



STEM SOLVERS

STEM Solvers Curriculum *Middle School* *LEGO Spike*

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Maryville University

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Ritenour School District



Curriculum Overview and Plan

Unit/Scene 1: The Basics of Spike

- Lesson 1: Getting Started with Spike
- Lesson 2: 1st Build from Instructions: Make it Move
- Lesson 3: Spike Programming + Setting up the Showcase Project

Unit/Scene 2: Dance Competition at School

- Lesson 4: Writing about Scene 2
- Lesson 5: 2nd Build from Instructions: Break Dance (Life Hacks)
- Lesson 6: Capturing Scene 2 for the Showcase/Script/Media

Unit/Scene 3: Service Project at School

- Lesson 7: Writing about Scene 3
- Lesson 8: 3rd Build from Instructions: Super Cleanup in Invention Squad Unit
- Lesson 9: Capturing Scene 3 for the Showcase/Script/Media

Unit/Scene 4: Design for Someone: Extend a Helping Hand

- Lesson 10: Writing about Scene 4
- Lesson 11: 4th Build/Free Build - Design for Someone
(option: prosthetic hand/daily living in Invention Squad Unit)
- Lesson 12: Capturing Scene 4 for the Showcase/Script/Media

Unit 5: Project Showcase

- Lesson 13: Showcase Storyboarding and Editing
- Lesson 14: Showcase Writing and Recording
- Lesson 15: Student Showcase



Lesson 1: Getting Started with Spike

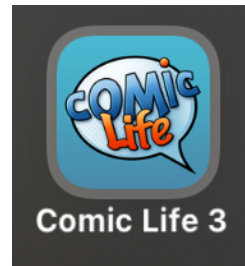
Unit/Scene 1: The Basics of Spike

Outcome(s): Students will be confident in their ability to manage the LEGO Spike set and the LEGO Spike app.

CCSS ELA connection(s): None.

Preparing for Class:

- *Materials Needed:*
 - **The classroom set of LEGO Spike kits.**
 - Do not open the Spike kits to allow the students the chance to unbox and organize their own kit.
 - **The classroom set of iPads.**
 - Ensure iPads are charged and ready for use on your school network (may require IT system upgrades with first use, so unbox each one and login with the appropriate Apple account per your school IT policy).
 - Download the LEGO Spike app (see icon below) on each iPad before the first class. Open it to be sure it is ready to open, but don't do the initial walk through in the app. The students will do that on Day 1.
 - Download the ComicLife 3 app (see icon below) to each iPad before the first class.



- Download **the Spike software** (link follows) **on 2-3 classroom computers** that have USB ports so that students can do the motor block upgrade during their kit unboxing. They will connect their SPIKE to the USB port to download. Link to instructions for different operating systems: <https://education.lego.com/en-us/downloads/spike-prime/software>
- Teachers should work through Lesson 1 (especially the update in Step 3) so you are familiar with the process.

Teacher Introductory Remarks to Students:

**There are slides [here](#) to explain this project overall (feel free to edit and make them your own). QR Code to Slides:*



This curriculum and set of activities will include three components. In the end, you will be creating a multi-media digital storytelling portfolio where you document what you will do with LEGO Robotics in this curriculum. You will be working with iPads and LEGO Spike kits to do a series of builds and using ComicLife3 writing exercises that together will provide an engaging platform where you can learn programming and robotics while also pushing forward your ELA, creativity, and problem-solving skills.

Step-by-Step Implementation

Step 1	Consider showing the PowerPoint slides to give students a sense of the overall curriculum. Once that is done, give students the never-before-opened Spike kits and ask them to take the kits apart, put the organizing stickers on the sorting trays, and get the kit pieces organized into the trays . Encourage them to ask questions about the pieces. Give ample time for this so they get to know their kits well.
Step 2	Ask students to use the stickers provided in the Spike kits to put the same number on the Spike kit case and its respective motors (7 total, plus the box) so that it will be easy to find the pieces that go together in each kit.
Step 3	Once students are familiar with their SPIKE kits, students should open the LEGO Spike app on the iPad and begin working through the setup screen/walk through to get the Spike connected to their iPad . At one point early in the setup, they will need to connect the Spike to a computer through a USB connection for an initial software update of the motor block. This will only happen once, but it is an important step in the kit unboxing to prepare the Spike for use. Allow them to use the computers you have prepped per the “Materials Needed” list above to do the motor block update. The iPad gives them instructions for how to do this.
Step 4	Once the motor block is updated and the kits are organized and labeled with stickers, students should return to the iPad and work through the yellow Start Here (Create a LEGO emoji) module on the home page of the Spike app.
Step 5	Next, students should work through the pink Motors and Sensors (Explore Action – Reaction) module on the home page of the Spike app. This module helps them test the various sensors that come with the Spike kit which will be very useful in later builds.
Step 6	Students should open the “ Photos ” app on the iPad and create a new album with their names and “Spike Project” (i.e. Jules and Henry Spike Project).
Step 7	Students should take a photo on their iPad of them with their Spike kit on Day 1 and save it to the new album in the Photos app with their names so that they can access the photos at the end of the project.
Step 8	Ten minutes before the end of class, ask students to put the Spike away and work with partners to answer these reflection questions: <ul style="list-style-type: none"> • How comfortable do you feel with the Spike LEGO kit? • How confident are you in using the Spike programming software in the app to tell your Spike what to do? • On a scale of 1-10, how much did you enjoy this project? • What else could you build with the LEGO Spike?



