



LEARNING
iNVENT & iNSPIRE

Digital Game Design from Scratch

Educator Guide (Revised Spring 2016)

when left arrow ▾ key pressed

change x by -10

when right arrow ▾ key pressed

change x by 10

when space ▾ key pressed

create clone of Laser ▾

broadcast shoot laser ▾



Challenges of Engineering

Developed in Partnership with

Derek Breen, Author of Scratch for Kids for Dummies

i2Learning.org

Course Introduction

Goals for the Course

This course will provide a lively and supportive atmosphere in which students explore and apply concepts of digital game design, which combines computer programming, graphic design and project management. By the end of the week, they will be confident using Scratch to develop a FUN game that expresses their unique viewpoints, interests and sensibilities. The course will culminate with a student showcase, where parents, teachers and peers will gather around the i2 Arcade to try their luck at games which exhibit both programming and design panache and also reflect the spark of each young creator.

Course Format

The course was originally designed as an intensive, hands-on workshop to be delivered over 5 full days. Students learn Scratch by diving immediately into game design. There is no overview of the Scratch interface, tools or programming blocks. Instead, students gradually discover each component as they complete a progression of game design challenges. Hence all learning is in-context. On the first day students will design 3 different games: a ball game (like Pong), a maze game (like Pac-Man) and a scrolling game (like Space Invaders). On Day 2 they improve each game with more sophisticated programming and design features. On the third day students begin by combining different game elements to come up with more unique game ideas, and then transition into designing their own custom Scratch game. Students will spend most of their classroom time on Days 4 and 5 developing their games, which will be presented in a student showcase on the final afternoon.

Game Design Process

Students will follow a five-step game design process:

1. Discover - Explore game assets, design tools and programming techniques.
2. Design - Combine bitmap and vector graphics to create game sprites and backdrops.
3. Develop - Program sprite behaviors and game mechanics toward increasingly complex games.
4. Debug - Continually playtest the game, fix bugs and improve the quality of gameplay.
5. Deliver- Share the game by publishing online and presenting in the end of the week student showcase.

Statement of Success

A successful week will not only yield a completed game, but also propel students toward further game development, digital design and programming projects throughout their life. They will take away a more critical eye for the uneven product landscape of our evolving digital culture and be inspired to grow as digital media producers rather than just consumers.

How to Use this Guide

This educator guide is intended for instructors of Digital Game Design From Scratch, a five-day course developed for i2 Learning by Derek Breen, author/designer of Scratch For Kids For Dummies (www.scratch4kids.com). The following pages cover each day's activities, including objectives, instructions, expectations for progress and methods of assessment. The instructor should feel free to adjust the allotted times, change the order of useful activities and skip past those you may find less useful to optimize student engagement. Please keep in mind the i2 goals: "invent and inspire, imagine and innovate, investigate and inquire, initiate and improvise, and have fun." FUN should be front and center throughout the week.

Course Overview

There are approximately 5 hours of learning activities during each day, for a total of 25 hours.

MONDAY
PRE-EVALUATION
BALL GAME 1
MAZE GAME 1
LUNCH
SCROLLER GAME 1
PROJECT OVERVIEW
TUESDAY
REFLECTION
BALL GAME 2
MAZE GAME 2
LUNCH
SCROLLER GAME 2
PROJECT BRAINSTORM
WEDNESDAY
REFLECTION
GAME MASHUP
PAPER PROTOTYPING
LUNCH
SCRATCH PROTOTYPING
PEER SHOWCASE
THURSDAY
REFLECTION
SCRATCH PROTOTYPING 2
TIPS&TRICKS
LUNCH
PEER PLAYTESTING
SCRATCH PROTOTYPING 3
FRIDAY
REFLECTION (OPTIONAL)
GAME REVISION
COURSE EVALUATIONS
LUNCH
SHOWCASE PREP
FINAL SHOWCASE

Learning Goals

Students will learn:

Day 1

- how to navigate the Scratch interface.
- how to combine blocks into functional scripts.
- how to rapidly design 3 working videogames.
- how to create Scratch accounts.
- about the engineering design process and how it can help them design games.

Day 2

- how to design vector graphics.
- how to animate sprites.
- how to make a game more complex by adding increasingly sophisticated behaviors.
- how to transfer newfound programming skills and play-testing experience to the task of brainstorming original game ideas.

Day 3

- how to combine elements from different Scratch games.
- how to hone in on a primary game concept and start to build a working prototype.
- how to replace basic shapes with custom shapes in order to build a more immersive environment.

Day 4

- how to add special effects and cut-scenes to projects.
- how to integrate player instructions into games.
- how to design artwork to enhance the visual presentation of games.

Day 5

- how to receive and incorporate feedback in order to improve games.
- how to use communication as a critical part of the engineering design process.

