefield, let them know that you are with them and that you are spotting them.
- Walkers in the Minefield are disoriented and easily startled. Avoid startling them by letting them know where you are positioned in relation to them at regular intervals.
- If you are facilitating the activity and spotting at the same time, make sure that you don't facilitate at a critical time when you should be focused on the safety of the participant to whom you are assigned.
- If you are uncertain whether a Walker needs help, always err on the side of safety. Better to give help when it isn't needed than someone falls and gets injured.
- A good spotter assists prior to, or at the moment that, a participant begins to lose their balance.
- Except in an emergency, don't touch a Walker without first asking them if it is okay for you to do so. Avoid touching Walkers anywhere on their body that might be inappropriate.
- Avoid holding on to Walkers for prolonged periods of time – this eliminates their experience of challenge in the activity. However, use your judgment of what support they need to feel safe and to be able to participate if they have poor balance.
- While acting as a spotter, minimize the amount of talking you do with others on, or outside of the field. Side talk distracts you from your job as spotter and can distract or disorient Walkers on the field.

Conduct Activity

25 minutes

- 1) Give each participant a blindfold.
- 2) Have each pair choose who will be the Talker and who will be the Walker for the first round.
- 3) Have each pair get set up on one side of the square with the Talker on their “X” and the Walker standing blindfolded on the edge of the square, in front of their Talker.
- 4) Check to make sure that all spotters are ready.
- 5) Tell students that they can start. Allow 15+ minutes to walk the minefield.

≧ How We Did It ≦

In GCG we saw that the amount of time a pair took to successfully navigate the Minefield varied widely. Think ahead of time about how strict the limits are on your time for this activity. You may have some pairs who simply cannot navigate the Minefield in the time available, if this is the case, think about how you will help them achieve a positive learning outcome out of “failure.”

- 6) If you see the students on the field headed for a potentially dangerous traffic jam, order them to “freeze.” Then have them talk about what is going on and problem solve what to do.
To increase the difficulty of the Minefield to ensure a challenge for the group: Add mines and/or increase the number of Talker/Walker pairs navigating the minefield simultaneously above the numbers recommended in the “time required” section of the activity plan, above.

If one of your objectives is to have all students make it through the minefield at least one time, use the modifications below to adjust the difficulty of the Minefield downward, or to provide additional supports to pairs:

- Remove some mines.
- Is there a Walker/Talker pair that is struggling to communicate effectively? Provide a “consultant” to the Talker, preferably an adult educator or participant who has demonstrated skillful communication in the Minefield activity and who will offer suggestions but not try to take over.
- Allow the Talker to leave their fixed starting spot and move around the square without entering the field.

Debrief
10 minutes

- 1) Bring all the students together into a discussion group. If you have a large class and more than one program leader, split up class into smaller groups of 6-8 students.
- 2) Ask students to answer the debrief questions, below. Use a “Round Robin” debrief technique, where every participant takes a turn to briefly answer the question. You can choose to allow students to “pass” and not answer questions if they prefer not to.
 - *Which role did you like better – Walker or Talker? Why?*
 - *What kinds of things helped your pair be successful at navigating through the minefield?*

Optional Questions:

- *What did you have to do with instructions to get someone through minefield?*
 - *How is this activity similar to working on the computers?*
 - *What can this activity teach us about working together?*
 - *What did it feel like to be the talker? What did it feel like to be the walker?*
 - *Which role were they more skilled at doing?*
- 3) Summarize key lessons from the activity as necessary:
 - The Minefield activity is very similar to what they do when they pair program, where one person must carry out the physical operations on the keyboard and mouse, while the other person guides the pair through step-by-step instructions to perform an unfamiliar skill and looks for unseen problems.
 - Both roles are important.
 - Success at this kind of teamwork requires trust, communication and helping each other.
 - Highlight the importance of support or encouragement when people are performing roles or tasks that are uncomfortable or unfamiliar.

Affirmations

Purpose: The purpose of this activity is for participants to practice giving and receiving compliments about their IT skills, achievements and their positive contributions to a collaborative learning environment, including good pair programming practices.

Time required: 20 minutes (1st implementation); 10+ minutes (subsequent implementations)

Materials:

- Affirmation slips (1 per student)
- Pencils (1 per student)
- Basket

Introduction & Instructions

10 minutes (1st time)

- 1) Explain that the last activity of the day is called “affirmations.” Tell students that an “affirmation” is when you tell someone, out loud or in writing, something you noticed that they did really well.
- 2) Tell students that they are going to choose one person in the group – a peer, not an adult program leader – who they are going to write an affirmation about. Explain that the affirmation should describe something that the person did really well today. It should be something related to the program (i.e., not what they are wearing, a note about who they like in school).
- 3) Show and read the prompt on a blank affirmation slip (see page 40).
- 4) Model how to write an affirmation (e.g., I noticed Brenda helping her partner figure out how to draw a person on the computer). Use another adult educator as the subject of your affirmation. If you are the only adult educator, try to use another adult with whom your students are familiar. If this isn’t possible and you have to select a youth, choose a youth who is unlikely to receive many affirmations from his or her peers.
- 5) Model folding the slips in $\frac{1}{4}$ s. Instruct youth that they should write the name of the person about whom the affirmation is written on the outside of the folded slip. Model writing the recipient’s name on the outside of the slip.
- 6) Explain that once everyone is done writing affirmations, some volunteers will pick an affirmation at random and read it to the group. After the volunteer reads the affirmation, he or she should give it to the person for whom it was written.
- 7) Tell students where adult program leaders are going to put the unread affirmations so students can read them between sessions or during the next program session.
- 8) Check for understanding and answer any questions.