Lesson 2: Make it Move

Unit/Scene 1: The Basics of Spike

Outcome(s): Students will do a complete build with the Spike using the Spike app. Students will build a program that controls the Spike using the Spike block-based programming language.

CCSS ELA connection(s): The importance of recording and archiving data as it happens.

Preparing for Class:

- *Materials Needed:* The classroom set of LEGO Spike kits and iPads.
 - Storing the iPads **with** the Spike kits is a great way to make the beginning and end of class easier, if possible, and to ensure that the kids use the same iPad each class, as that is where their photos and multimedia project will be stored in the Photos app.

Teacher Introduction Remarks to Students: This lesson will help you get familiar with the Spike kit and app and will begin your multimedia project where you will capture your learning through photos and video on your iPad.

Step-by-Step Implementation

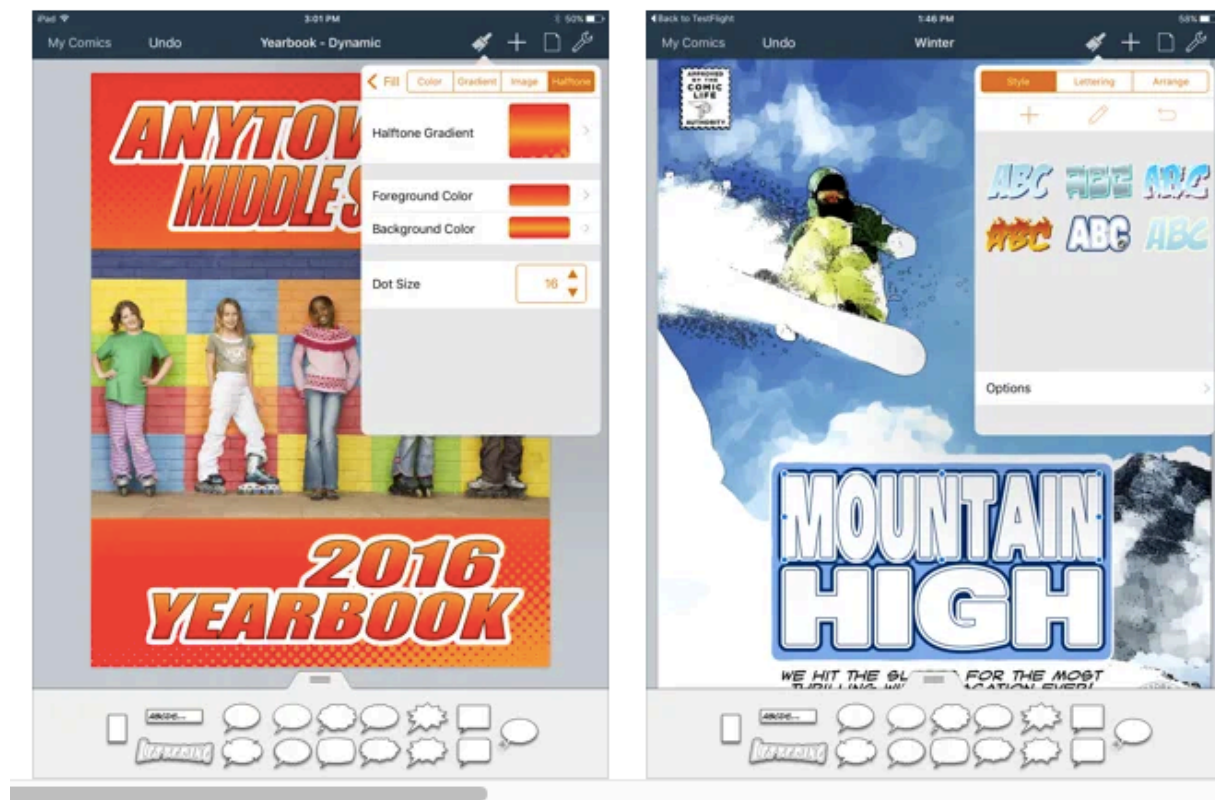
Step 1	Introduce to students the idea that the Spike kit is designed to teach programming and robotics through the block-based programming on the Spike app. Explain that block-based programming allows beginner programmers to pull blocks together and each block represents a line of code if they were coding by hand. Seeing the robot move based on the program helps students see the connection between the line of code and the effect of the program.
Step 2	Students should get the Spike kit and iPad ready at their station.
Step 3	Students should work through the blue Make it Move (Build a Hopper) module on the Getting Started page of the Spike app on the iPad.
Step 4	Students should take a photo on their iPad of them with their Spike and save it to the personal album in the Photos app where they can easily find it in the future. They should have created this album in Lesson 1.
Step 5	Students should take a video explaining what they did in class today and save that video in their personal album on the Photos app on their iPad. Continue to drive home the point with the kids that we want them to be recording everything they do in this curriculum so they can do a multimedia project with it.