Day 1

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
EVALUATION/ TRANSFORM	REFLECTION	REFLECTION	REFLECTION	REFLECTION (OPTIONAL)
BALL GAME 1	BALL GAME 2	GAME MASHUP	SCRATCH PROTOTYPING 2	GAME REVISION
MAZE GAME 1	MAZE GAME 2	PAPER PROTOTYPING	TIPS&TRICKS	COURSE EVALUATIONS
LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
SCROLLER GAME 1	SCROLLER GAME 2	SCRATCH PROTOTYPING	PEER PLAYTESTING	SHOWCASE PREP
PROJECT OVERVIEW	PROJECT BRAINSTORM	PEER SHOWCASE	SCRATCH PROTOTYPING 3	FINAL SHOWCASE

Materials and Preparation

1. Ensure Scratch is installed/working on each computer.
2. Check internet access (first thing each morning).
3. Print handouts (Prevaluation, Scratch Accounts & Studios).

Course Prevaluation (15 minutes)

Students usually fill out evaluations at the end of courses and NEVER enjoy doing this. But if they fill out an evaluation at the beginning it can be (at least a bit) fun. They could start by writing “Mrs. X is the best teacher I’ve NEVER had” or “Mr. Y seems like he will be an awful teacher. . . let’s see.” Saying as little as possible about the class prior to the prevaluation ensures they focus on the expectations they brought with them. This also goes against their experience for how a course usually begins and feeds into the idea that this totally immersive workshop will be different from typical school classes.

[HANDOUT: Student Prevaluation]

GAME DESIGN CONNECTION

When you design a game you usually start with the ending, i.e. how does a player win or lose? More specifically, “What is the goal of the game?” We call this BACKWARDS DESIGN. So doing the evaluation at the beginning means they are already starting to behave like game

The pre evaluation is a chance for them to tell you what the goal of the course is for them. You can emphasize this by inviting students to share their goals in a brief discussion after everybody has finished. If any students have trouble finishing, tell them you will hold their sheet aside and allow them to finish later in the day (during a break or shortly before leaving) rather than making all the other students wait for a few slower (and perhaps more considerate) students.

Transformation Game (15 minutes)

Start by asking everybody to form a circle, then share the first rule: pay attention to the person with the object. What’s the object? It starts off as “an invisible ball” you slowly toss after making eye contact with somebody. Once they catch it then it’s their turn to make eye contact with somebody else before throwing them the invisible ball. The second rule is “look cool” when catching the object.

After a few minutes ask for the ball to be returned to you, then share rule number three: they can transform the object into anything they can imagine. They will look coolest if they do not tell the group what it is. Instead, they can show what it is by the way they pass it to the next person. Allow enough time for everybody to get a turn. For large groups you may raise the stakes by increasing the number of invisible objects. End the activity with a brief discussion about the parallels between the game and

Day 1 (part 2)

the use of Scratch, citing the Scratch motto: imagine, create, share.

Ball Game 1 (45 minutes) Studios]

[HANDOUT: Scratch Accounts &

Open: “Other teachers may start a game design course by showing you how Scratch works and teaching you a bunch of tools and commands then FINALLY allow you to design a game. NO WAY! Our goal is for each of you to create THREE games by the end of the day. To make it interesting, let’s see if you can make 2 different games before LUNCH!?! Start by opening Scratch and figuring out how to make the Cat move across the screen.”

Guide students through the first few challenges on the projector. Avoid describing the interface and demonstrating solutions. Permit more advanced Scratch users to race ahead and to create their own challenges for fellow fast Scratchers.

Challenge 1: Move the cat using blocks.

Challenge 2: Move the cat with keyboard arrow keys.

Challenge 3: Add a soccer ball to the scene.

Challenge 4: Program the ball to bounce around the screen.

Challenge 5: Program the cat to kick the ball.

New Blocks/Concepts: Movement, Events (Keys), Looks (Costumes), Library/Sprites, Control (Loops), Sensing (Collision), Bitmap Editor

← Break →

Maze Game 1 (60 minutes)

[HANDOUT: Scratch Game Design Skill Cards]

Open: “Not everybody is into sports, so for our next game let’s keep the cat but get rid of the ball. Stand up if you have ever played Pac-Man. . . Heard of Pac-Man? . . Pac-Man is a classic maze game which seems simple at first, but is hard to beat. Game designers refer to this as “hard fun.” If a game is too easy, it’s not fun for long. And if it’s TOO hard, then it’s not fun either. The goal is to create a game that’s falls somewhere between easy and too hard. Oh, and maybe these cool Scratch cards will help!”

“Start a new Scratch project. . . first be sure to save your ball game project. . . To make your game a bit more like Pac-Man, go to the Costumes tab and use the select tool to delete everything except for the cat’s head. Then add the scripts required to control the cat head with the up, down, left and right keyboard buttons. Next click the stage button, go to the Backdrops tab and draw a simple maze.”

Challenge 1: Prevent the cat from going through the walls.

Challenge 2: Make the cat’s mouth open and close like Pac-Man.

Challenge 3: Allow the cat to win the game when it reaches a prize.

Challenge 4: Create a second level.

Challenge 5: Add enemies.

← Lunch →

Day 1 (part 3)

i2 Teaching Tip

When students go to break, lunch or when they leave at the end of the day, have them keep their computers on and their most recent project open so you can quickly review projects/progress.

