Lesson #2: App Inventor- Beginner Practice

Overview:

This lesson is designed to allow students to take their MIT App Inventor skills to the next level. Students will get to complete one or two tutorials which will advance their skills using canvas events, arrangements, variables, and procedures.

Student Agency:

Students will have an opportunity to add their own unique flair to their app as they follow a series of tutorials to learn how to use canvas events, arrangements, variables, and procedures. Students may change the layout of their apps including colors, pictures, and sounds, as well as, the topics in the Quick_Quiz app.

Pathway: Coding/Computational Thinking

Duration: This lesson will take roughly 1/2 - 2 hours to complete based on student background and teacher familiarity.

Essential Question:

- How can apps using advanced technology such as machine learning and artificial intelligence make the world a safer place?

Objectives:

- Students will be able to use a canvas and image sprite to complete an app that will allow the user to draw or write.
- Students will be able to utilize variables, procedures, and lists to create an app which will replicate a quiz.

Competencies & Practices	**Student Artifacts/Evidence**
Collaboration	Students will collaborate with each other to

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	work through problems that arise while completing their first apps.
Simulation	MIT App Inventor simulates what an app will look like on an emulator or tablet.
Abstraction	Apps use abstraction to remove complex details such as coding so it is user friendly.
Algorithms/Procedures	Students program a series of algorithms so that the app knows what it should do next.
Test and Debug	Students will be testing and debugging all of their apps in order to make sure the work seamlessly.
Reuse and Remix	Students can remix their apps to have their own unique pictures, sounds, and layouts.

Teacher Preparation:

Teachers should have already completed the tutorials found in Lesson #1 before moving on to this lesson. Teachers should complete Digital_Doodle and Quick_Quiz to ensure that they can help students as problems arise.

Materials for Students:

- Students will need a computer with access to the internet and a Gmail account.

Students Prior Knowledge:

Students should have successfully completed the tutorials in Lesson #1 to have the background knowledge to move to Lesson #2.

Concepts:

- Canvas- A two-dimensional touch-sensitive rectangular panel on which drawing can be done and sprites can be moved.

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- Image Sprite- A 'sprite' that can be placed on a Canvas, where it can react to touches and drags, interact with other sprites and the edge of the Canvas, and move according to its property values.
- Arrangements- Arrangement components display a group of components laid out from left to right or top to bottom.
- Lists- Make lists of different variables
- Variables- Creates a value that can be changed while an app is running, and gives that value a name.
- Procedures- Create functions that do certain tasks in a sequence.

Habits of Mind:

- Persisting
- Managing Impulsivity
- Applying Past Knowledge to New Situations
- Creating, Imagining, Innovating
- Thinking and communicating with clarity and precision

Lesson Sequence:

1. **Anticipatory Set:** Introduce this lesson by playing the following video.
   - Video Connection:https://www.youtube.com/watch?v=NrmMk1Myrxc
   - Questions to Ask Students:
     - ➢ What technology is helping make stores like this possible? *Machine Learning, Computer Vision, and Artificial Intelligence.*
     - ➢ Could schools use this type of technology? How? *Attendance, hall passes, security, etc...*

2. **Engaging Activities: Engaging Activities:**
   a. **Tutorials:** Students are going to follow two separate tutorials at their own pace to expand their App Inventor skills.

Teacher Tip: Allow students to change the layout of their app to make it unique for their own needs. They may change colors, pictures, sounds, etc...

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i. **Digital_Doodle**- Students will program a drawing app to learn how to use the image sprite and canvas functions in a new way.
Link to Digital_Doodle Google Slide.

ii. **Quick_Quiz**- Students will create a quiz to hone in their skills using vertical/horizontal arrangements, lists, variables, and procedures.
Link to Quick_Quiz Google Slide.

Teacher Tip: Teachers may want to offer small group instruction for students who are still struggling with the App Inventor program. This will help them get up to speed before moving on to more advanced apps.

3. **Share Out:** Give students an opportunity to share their apps with each other. This will give them an opportunity to show how the changed their app to make it meet their own individual needs.

   Teacher Tip: This is a great time for students to teach each other how to design and program components that are not in the tutorials. Some students will figure out how to do advanced things on their own and their friends will want to know how to do it.

4. **Wrap Up**: Have students expand upon their ideas for their own app that they started in Lesson #1. This will allow them an opportunity to add some of the functions that they learned in this lesson.

Assessment Questions	**Yes**	**No**
Students used the canvas and image sprite tools correctly?		
Students can use the horizontal and vertical arrangement functions?		
Students understand how to use variables and procedures in an app?		

Activities for Relearning:

Teacher may guide small groups of struggling students to help them understand the concepts better. Students may also complete a less complex version of each app while still learning the important concepts.

- Digital_Doodle can be replaced with Paint_Pot
- Quick_Quiz can be replaced with Quiz_Me

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Activities for Enrichment:

Students can challenge themselves to create the same apps with alterations

- Digital_Doodle
  - Program with less code
  - Add buttons to change colors
  - Change the size of dots
  - Change the canvas to another picture to draw onto
- Quick_Quiz
  - Program the app so that a user can only move on if it is the correct answer
  - Program with less code
  - Add a label which displays the number of correct answers

Resources for Teachers:

- http://ai2.appinventor.mit.edu/reference/components/animation.html#Canvas
- http://ai2.appinventor.mit.edu/reference/components/layout.html#HorizontalScrollArrangement
- https://www.youtube.com/watch?v=NrmMk1Myrxc
- https://docs.google.com/presentation/d/1lw4Wj-vk7Ziby3JOaH7I08hAMcj8wUkJZ-3rFwCP7xA/edit#slide=id.g3c11d03f28_0_33
- https://appinventor.mit.edu/explore/ai2/quizme.html
- https://appinventor.mit.edu/explore/ai2/paintpot-part1.html