Step 6

Students should **open the Comic Life 3 app** and play around a bit to get to know the app. Have them practice by creating a new comic (use the + sign to start a new comic or to add an element to a comic. We recommend using one of the Education or How-To templates to get a sense for how you can build things in this app.

We will use this app in the next class, so it is important that students begin to open it and get familiar with it in this lesson so it isn't entirely new to them in the next lesson.

Example of Templates from Comic Life and how you can add elements in the upper right hand corner menu:



Step 7

Students should **keep the Make it Move build together** as they store the Spike, to the extent possible, since they will use it again in the next lesson.

Step 8

Ten minutes before the end of class, teachers should ask students to answer these reflection questions:

- How comfortable do you feel with the Spike LEGO kit?
- How confident are you in using the Spike programming software in the app to tell your Spike what to do?
- What else might you like to build with the LEGO Spike?
- How did you like the Comic Life 3 app?



Lesson 3: Spike Programming + Showcase Setup

Unit/Scene 1: The Basics of Spike

Outcome(s): Students will be introduced to either iMovie or ComicLife apps which they will use to storyboard their work in this curriculum.

CCSS ELA connection(s): Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. ([CCSS.ELA-LITERACY.WHST.6-8.6](#))

Preparing for Class:

- *Materials Needed:* The classroom set of LEGO Spike kits and iPads.
 - Storing the iPads with the Spike kits is a great way to make the beginning and end of class easier, if possible.
 - Set up a greenscreen space so that students can easily create photos with the LEGOs that are easy to maneuver.

Teacher Introduction Remarks to Students: This lesson will help you get familiar with programming with the Spike kit and app and will advance your multimedia project. Be sure to take a few photos or videos of our activity today and store them in an album on your iPad.

Step-by-Step Implementation

Step 1	Review the previous lesson and the overall structure of this project → Students are working with Comic Life 3 to build a robotics project with digital storytelling.
Step 2	<p>Students should work on the next phase of the blue Make it Move (Build a Hopper) module by adding in the programming elements to the build. Can they actually make the hopper move and work?</p> <p>Students will likely use the LEGO block-based programming system embedded in the LEGO Spike app, but if you have students who have programming knowledge and they want to use Python or another language, it is up to you if you want them to do so.</p> <p>This YouTube video has a walk-through of the programming elements of this build if students are stuck. You may even want to start class with this video if you sense the students might benefit from it.</p> <p>Still from the video showing one programming option:</p>

Step 6	<p>Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none">• What questions do you have about the showcase project?• What could this hopper from the last couple lessons of building help someone with?• What does it mean to design to help someone?• What questions do you have about the programming elements of LEGO Spike?
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Lesson 4: Writing about Scene 2

Unit/Scene 2: Dance Competition at School

Outcome(s): Students will pause building with the LEGO Spike kits and begin to brainstorm characters, plot lines, etc related to a dance competition at school.

CCSS ELA connection(s): Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. ([CCSS.ELA-LITERACY.WHST.6-8.4](#))

Preparing for Class:

- *Materials Needed:* Paper and pens or technology that allows notetaking. I would also suggest that you find a whiteboarding app that will work easily for the students. Some common ones are the Notes app or Explain Everything.

Teacher Introduction Remarks to Students: This lesson will help build your skills at telling a story and brainstorming about characters and plot twists and turns. This will prepare us for the build in our next class where you will build a break dancer.

Step-by-Step Implementation

Step 1	Review the previous lesson and the overall structure of this project → Students are working with Comic Life 3 to build a robotics project with digital storytelling.
Step 2	Explain that today, our focus is to do some writing based on the below prompts that will get you thinking about characters for your comic and possible plot lines. We will do some brainstorming that will help guide you through this.
Step 3	<p>Character Development: Good characters take time to build. Today, we are going to build and design two characters. To get started, let's review this YouTube video from Reedsy which explains some of the elements of building characters.</p> <p>Link: https://www.youtube.com/watch?v=PqKxLx3As28</p>
Step 4	<p>Have students use a whiteboard app on the iPad to draw a character and then draw lines from the character to explain their goals and motivations. The overall prompt for this showcase is that we need concepts and visuals of 2-3 characters that can go through the following scenes that make up the general plot of the showcase comic/story:</p> <ol style="list-style-type: none"> 1. Character A and B walk to school and encounters an animal hopping on the sidewalk during their walk. 2. Character A and B attend a school dance and one of them break dances. 3. Character A and B help an after-school club with a cleanup of the school grounds. 4. Character A and B help someone do something at school that requires a machine. <p>The audience for this showcase is your class. Think of that as you write and build out your plot. Your class includes your teacher and classmates.</p>

Step 5	Have students do some brainstorming about what sorts of conflicts the character might encounter during a normal day of middle school. What are the characters internal journeys or struggles that they can grapple with during the showcase? Students should sketch out some ideas on their whiteboard app so that they can return to it in future lessons.
Step 6	Have students sketch out the back story for Characters A and B. What has happened in their past? What are their external characteristics? Be sure to give both characters a name.
Step 7	Students can create the characters using ComicLife3 of an app of their choosing, but they should be able to show and explain their two characters to someone by the end of today. Check that they have names, back stories, preferences, and interests.
Step 8	<p>Ten minutes before the end of class, teachers should ask students to put the brainstorming paperwork away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none"> • What do you like about your characters? • What do you want to work on to make your characters even more robust and interesting? • How similar or different are your characters to you?