New Blocks/Concepts: Vector Editor (Group/Ungroup, Select), NEXT COSTUME (Animation), WHEN BACKDROP SWITCHES TO (Levels), POINT TOWARDS (Enemy AI), PICK RANDOM NUMBER (Chance)

Scroller Game 1 (90 minutes)

Open: “If you are going to finish 3 games before you leave, then we should dive right into a new game, right? Don’t worry, you’ll have another chance to work on your maze and ball game tomorrow. Now that you’ve made a basic sports game and a maze game, would anybody be interested in making a shooter? What if I told you it’s possible to make a game as cool as Far Cry or Assassin’s Creed in Scratch within the next 2 hours? I’d be TOTALLY LYING! But you can make a pretty fun scrolling space game before you leave.”

“While you still have your Maze Game open try pressing two arrow keys at once. What happens? The blocks you’ve been using only recognize one keyboard input at a time. That was fine for your maze game, but in a shooter you need to be able to move and fire at the same time. Create a new project, delete the cat, go into the Sprites library and choose the spaceship.”

Challenge 1: Program the player ship to be controlled by arrow keys with different Scratch blocks (refer them to Scratch card #7 which shows an alternate programming method).

Challenge 2: Program the laser to shoot out of the spaceship when the spacebar is pressed.

Challenge 3: Add enemies that disappear when the laser hits them.

Challenge 4: Display a score which increases each time an enemy is destroyed (card #12).

Challenge 5: Program the enemies to attack the player.

Challenge 6: Allow more than one laser to be fired at a time (card #14).

(Toward the end of the day, if students haven’t reached challenge 6 yet refer them to the CLONE blocks in the Control category.)



Course/Project Intro (30 minutes)

Open: “CLOSE YOUR LAPTOPS (or TURN OFF MONITORS)! You started the day by sharing your goals for the course; this is a chance to share my goal! By the end of the week each of you will present a unique videogame designed and programmed by you. The course will end with a project showcase where parents, friends, students and teachers will get a chance to play your games, like a cross between a science fair and a videogame arcade.”

Day 1 (part 4)

“This course used to begin with the instructor asking students, ‘What is a game?’ and then going through a Powerpoint presentation with a bunch of slides about the ‘Design Process.’ Instead, you just learned the design process by actually designing 3 games. . . pretty cool, right? But you only had time to get through part of the process, so let’s take just a few minutes to explore the steps that will help you design an awesome game of your own.”

[POWERPOINT: Custom Game Overview slide]

“This course used to begin with the instructor asking students, ‘What is a game?’ and then going through a Powerpoint presentation with a bunch of slides about the ‘Design Process.’ Instead, you just learned the design process by actually designing 3 games. . . pretty cool, right? But you only had time to get through part of the process, so let’s take just a few minutes to explore the steps that will help you design an awesome game of your own.”

[POWERPOINT: Game Design Process slide]

“The 5 D’s: 1. Discover 2. Design 3. Develop 4. Debug 5. Deliver. . . How many of those have you done today? What about number 5? When does that happen? That should happen LONG before FRIDAY! You deliver every time you show your game to somebody, or better yet, every time somebody plays your game-in-progress.”

“While you will not be getting grades for your work, I do have a checklist (rubric) of essential things your game should include and will be giving you feedback well before the last day so you will have plenty of time to improve your project. You will also playtest each others games and share constructive criticism throughout the week. Any questions?”

Before they leave, have students open their most recent Scratch game project so you can review it. If you have time you may remix and BREAK their game for tomorrow’s first debugging challenge! If you have a large class, you can instead have students remix the shared Maze Game Debug or Scroller Game Debug project.

Day 2

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
EVALUATION/ TRANSFORM	REFLECTION	REFLECTION	REFLECTION	REFLECTION (OPTIONAL)
BALL GAME 1	BALL GAME 2	GAME MASHUP	SCRATCH PROTOTYPING 2	GAME REVISION
MAZE GAME 1	MAZE GAME 2	PAPER PROTOTYPING	TIPS&TRICKS	COURSE EVALUATIONS
LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
SCROLLER GAME 1	SCROLLER GAME 2	SCRATCH PROTOTYPING	PEER PLAYTESTING	SHOWCASE PREP
PROJECT OVERVIEW	PROJECT BRAINSTORM	PEER SHOWCASE	SCRATCH PROTOTYPING 3	FINAL SHOWCASE

Materials and Preparation

1. Print Handouts (Reflection Worksheet, Gamestorming Worksheet).
2. Check internet access.
3. Complete adding bugs to student Scroller minigames.

Reflection (15 minutes)

[HANDOUT: Reflection Worksheet]

Last summer I had my students do their reflections outside. Other times I've used an adjacent classroom. . . anything to keep them away from the computers and their minds focused on the task at hand.

Open: "This does not have to be lame!"

Tell students this will help them shift back into the great game design groove they had going yesterday and prepare for even GROOVIER game design sessions today.

Ball Game 2 (30 minutes)

Open: "Let's ease our way back into Scratch by revisiting your Ball Game project from yesterday." Instruct students to open Ball Game 1 then File: Save As to make a copy and add '2' to the title. "Remember the game design process? What are the steps again?" [Let the students come up with Discover/Design/Develop/Debug/Deliver] "How about starting by Discovering a few new Design and Develop techniques to improve your game? I'm sure the need to Debug will come up on it's own. . . Otherwise I will MAKE YOU DEBUG!"