Conduct Activity

10 minutes

- 1) Give students 2-3 minutes to write their affirmations and put them in the basket. Assign the task of collecting the folded affirmations slips to one of the students who finishes first.
- 2) When all the slips have been collected, ask for volunteers to pick out an affirmation at random and read it to group. If a volunteer picks one out that is written for them, they will choose again. After the volunteer reads the affirmation, he or she should give it to the person for whom it was written.
- 3) As time runs out, congratulate ALL students on their excellent work. Remind students where they will be able to find their affirmation if it wasn’t read. Instruct students who received the affirmations that were read aloud to store them in an appropriate place.

≧ How We Did It ≦

After the first couple implementations of this activity, program leaders wrote affirmations for students who did not receive any from their peers. The attempt was to write them in “kidspeak.” Usually students knew that a program leader wrote them, but it was still important to make sure they were acknowledged for the positive things they were doing in the program.

What is something you noticed that someone did especially well today?

What is something you noticed that someone did especially well today?

What is something you noticed that someone did especially well today?

What is something you noticed that someone did especially well today?

What is something you noticed that someone did especially well today?

Ground Rules Review & Additions

Purpose: The purpose of this activity is to engage students in a review of the program’s “ground rules” for behavior and to create the opportunity for them to add new rules to the set, especially once they have had some experience with pair programming and identified specific behaviors that they want from their peers when working in collaboration. Another purpose of the activity is to generate positive peer reinforcement around good collaborative behaviors and to generally increase the degree to which collaboration and support from peers for collaboration is a “norm” within the program environment.

Time required: 25 minutes

Materials:

- Ground Rule poster (specific to your class)
- Modified affirmation slips (1 per student)
- Pencils (1 per student)
- Chart paper
- Large marker

Introduction & Instructions

- 1) Refer students to Ground Rules poster (see page 43) and remind them that all students and adult staff have signed the chart as a symbol of their agreement to live by these rules. (Signatures should be visible on posted chart.)
- 2) Tell them that the group is going to spend the next few minutes reviewing the Ground Rules because living by these rules not only helps everyone get along in the big group, it also makes pair programming partnerships work better.
- 3) We will review each ground rule and come up with examples of students who have done a good job living by that particular rule. Explain how this will work:
 - a) Someone will read the ground rule out loud.
 - b) Everyone will try and think of someone in the group who did something that is an example of living by that ground rule.
 - c) When you have an example, raise your hand. A program leader will choose one student to stand up and give their example.
 - d) The student who is chosen to share their example should then write the example down on the affirmation slip and give it to the person it was about. After that the chosen volunteer’s slip is now gone – each participant only gets one).
- 4) Lastly, explain that during the last part of the activity, students will have a chance to add new rules, especially rules that they think will encourage good teamwork.

Review and Affirmations

- 1) Hand out one modified affirmation slip (see page 44) and one pencil to each student.
- 2) Review each ground rule by following steps a–d above.

Ground Rules Additions

- 1) After ground rules have been read and examples/affirmations given tell students now is their opportunity to add to the ground rules. Remind them that new ground rules are intended to help promote successful teamwork in pair programming partnerships and during whole group activities.

- 2) Then, tell students to think about the things that have gone well, and the things that have not gone so well, in their pair programming partnerships. Ask them: *“What are some new rules or guidelines you would like to see students follow to increase good teamwork and reduce or eliminate problems?”*
- 3) Give students a few seconds to think about these things and then ask for volunteers to share the ideas they came up with. Discuss the ideas for new rules as needed to clarify them and word them in a way that the whole group can support.
- 4) Note any new idea(s) on posted chart paper.
- 5) Close by telling students that the program leader will add students’ new ideas for ground rules to the poster for them. Tell them that the new poster will be ready for the next session and that they will be asked to sign the poster with additions to show that they agree to follow the new ground rules. Compliment them on a doing a good job reviewing the ground rules and coming up with ways of promoting teamwork.
- 6) Following activity prepare a new Ground Rules poster for the next session. Be sure to set aside a couple of minutes during roll call or another introductory activity to have students sign the new chart.

Girls Creating Games Ground Rules

Arrive on Time and Stay for the Whole Session

Take Good Care of the Computers and Education Center

No Put-downs, Insults or Hurtful Teasing

Take Turns Talking – Be a Good Listener – Don't Interrupt



Sensitive & Supportive

Ask for Help & Help Others

Ask Questions When You're "Stuck"

Have Fun! Be Creative!



Write about a time when someone in *GCG* did a particularly good job of following a ground rule.

Write about a time when someone in *GCG* did a particularly good job of following a ground rule.

Write about a time when someone in *GCG* did a particularly good job of following a ground rule.

Write about a time when someone in *GCG* did a particularly good job of following a ground rule.

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