Lesson 5: Break Dance Build

Unit/Scene 2: Dance Competition at School

Outcome(s): Students will do a second complete build with the Spike using the Spike app. Students will write a program that controls the Spike using block-based programming language.

CCSS ELA connection(s): None.

Preparing for Class:

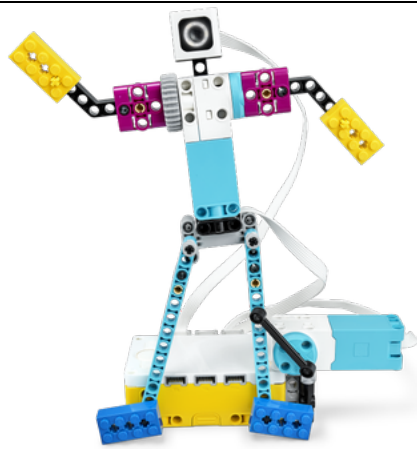
- *Materials Needed:* The classroom set of LEGO Spike kits and iPads.
 - Storing the iPads with the Spike kits is a great way to make the beginning and end of class easier, if possible.

Teacher Introduction Remarks to Students: This lesson will help you get familiar with some advanced elements of the Spike set so that you can build on your learning and begin developing Scene 2.

Be sure to take a few photos or videos of our activity today and store them in an album on your iPad. Also, if you get to the programming part of this scene, be sure to take a screenshot of your program so you can include it in the showcase.

Step-by-Step Implementation

Step 1	Review the previous lesson and the overall structure of this project → Students are working with Comic Life 3 to build a robotics project with a digital storytelling showcase.
Step 2	Start class by asking students if anyone knows how to break dance . Play a song and have a dance competition/party for a few minutes if you are up for it and the students are willing.
Step 3	<p>For this lesson, students will be working with the LEGO Spike sets and they will build the LEGOs that will go with scene 2 for the showcase project.</p> <p>The Break Dance module in the Life Hacks section of the LEGO Spike app is the build we will focus on today. Here is more information about this build: https://education.lego.com/en-us/lessons/prime-life-hacks/break-dance#lesson-plan</p> <p>Here is an example of the finished product (photo from LEGO website):</p>



Students should work in pairs to build the break dance build in Life Hacks.

Step 4

Once students are done with the build, they should move into **the programming part of the build** to begin to get the break dancer to move. Feel free to talk to them about how they could time the dancing to their favorite song.

Step 5

Encourage students to end class by **taking a series of videos and photos of this build** set to different songs so that they will have plenty of information in their personal album on the iPad to make their comic. They should consider the lyrics of a song that makes sense for their characters to enjoy.

Be sure they also take a screenshot of their program and a video of the build with the program executing so that they can use that footage in their showcase. They can use the greenscreen and tripod as needed for their video work.

Step 6

Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to **answer these reflection questions:**

- What was fun about building a dancing character?
- Which character from my character development work last class did I envision when I was building this LEGO build?
- What did you enjoy about building and programming?
- What challenges did you encounter related to building and programming?



Lesson 6: Showcase Prep

Unit/Scene 2: Dance Competition at School

Outcome(s): Students will spend this lesson working on the ComicLife 3 app and building Scene 1 and 2 in their ComicLife Project.

CCSS ELA connection(s): Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. ([CCSS.ELA-LITERACY.WHST.6-8.6](#))

Preparing for Class:

- *Materials Needed:* The classroom set of iPads.

Teacher Introduction Remarks to Students: Now that you have completed another build, we want to work on the showcase project and encourage you to begin sketching out your comic and project and how it will develop.

Step-by-Step Implementation

Step 1	Review the previous lesson and the overall structure of this project → Students are working with Comic Life 3 to build a robotics project with a digital storytelling showcase.
Step 2	<p>Recall the first build and the photos and videos you took for the Make it Move. Now that you have developed your characters, we want you to add an introductory scene to the showcase project in ComicLife 3. Build out Scene 1 including an introduction to the characters and where they are walking to school and stop to see an animal hopping on the sidewalk. Use the photos and videos that you took from the last build to craft your scene.</p> <p>IMPORTANT: The students should show the program they built for the Spike build in their showcase and they should also capture video of the program being executed.</p>
Step 3	<p>Next, add Scene 2 to your ComicLife 3 project which should focus on your characters and the second break dancing build. The characters will be attending a dance competition at school and one of them should be break dancing as part of the story. Feel free to add in a lot more detail to make your story interesting and unique. Students should use the video/photo artifacts that they have stored in the Photos app to build out their comic.</p> <p>IMPORTANT: The students should show the program they built for the Spike build in their showcase and they should also capture video of the program being executed.</p> <p>*Note: Some students may still need to finish their build or program and they can use some time today to do that, but they really do need to spend the majority of this time working on their showcase project.</p> <p>We suggest 15-minute work stretches with 5 minutes of exchange following where they check in with 1-2 other people in the class (rotating) so that there is as much learning as possible with ComicLife 3. As they see things that others are working on, we expect that they'll teach each other and their overall knowledge of how to build the comic story out will improve.</p>