Discover: Replace the cat with a new player sprite from the Scratch Sprite Library.

Design: Add a costume to your new sprite.

Develop: Randomize the angle of the ball bouncing off your player.

Debug: [After students finish the three steps above, "break" a script or two in the ball game and ask students to debug it.]

Breaking/Debugging Ideas:

1. Hide a small script behind a larger script in the editor.
2. Reverse movement code of arrow keys.
3. Swap REPEAT for a FOREVER block (or FOREVER for a REPEAT block).
4. Move code from one sprite to another or to the stage.
5. Change the order of blocks in a script.

Day 2 (part 2)

6. Move a block(s) from inside a FOREVER or REPEAT block to snap above or beneath the block.

Maze Game 2 (45 minutes)

Open: “I know what you’re thinking: ‘Why can’t we move onto designing our own game?!?’ That comes after lunch. But a big part of the game design process comes from step 2. . . what’s that again? Yes, DESIGN! That one should be the easiest to remember because it’s RIGHT IN THE TITLE! Within the design world is the really important concept of ITERATING. Anybody know what that is? Open your Maze Game from yesterday. As soon as you do a Save As and add the number “2” to the title you are making the first change and you are ITERATING, BABY!”

Point out that they will now build on what they Discovered while designing the previous version of the maze game, then have them skip ahead to the Develop stage again.

Challenge 1: Add a door that requires a key to open.

Challenge 2: Randomly place the key in a different place each time the game begins.

Challenge 3: Program the player sprite to “pick up” the key.

Challenge 4: Use a LIST to keep track of what items (i.e. the key) the player has collected.

Challenge 5: When player collides with a door, use LIST blocks to determine whether they have the key and then either open the door or give the message “You need a key to open this door.”

Challenge 6: Allow the player to hide or show their inventory list with a keyboard shortcut (such as pressing the ‘i’ key).

New Blocks/Concepts: User Interface Design (positioning/scaling/hiding/showing the inventory list on the stage), ADD TO and DELETE (Lists), SAY (text output)

←————— Break —————→

Scroller Game 2 (until Lunch)

Open: “Please open your Scroller Game from yesterday. . . What? You say there’s a new version? Hmm. . . Well open that one. Does it work? Then it must be time for a bit more debugging, right?”

It shouldn’t take them too long to debug; resist revealing bugs as long as possible without being too infuriating. Then they can move onto the next set of challenges.

Challenge 1: Create at least 3 rows of marching enemies using Clone blocks.

Challenge 2: Have all the enemies start marching at once using Broadcast blocks.

Challenge 3: Have enemies speed up as the game progresses.

Challenge 4: Add powerups for the player (shield, special laser blast, etc.).

Challenge 5: Program enemies to randomly dive-bomb the player’s ship.

New Blocks/Concepts: Clone alignment, BROA (Simultaneity)

←————— Lunch —————→

Day 2 (part 3)

Scroller Game 2 (continued)

Allow students to continue working on their Scroller Game challenges for about 30 minutes or so, then shift into Peer Destroy/Debug. You may want to allow more than 30 minutes depending on how much time they had spent before lunch and on the general interest level in completing the challenges. Please encourage antsy kids to do an informal gallery walk (checking out other projects) and those who finish all the challenges early to offer their “expert consulting services” to other students.

Before you begin the Scroller Game Peer-Destroy/Debug phase, please have students SAVE the project and then SAVE AS to make a copy with the word “Broken” in the title. Then ask students to make one sneaky change to their code to break it, have everybody stand up, shift one computer to the right and try to figure out the bug. It’s important to keep students close to their own game for the first round so they can offer hints or confirm/deny the found bug without having to leave their own debug desk or scream across the classroom. Once students identify and fix the bug they should create a new bug before everybody shifts another seat to the right. Do this as long as kids are having fun, at least 3 rounds.

For the final round, once the bug has been found/fixed, invite students to do a Save As and then change sprites and/or background to anything they wish (within bounds of classroom decency, of course!) before they return to their original seat/computer/project to inspect the changes somebody has made to their game.

Project Brainstorm (30 minutes)

[HANDOUT: Gamestorming Worksheet]

Open: “CLOSE YOUR LAPTOPS (or TURN OFF MONITORS)! It’s time to brainstorm ideas for your custom project. . . I mean GAMESTORM!”

Day 2 Assessment

Skill Card Experts: Elicit requests for students to take “ownership” of a specific skill card. There are 15 skills (since the first card is just the title and list of cards), so you may need to assign more than one card to one or all students. Each student will demonstrate mastery through the integration of the technique in either their original game or paintball project. Encourage peers to seek out “expert” advice.

Day 3

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
EVALUATION/ TRANSFORM	REFLECTION	REFLECTION	REFLECTION	REFLECTION (OPTIONAL)
BALL GAME 1	BALL GAME 2	GAME MASHUP	SCRATCH PROTOTYPING 2	GAME REVISION
MAZE GAME 1	MAZE GAME 2	PAPER PROTOTYPING	TIPS&TRICKS	COURSE EVALUATIONS
LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
SCROLLER GAME 1	SCROLLER GAME 2	SCRATCH PROTOTYPING	PEER PLAYTESTING	SHOWCASE PREP
PROJECT OVERVIEW	PROJECT BRAINSTORM	PEER SHOWCASE	SCRATCH PROTOTYPING 3	FINAL SHOWCASE

Materials and Preparation

1. Print Handouts (Reflection, Game Mashup, Paper Prototyping).
2. Create Game Mashup Studio.
3. Create Prototypes Studio.
4. Remix Scratch Wireframe Project to share with students via online link or flash drive.

Reflection (15 minutes)

[HANDOUT: Reflection Worksheet]

Remind students this writing activity will help them shift back into the great game design groove they had going yesterday and prepare for even GROOVIER game design sessions today.

Ball/Maze/Scroller Mashup (45 minutes)

Open: “You will spend MOST of the day on your custom games, I PROMISE, but you’ve got one more set of mini-game challenges. They will help get your creative game dev juices flowing AND may lead to some interesting new ideas for your game. During the Discovery phase of the Game Design Process, many designers and developers will consider ways to combine elements from popular games toward creating a new game experience. It’s time to do the same thing with your 3 mini-games.”

Start a brief class brainstorming discussion with laptops closed/screens off to get the creative juices flowing. (OPTIONAL PROMPTS: Would it be more fun to bring a bouncing ball into their scroller game or alien invaders into their ball game? How would lasers blasting change their maze game?)

After brainstorming, have students open, Save As and rename their latest Ball, Maze or Scroller (they can decide which they wish to use as the base game) to include the word “Mashup” and their initials in the title. If students are working with the online version of Scratch, demonstrate how sprites/costumes/code/backdrops/sounds can be put into the Scratch Backpack and then pulled out in other projects. If they are working online, it’s a good idea to have them add their game to the Mashup Studio right after they Save As and rename it. This isn’t useful for the offline version because offline project changes are not automatically updated as they are online.

SCRATCH TIP

It can take several days, if not weeks, for Scratch projects and studios to show up in searches on the Scratch website. Most likely you will need to give students the URL for your class Mashup Studio (on the Scratch website) so they can find it and add their project.

Day 3 (part 2)

If working with Scratch offline, they can export sprites/backdrops/costumes/sound by right-clicking (or holding down the SHIFT key while clicking) and choosing “save to local file.” To save scripts they must export a sprite which contains the blocks they wish to reuse. To import saved elements offline students will need to use the Upload [Sprite/Costume/Backdrop/Sound] For File button. Imported sprites will include all costumes, scripts and sounds added in the previous project.

Challenge 1: Combine 2 or more mini games into a mini game mashup.

Challenge 2: Simplify code by grouping scripts into custom blocks.

Challenge 3: Enable the player to control something in the game with their voice (such as firing laser blasts).

Challenge 4: Reduce the entire game to no more than 3 sprites.

New Blocks/Concepts: Mashups, Backpack, Import/Export, Custom Blocks (Procedures), Microphone

SCRATCH BEYOND GAMES

Since you can export bitmap costumes/backdrops in the common .png format and vector costumes/backdrops in the common .svg format, Scratch can be used to design graphics for other applications, such as Microsoft Word or Powerpoint. You may also use Scratch as an audio recording and editing application since audio files may be imported and exported in .mp3 format.

input, increasing/reducing audio gain (for change the standard loudness range of 0 to 100)



Paper Prototyping (30+ minutes)

[HANDOUT: Paper Prototyping]

Before you begin make sure all students have added their game to the Mashup Studio. This might be a good time to invite a student or two to show off their mashups while others are adding theirs to the studio.

Open: “Most digital artists and game developers do quite a bit of drawing before they start designing on the computer. Yesterday afternoon you did simple brainstorming with words. For the next half hour or so you will sketch out more of how your game should look and sound, identifying the backdrops, sprites, music and sound effects you want to use. The prototyping worksheet designed especially for this course even has a place where you can sketch out programming ideas—you don’t have to write down every block, just write the functions the scripts should provide, such as moving a sprite with keyboard keys or switching a backdrop. It is important to begin with the essential game design elements. . . What does every great videogame have? Goals, rules, obstacles, characters, world and story!

Scratch Prototyping (up to and after Lunch)

[POWERPOINT: Final Project Overview - Elements/Goals/Rubric]

Open: “Game designers generally create more than one version of a project, progressing from a

Day 3 (part 3)

simple version to complex to final version, just like you did with the three mini-games. Each of these different versions is called an ITERATION. You will be doing iterations of your paper prototype for the rest of the day, so you will not need your computers at all. . . JUST KIDDING! From now on you will spend practically ALL of your time on the computer working on your custom game!!! But you WILL use an iterative approach. The first stage is to rapidly develop a playable version of your game which uses simple shapes.”

While students should use only the three provided shapes for their game wireframe, they can combine those shapes, change the scale and color as they wish.

Have students REMIX (online) or open-and-Save-As (offline) the Scratch Wireframe project; they should include the number “1” at the end of the new title to indicate this is their first iteration. The wireframe version should be limited to the simple shapes included as costumes in the Wireframe sprite. Using simple shapes will enable them to more rapidly work out the game mechanics, concentrating on programming rather than being sucked into searching for graphics in the backdrop or sprite library or online.