Step 4	<p>Continue to encourage them to look at their whiteboard app to review the character details and back story so that they can write interesting dialogue throughout.</p> <p>Touch base with the students as the class session proceeds to identify students struggling with the LEGO Spike or the ComicLife 3 app.</p>
Step 5	<p>Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none"> • What is going well with the ComicLife 3 showcase project? • What are you struggling with related to ComicLife 3? • What is going well with the LEGO Spike builds? • Are you feeling more comfortable with LEGO Spike?



Lesson 7:
Writing About Scene 3
Unit/Scene 3: Service Project at School

Outcome(s): Students will spend this lesson working on brainstorming dialogue for their second scene about a service project at school.



CCSS ELA connection(s): Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. ([CCSS.ELA-LITERACY.WHST.6-8.4](#))

Preparing for Class:

- *Materials Needed:*
 - Paper and pens or technology that allows notetaking. I would also suggest that you find a whiteboarding app that will work easily for the students. Some common ones are the Notes app or Explain Everything.
 - Copies of the Lesson 7 Worksheet from the [Google Drive](#).

Teacher Introduction Remarks to Students: Now that you have completed the last scene, it's time to move into another scene where you will manage a service project for your school. This lesson leads to a build called "Super Cleanup" where you'll build a LEGO creation that will help with cleaning up an area.

Step-by-Step Implementation

Step 1	Review the previous lesson and the overall structure of this project → Students are working with Comic Life 3 to build a robotics project with a digital storytelling showcase.
Step 2	<p>Now that you have sketched out your characters and completed another build, we want you to add another scene to the showcase project in ComicLife 3 where your characters will help a club at their school do a cleanup project. It could be on the playground or in a room, but the characters need to come across the mess and figure out a machine to clean it up. You'll build that machine in the next lesson (feel free to preview what the next build looks like at this website) and then you can record your dialogue in the next lesson to complete this scene. QR code for the aforementioned website:</p> 
Step 3	<p>Introduce the concept of how to write dialogue for comics by showing any portion or the full video here by Palle Schmidt (11 min long video). This video helps explain how character development and dialogue development work together to help prime the students for writing some dialogue. QR code for video here:</p> 

<p>Step 4</p>	<p>Show students the Lesson 7 Worksheet in the Google Drive Folder here. They can use it to sketch out how this scene will go.</p> <div data-bbox="570 222 659 310" data-label="Image"> </div> <p>QR code for above link here:</p> <p>Prompt students for a 15-20 minute writing/brainstorming session (or shorter if you prefer multiple rounds) with these prompts:</p> <ul style="list-style-type: none"> • “How might a scene go if your characters encountered something at school that needed cleaned up? • Imagine your characters work with an after-school club to clean something up. Where would they be in school? • What would they be cleaning up?” <p>Students can share their brainstorming results with others if time allows or you can do another round of brainstorming.</p>
<p>Step 5</p>	<p>Ten minutes before the end of class, teachers should ask students to put the brainstorming paperwork away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none"> • What was easy about writing dialogue for your characters? • What was difficult? • What resources might make this process feel easier for you?



Lesson 8: Super Cleanup Build

Unit/Scene 3: Service Project at School

Outcome(s): Students will do a third complete build with the LEGO Spike kit using the Spike app. Students will also write a program that controls the Spike using the Spike block-based programming language.

CCSS ELA connection(s): None.

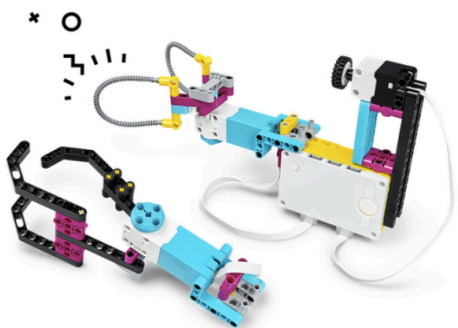
Preparing for Class:

- *Materials Needed:* The classroom set of LEGO Spike kits and iPads.
 - Storing the iPads with the Spike kits is a great way to make the beginning and end of class easier, if possible.

Teacher Introduction Remarks to Students: This lesson will help you work with some advanced elements of the Spike set so that you can build on your learning and begin developing Scene 3: Service Project at School.

Remind students to be sure to take a few photos or videos of our activity today and store them in an album on your iPad. They need to capture the program that they write for the build, as well, if they get that far today.