Scratch Prototyping (continued)

Encourage students to stick with the wireframe version of their game until the next activity. When/if some will say they are finished/ready to move on, encourage them to add new levels or features in the remaining time. This should ensure more complex games than were completed in last year’s course (before this wireframing stage was included). Students should add their projects to the Scratch Prototypes Studio. This give you a convenient place to review all their work and enables peers to try out each others games.

Peer Showcase (15-30 minutes)

Ask for volunteers to demonstrate the wireframe version of their game. I recommend having all the students leave the computers and group together in front of the projector to help them focus on the presentations. Please encourage viewers to ask questions about game elements (goals, rules, obstacles, etc.) and programming (as in “How the heck did you do that?”). Presenters can also ask the audience questions if they want specific feedback or need help with something.

You may wish to shift the Peer Showcase to begin an hour or so before the class ends to allow time for them to return to their computer and continue working, otherwise you could have an awkward situation where the Showcase ends a bit early and students are stuck between wanting to return to work and shifting into leaving-school-mode.

Day 3 Assessment

During the Scratch prototyping activity start noting campers who have a fully playable prototype, track whether they have added new features from the Skill Cards and the degree to which they replaced stock sprites with modified or custom graphics.

Day 4

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
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MAZE GAME 1	MAZE GAME 2	PAPER PROTOTYPING	TIPS&TRICKS	COURSE EVALUATIONS
LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
SCROLLER GAME 1	SCROLLER GAME 2	SCRATCH PROTOTYPING	PEER PLAYTESTING	SHOWCASE PREP
PROJECT OVERVIEW	PROJECT BRAINSTORM	PEER SHOWCASE	SCRATCH PROTOTYPING 3	FINAL SHOWCASE

Materials and Preparation

1. Print Handouts (Reflection).
2. Review work in Game Prototypes Studio (try to leave a brief comment on at least 1 project per student).
3. Note novel game programming or cool design techniques (i.e. cool techniques) you can share/celebrate in class.

Reflection (15 minutes)

[HANDOUT: Reflection Worksheet]

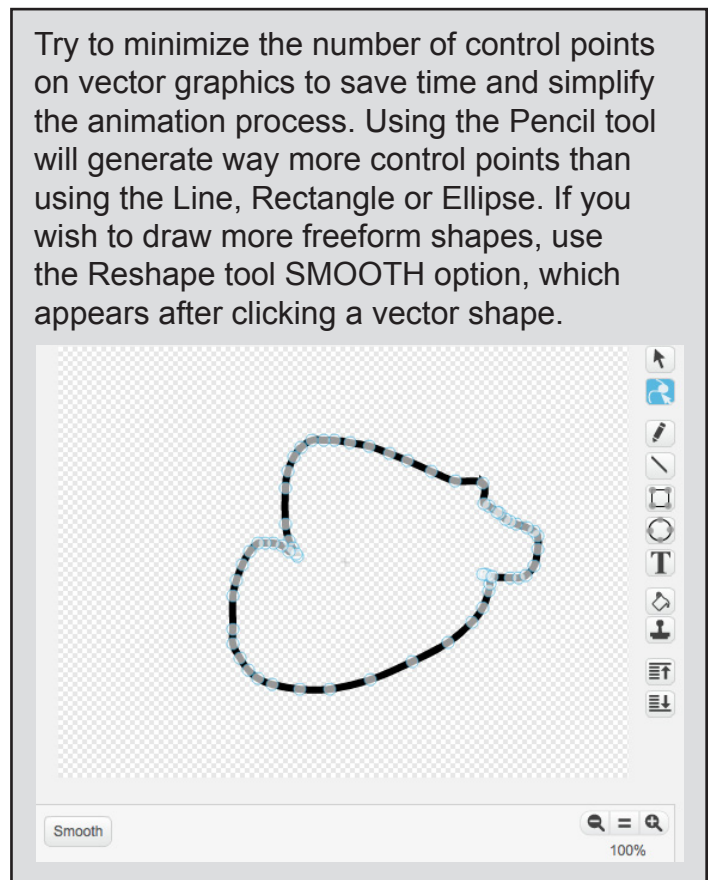
Since I will suggest you skip the reflection on Day 5 (when students will have to fill out course evaluations), this will likely be the last formal reflection students do. As such, do your best to make it meaningful for them. One way is to call out a few exemplary highlights you have found in student reflections from previous days.

Scratch Prototyping - 2nd Iteration

Open: “Now you can wave bye-bye to those basic sprite shapes and dig back into the Scratch Paint Editor! Remember designing sprites in Vector mode will give you much more flexibility especially for the more complex graphics or costumes you wish to animate. Best of all, if you keep the same sprites but design new costumes, you will not have to recreate all the code you used in the first iteration. And to save valuable development time, you might add Cheat Codes [combine keyboard input with broadcasting] to your game so you can skip ahead to specific parts of the game instead of having to start from the beginning each time.”

If students are working offline they should upload their wireframe game and add it to the Prototypes Studio. Instruct students to create a new version of their game (Save As) and add the number “2” to the end of the title. Again, students working online can add the new project to the Prototyping Studio right away.

Try to minimize the number of control points on vector graphics to save time and simplify the animation process. Using the Pencil tool will generate way more control points than using the Line, Rectangle or Ellipse. If you wish to draw more freeform shapes, use the Reshape tool SMOOTH option, which appears after clicking a vector shape.



Day 4 (part 2)



Gallery Walk (10 minutes)

Have students do a freeze frame, stopping Scratch at a cool point in the game where sprites and backdrop give a sense of the action, then have them walk around to inspect each others game progress.

Scratch Prototyping - 2nd Iteration (continued)

Discourage students from using other people's graphics in their game. If they lack the confidence to design their own sprites or have trouble getting a certain backdrop or sprite to look the way they want, encourage them to try "remixing" one from the Scratch library by modifying it in the Paint Editor until it is hardly recognizable as a stock image. If they must go to the internet to find the right image, challenge them to create their own version, perhaps tracing at first, or using a photo as a source for designing a more stylized sprite or backdrop. Emphasize the need to make all the graphics share a unified look or style, by using consistent fill colors and/or outline color and line thickness. Students should avoid using the same colors in sprites and backdrops. They may use a thin, black line along the outside of sprites to help them stand out from the background.

Tips & Tricks (15 minutes)

Demonstrate one cool coding or design technique you have discovered (always important to have a few of these up your teacher sleeve), then invite a few students to present their own tips and tricks to the class.

A few of my favorite tips and tricks: Using Fill/Blank, cutting out irregular bitmap shapes with vector mask, keeping a few extra blocks on Sprites (BRING TO FRONT), changing the center of rotation on vector body parts for animating and using PEN blocks to automatically draw parts of a backdrop.



Peer Playtesting (30 minutes)

If students are working offline they should upload their 2nd iteration and add it to the Prototypes Studio. Then have all students duplicate their project and add "3" to the end of their title (not only setting up for the next round of prototyping but also to ensure peers don't accidentally break their game during playtesting).

Open: "Yesterday your primary focus was on the Develop stage, and today you should have been focusing primarily on Design. But surely you have also been doing a fair bit of Debugging. And so, what about the final stage of the Game Design Process? What is that again? Yes, DELIVER! What good is game design if you cannot deliver your game to players? That's where Playtesting comes in!"

Day 4 (part 3)

You may use the same computer/seat switching technique as in Tuesday's Destroy/Debug, or have students swap on their own. Discourage them from only having friends try their game as it's important to get different player perspectives. Make each turn 5-7 minutes depending on the complexity of the games and how engaged players seem. Remind designers to share cheat codes with players so some of them may skip ahead to specific parts/levels they wish to get feedback on.

Scratch Prototyping - 3rd Iteration (until end of the day)

Before students leave for the day they should design a title screen for their game (either a backdrop or full-stage-sized sprite to hide opening game elements) and incorporate player instructions.

Day 4 Assessment

Campers should each have a playable game with a title screen and detailed set of player instructions added to the Prototyping Studio.

Day 5

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
EVALUATION/ TRANSFORM	REFLECTION	REFLECTION	REFLECTION	REFLECTION (OPTIONAL)
BALL GAME 1	BALL GAME 2	GAME MASHUP	SCRATCH PROTOTYPING 2	GAME REVISION
MAZE GAME 1	MAZE GAME 2	PAPER PROTOTYPING	TIPS&TRICKS	COURSE EVALUATIONS
LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
SCROLLER GAME 1	SCROLLER GAME 2	SCRATCH PROTOTYPING	PEER PLAYTESTING	SHOWCASE PREP
PROJECT OVERVIEW	PROJECT BRAINSTORM	PEER SHOWCASE	SCRATCH PROTOTYPING 3	FINAL SHOWCASE

Materials and Preparation

1. Print Handouts (Student Evaluation).

Reflection (15 minutes)

[HANDOUT: Reflection Worksheet]

Okay, it's the final day and most students are probably RARING to go if not TOTALLY STRESSED OUT about the current state of the game which they are supposed to present to parents and peers TODAY!?! On top of that, these folks are going to have ANOTHER writing session before lunch in the form of the course evaluation. So here's your chance to be a hero. . . go head and tell them they've done such a great job this week that you want to reward them by SKIPPING the "mandatory" morning reflection.

You can get some of the benefit of the reflection process by asking them to do something for you in return. Ask them to keep their laptops closed for exactly one more minute. Instruct them to rest both elbows on their desk, open their palms, close their eyes and rest their head so hands cover eyes. Tell them to project their thoughts 5 hours into the future (or however long before they would be at the showcase). . .

OPEN: "Think for a moment about exactly how you are hoping your game will work at this afternoon's showcase. . . picture somebody, one of your parents or a friend playing your game and having a real blast. . . hear their familiar laughter as they lose a life or take a wrong turn or miss the ball. . . see that familiar smile spread across their face as they win for the first time. . . "

"Now open your eyes. . . What can you do in the next few hours to make that a reality? Don't tell me! Thoughts have power, the power of INTENTION. So channel that intention to make your game even BETTER. Now GET TO WORK!"

Game Revision (90-120 minutes)

Come on, it's your fifth day, you know the drill; help keep them on task and prevent any fires from breaking out via technical difficulties, frustration and/or outright terror. And don't forget to fit in the morning snack break.