Step-by-Step Implementation

Step 1	Start class by asking students if anyone has had to do a big cleanup in the past and what tools they used to aid them with brainstorming details for this scene.
Step 2	<p>For this lesson, students will be working with the LEGO Spike sets and they will build the LEGOs that will go with Scene 3 for the showcase project.</p> <p>The Break Dance module in the Life Hacks section of the LEGO Spike app is the build we will focus on today. The result is a tool that can grab things.</p> <p>Here is more information about this build: https://education.lego.com/en-us/lessons/prime-life-hacks/break-dance#lesson-plan</p> <p>Here is an example of the finished product (photo from LEGO website):</p> 

Step 3	Students should work in pairs to build the Super Clean Up build which can be found in Invention Squad in the SPIKE app. There are two options for the grabber and students can do either one.
Step 4	Once students are done with the build, they should move into the programming part of the build to begin to get the grabber to move. Feel free to talk to them about how they could build a program that fits into their storyline from the last lesson.
Step 5	<p>Encourage students to end class by taking a series of videos and photos of this build so that they will have plenty of information in their personal album on the iPad to make their comic.</p> <p>Be sure to have them screenshot the program they built and a video of the cleanup grabber moving when the program executes so they can use that in their showcase. They can use the greenscreen and tripod as needed for their video work.</p>
Step 6	<p>Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none"> • What was fun about building this cleanup machine? • How did your storyline fit with this build? • What resources would be helpful as you continue? • What barriers are you encountering?



Lesson 9: Showcase Prep

Unit/Scene 3: Cleanup at School

Outcome(s): Students will spend this lesson working on the ComicLife 3 app and integrating Scene 3 about a cleanup at school into their story.

CCSS ELA connection(s): Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. ([CCSS.ELA-LITERACY.WHST.6-8.6](#))

Preparing for Class:

- *Materials Needed:* The classroom set of iPads.

Teacher Introduction Remarks to Students: Now that you have completed another build, we want to work on the showcase project and encourage you to begin sketching out your comic and project and how it will develop.

Step-by-Step Implementation

Step 1	<p>For this lesson, your goal is to add Scene 3 to your ComicLife 3 project which should focus on your characters encountering an after-school club that needed help with a cleanup as part of the story. Feel free to add in a lot more detail to make your story interesting and unique.</p> <p>IMPORTANT: The students should show the program they built for the Spike build in their showcase and they should also capture video of the program being executed.</p> <p>*Note: Some students may still need to finish previous showcase scenes or the third build.</p> <p>Students should use the video/photo artifacts that they have stored in the Photos app to build out their comic. Play some music or give them a lot of time to work on this. We suggest 15-minute work stretches with 5 minutes of exchange following where they check in with 1-2 other people in the class (rotating) so that there is as much learning as possible with ComicLife 3. As they see things that others are working on, we expect that they'll teach each other and their overall knowledge of how to build the comic story out will improve.</p>
Step 2	<p>Continue to encourage them to look at their whiteboard app to review the character details, dialogue, and back story so that they can write interesting dialogue throughout.</p> <p>Touch base with the students as the class session proceeds to identify students struggling with the LEGO Spike or the ComicLife 3 app.</p>

Step 3	<p>Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none">• What is going well with the ComicLife 3 showcase project?• What are you struggling with related to ComicLife 3?• What is going well with the LEGO Spike builds?• Are you feeling more comfortable with LEGO Spike?
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Lesson 10: Writing About Scene 4

Unit/Scene 4: Design for Someone

Outcome(s): Students will spend this lesson working on brainstorming the scene and plot for the third scene which is a free build where they can pick a situation where their characters help someone at school.

CCSS ELA connection(s): Brainstorming and building imaginative stories that have cohesion.

Preparing for Class:

- *Materials Needed:*
 - Paper and pens or technology that allows notetaking. I would also suggest that you find a whiteboarding app that will work easily for the students. Some common ones are the Notes app or Explain Everything.
 - Copies of the Lesson 7 Worksheet from the [Google Drive](#).

Teacher Introduction Remarks to Students: Now that you have completed the last scene, it's time to move into another scene where you will have more freedom to build something of your choice. We recommend looking at the Design for Someone section which has options for building a prosthetic hand and other daily living supports, but this is a free build that can be adapted per the student's choice. This scene gives you maximum freedom to allow students to use what they have learned about storytelling and LEGO Spike builds to create a scene and a build that fulfills their imagination.

Step-by-Step Implementation

Step 1	As we move into this fourth build, students have the knowledge and knowledge of ComicLife3 and the LEGO Spike kits, so this scene and unit will focus more on giving students more freedom to craft this final scene.
Step 2	<p>Prepare students for a 15-20 minute writing/brainstorming session (or two 10 minute rounds if shorter feels more appropriate) where you ask them to respond to this prompt:</p> <ul style="list-style-type: none">• This final build is focusing on helping someone or designing something for someone who can help. Some of the builds are a prosthetic hand or things that might help someone with daily living tasks, but you can also build anything at all. Do some brainstorming about items you could build with LEGOs that could help someone.• What are some problems you have recently encountered that a small device could help solve?• What is something you've been wanting to try with the LEGO builds? Any specific item you want to be sure to include from the SPIKE kit?
Step 3	<p>Encourage students to build out a storyline using their characters and dialogue. They can use the worksheet from Lesson 7 if it is helpful. This will be more of a free scene, so they can determine the storyline they want and the accompanying build that will help them create that scene.</p> <p>They should plan for a moving machine or item that will require programming.</p> <p>Also, for students who need more scaffolding, I recommend directing them to build the prosthetic hand from the Design for Someone - Invention Squad Unit. They can build a story around that if they are struggling with coming up with an idea for a storyline or a free build.</p>