← Break →

Day 5 (part 2)

Course Evaluations (20 minutes) [HANDOUT: End of Week Student Evaluation]

Even if you did NOT skip the morning reflection it is IMPERATIVE that you have each student complete the end of course evaluation! I don't just say that for job security as your friendly neighborhood course designer; I mean who knows, the kids might hate my class and their collective opinions could destroy my chance to work with i2 again if not totally sink my entire instructional design career. . . To be honest, I'm cool with skipping the morning reflection because this evaluation serves as another form of reflection, and just as vital.

In the past I've tried to give the evaluation first thing in the morning on the last day, right after lunch and right before the showcase (right after would be hopeless as parents sneak off with their kids while your back is turned). So this is a last chance for intentional student reflection as well as a way for you to gather specific feedback about your work, share feedback with i2 administrators, and share feedback with me (via i2). Think what you will about this course, but I can assure you it is better, if not MUCH better after carefully considering last year's feedback from students, teachers and i2 folks and spending many weeks on a substantial revision.

I wrote "Evaluations" not just because there are multiple kids submitting multiple evaluations but also because this is the ideal time for YOU to fill out the TEACHER EVALUATION while everything is fresh in your mind, before your post-i2 life kicks back in and all the other stressors take over. Why not elicit a bit more student sympathy by using your best whiny voice and proclaiming, "There's an even LONGER one for teachers which I have to do now, TOO!?!"



Game Revision/Final Showcase Preparation (? Minutes)

To be honest, I'm not sure how much time you will have between getting back from lunch and before the start of the showcase, which might be in the same classroom or way over on the other side of the school, campus, etc. The MOST important thing is to have students save the completed version of their Scratch project with the word "Final" in the title and make sure they have added it to the class Scratch Studio!!! It would be good to have them put their initials in the title, too, to help you keep track of whose project may be missing.

The SECOND most important thing is to help psychologically prepare students for the showcase. In the hours/minutes leading up to end of week showcases I have experienced crying students (girls AND boys), bored students (boys AND girls) and everything in-between (girls-and-boys-and-boys-and-girls-and-). . . If you have a few minutes, you might duplicate the elbows-on-desks-eyes-closed routine from earlier, hopefully inserting a bit of humor, something like this:

"Project yourself forty-three minutes into the future. This time picture the absolute WORST showcase experience you can. . . what is the worst possible thing that can happen when that special person clicks the green flag? If you need help picturing the worst maybe Poppy can help you—you have a lot of experience imaging the worst that can go wrong, right Poppy? And Weston experienced some of the worst about this time yesterday, didn't-cha man?"

"Open your eyes. Let's go and have a much better showcase than you just imagined, okay? No? Well

Day 5 (part 3)

let's at least aim for somewhat better than the worst version you can imagine. And if you start to feel a bit stressed, just picture all of the sprites in the Scratch library naked. . . I said IMAGINE Weston, don't let me catch you attacking all of them with the Eraser tool!!!!"

Final Showcase (as many minutes as you can amuse guests)

While you may have to help a student or two force-quit Scratch or reboot their laptop completely, your primary job is greeting, entertaining and waving a fond farewell to parents and other guests. Whether this is their first or their fifth (fiftieth?) impression of you, it is likely their first full impression of this alternate approach to education. I'm a pretty big fan of the i2 approach, so I have a lot invested in parents recognizing the value of this (at-least-somewhat)-less-formal-yet-completely-focused-project-based learning experience. And if your showcase is away from the classroom, perhaps a few of them will even offer to help shuttle laptops back after the showcase.

Have all the final versions of student projects saved on a flash drive (or two or three) in case there are internet connectivity problems or you need to switch to another computer.

Day 5 Assessment

Day 5 is bound to be your most hectic, especially after lunch. While the questionnaires serve as a weeklong reflection for campers, choose a specific point between lunch and the final showcase to check in with the class as a whole, celebrate their hard work and encourage them to continue working after they have left (recovered from?) i2 Camp. The showcase is a fantastic opportunity to assess the entire week and to take a moment to check-in with each camper before they are whisked off by a parent or guardian.

Conclusion

Can I be completely honest with you? I am honestly jealous. Yup, completely true. Now that I've shifted into author and curriculum developer mode I have hardly any time to teach, much less teach a week-long intensive course. And one of my VERY favorite things to teach is Scratch. . . my OTHER very favorite thing to teach is game design. So teaching game design with Scratch is like the pedagogical equivalent of a Reese's Peanut Butter Cup, one of those JUMBO-sized ones with extra thick chocolate on the top and bottom. . . the dark chocolate. . . Mmmm. . .

Of course I hope you enjoyed your week and I welcome as much direct feedback as you can stand to deliver. Again you can reach me at breenworks@gmail.com (surely you didn't need to email me in previous weeks/months because my guide is so elegantly designed it requires absolutely NO clarification).

You have just completed one of the most challenging-but-rewarding tasks in creative computing education: cultivating a new crop of game designers. Bravo! Now go celebrate with a glass of wine or an overpriced dinner or whatever way you prefer to treat yourself for a job well done. I'm going for one of those jumbo-sized, dark chocolate Reese's Peanut Butter Cups! Mmmm...