Step 4	<p>Ten minutes before the end of class, teachers should ask students to put the brainstorming paperwork away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none">• What was easy about crafting this final scene and build?• What was difficult about brainstorming?• What resources might make this process feel easier for you?
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Lesson II: Free Build/Helping Hand Unit/Scene 4: Design for Someone

Outcome(s): Students will do a fourth complete build with the LEGO Spike kit using the Spike app, although students will have much more freedom with this build to build without instructions if they would like. Students will also write a program that controls the Spike using the Spike block-based programming language.

CCSS ELA connection(s): None.

Preparing for Class:

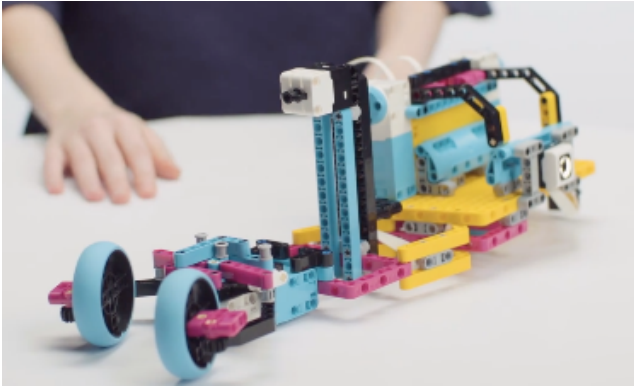
- *Materials Needed:* The classroom set of LEGO Spike kits and iPads.
 - Storing the iPads with the Spike kits is a great way to make the beginning and end of class easier, if possible.

Teacher Introduction Remarks to Students: This lesson will help you build with a bit more freedom. Now that you know about the Spike kits and the ComicLife3 app, this unit gives you flexibility to design a scene that revolves around helping someone in some way, but you want design any build you want.

Remind students to be sure to take a few photos or videos of our activity today and store them in an album on your iPad. They need to capture the program that they write for the build, as well, if they get that far today.

Step-by-Step Implementation

Step 1	Start class by asking students to share a way that someone helped them recently. Inquire about if there were any machines or tools that were used in the process if appropriate for their responses.
Step 2	<p>For this lesson, students will be working with the LEGO Spike sets and they will build a machine that will go with scene 4 for the showcase project.</p> <p>Students can do an entirely free build using the kit pieces (DO NOT mix the kit pieces to ensure kit item integrity for future use) if they chose. They should use the brainstorming notes that they took in the last lesson to guide this build. Expect that they will take longer with this build since they will not be working from instructions. There may also be some conflict that arises in the partnerships since students will have less structure as they move through this build. There is no “right” answer for a free build, so expect more negotiation.</p> <p>For students who need more support or scaffolding, they can work on the Design for Someone build in Invention Squad Unit which is a prosthetic hand to incorporate that into their storyline. Here is more information about this build: https://education.lego.com/en-us/lessons/prime-invention-squad/design-for-someone#coding-tips</p>

	<p>Here is an example of the finished product of the prosthetic hand build (photo from LEGO website):</p> 
Step 3	<p>Once students are done with the build, they should move into the programming part of the build to begin to get their machine to move. Again, because there is less structure here, they may move slower or struggle more with conflict.</p>
Step 4	<p>Encourage students to end class by taking a series of videos and photos of this build so that they will have plenty of information in their personal album on the iPad to make their comic.</p> <p>Be sure to have them screenshot the program they built and a video of the machine moving when the program executes so they can use that in their showcase. They can use the greenscreen and tripod as needed for their video work.</p>
Step 5	<p>Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none"> • What felt different doing more of a free build instead of a build from instructions? • What did you enjoy about this build compared to the others? • What resources would be helpful as you continue? • What barriers are you encountering?



Lesson 12: Showcase Prep

Unit/Scene 4: Design for Someone

Outcome(s): Students will spend this lesson working on the ComicLife 3 app and integrating Scene 4 into their showcase.

CCSS ELA connection(s): Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. ([CCSS.ELA-LITERACY.WHST.6-8.6](#))

Preparing for Class:

- *Materials Needed:* The classroom set of iPads.

Teacher Introduction Remarks to Students: Now that you have completed another build, we want to work on the showcase project and encourage you to continue sketching out your showcase project.

Step-by-Step Implementation

<p>Step 1</p>	<p>For this lesson, your goal is to add Scene 4 to your ComicLife 3 project which should focus on your characters encountering a person who needs help. Their LEGO build should support the scene by helping the person who needs help. Feel free to add in a lot more detail to make your story interesting and unique.</p> <p>IMPORTANT: The students should show the program they built for the Spike build in their showcase and they should also capture video of the program being executed.</p> <p>Students should use the video/photo artifacts that they have stored in the Photos app to build out their comic. Play some music or give them a lot of time to work on this. We suggest 15-minute work stretches with 5 minutes of exchange following where they check in with 1-2 other people in the class (rotating) so that there is as much learning as possible with ComicLife 3. As they see things that others are working on, we expect that they'll teach each other and their overall knowledge of how to build the comic story out will improve.</p>
<p>Step 2</p>	<p>Continue to encourage them to look at their whiteboard app to review their notes on the character details, dialogue, and back story so that they can write interesting dialogue throughout.</p> <p>Touch base with the students as the class session proceeds to identify students struggling with the LEGO Spike or the ComicLife 3 app.</p>
<p>Step 3</p>	<p>Ten minutes before the end of class, teachers should ask students to put the Spike away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none"> • What is going well with the ComicLife 3 showcase project? • What are you struggling with related to ComicLife 3? • What is going well with the LEGO Spike builds?



Lesson 13: Showcase Storyboarding and Editing

Unit/Scene 5: Project Showcase

Outcome(s): Students will spend this lesson finetuning the overall plot flow and storyline of their comic or digital story.

CCSS ELA connection(s): Students will learn the importance of editing once a final draft is completed.

Preparing for Class:

- *Materials Needed:* The classroom set of iPads.

Teacher Introduction Remarks to Students: Now that you have completed all four builds and scenes, it's time to begin editing and filling in the missing sections of the showcase project. By the end, the goal is to have four scenes that your character moves through with dialogue and movement with each LEGO build so that you demonstrate your programming skills. It is essential to include the programming screenshots at the end of your showcase project to demonstrate how you got your builds to move.

Step-by-Step Implementation

Step 1	<p>For this final unit, we will be fine-tuning the project showcase by reviewing what you have in ComicLife 3 and incorporating scenes from ComicLife into an iMovie or further developing the ComicLife 3 project if you prefer.</p> <p>The final project should be a fully edited, audience-ready digital story that tells the story of your characters.</p>
Step 2	<p>For this lesson, your goal is to focus on the overall storyline. The next lesson will focus on the dialogue and captions, so don't worry about the words in your digital storytelling showcase at this time. Instead, focus more on the overall storyline and how it flows through the scenes and overall character development. Feel free to add details and elements to smooth out the overall plot.</p>
Step 3	<p>Ten minutes before the end of class, teachers should ask students to put the work away and work with partners to answer these reflection questions:</p> <ul style="list-style-type: none">• What is going well with your showcase project?• What are you struggling with related to your showcase project?• How is it going working with your partner and how could you strengthen your partnership as we head into the final lessons?



Lesson 14: Showcase Writing and Recording

Unit/Scene 5: Project Showcase

Outcome(s): Students will spend this lesson finetuning the dialogue and captions of their comic or digital story.

CCSS ELA connection(s): Students will learn the importance of editing once a final draft is completed.

Preparing for Class:

- *Materials Needed:* The classroom set of iPads.

Teacher Introduction Remarks to Students: Now that you have smoothed out the storyline of your project, work more specifically on the dialogue and captions to ensure that it is error-free and clear.

Step-by-Step Implementation

Step 1	Begin by arranging the schedule for the showcase so that students will know how they are presenting. You can either do group presentations where they explain their project to the class or you could do a split showcase in an open-house format where half the class is an audience for the other half, who present at small tables in an open-house format. Just be sure the students have a good sense of how you want to hold the showcase.
Step 2	For this lesson, your goal is to focus on the dialogue and captions within your showcase. Remember what you learned from the dialogue video in the early lessons of this curriculum to guide your work. Feel free to add details and elements to smooth other the overall dialogue of your characters.
Step 3	The next lesson is the showcase where you will show your showcase to your class. Be sure to look for errors in grammar and missing clarifications that would help your audience understand your story.
Step 4	Ten minutes before the end of class, teachers should ask students to put the work away and work with partners to answer these reflection questions: <ul style="list-style-type: none">• What is going well with your showcase project?• What are you struggling with related to your showcase project?



Lesson 15: Student Showcase

Unit/Scene 5: Project Showcase

Outcome(s): Students will display their digital story showcase project for the class.

CCSS ELA connection(s): Students will learn the importance of sharing their work with others.

Preparing for Class:

- *Materials Needed:* The classroom set of iPads and a way to project them to the class.

Teacher Introduction Remarks to Students: This is the day we have all been waiting for.

Step-by-Step Implementation

Step 1	Collect the student showcase pieces in a single place so that you can send them to us. We plan to analyze them to determine effectiveness of the program.
Step 2	Have the student showcase where they can display what they created. Engage them in questions about their programming and LEGO builds, specifically, as well as their storyline and how they pulled it all together.
Step 3	Send us the showcase samples by emailing the folder with all of the projects in it to GRoberts1@maryville.edu . We hope you have enjoyed the SPIKE kits and iPads and that they come in handy for your class for years to come. Great job completing this curriculum. Thank you for partnering with us to deliver it!