Augmented Reality (AR) – Lesson plan

**Objective:**
Students will explore the emerging technology of Augmented Reality (AR). They will use innovative thinking and teamwork to imagine how AR might be used to assist humans in various tasks.

Learn more about the Essential Eight [here](#).

**Audience:**
High school and older.

**Essential question:**
How can AR technology be used to help humans carry out tasks?

**Materials:**
- “Augmented Reality” visual handouts – 1 copy per student
- “Designing Your Own AR Experience” team design challenge handouts – 1 copy per small team of 3-4 students
- Whiteboard markers
- Enough MERGE Cubes and tablets to distribute one set to each group of 3-4 students
  - Set the Cubes and tablets up on a table at the front of the classroom so that the students can see them as they enter the room. This will help build excitement and anticipation around the mysterious black cubes and the possibility of getting to use the equipment (See below in “Pre-Visit Prep” for how to request MERGE Cubes as well as recommendations on procuring tablets)

**Pre-visit prep:**
- **Note:** It is highly recommended that you spend time interacting with these items and have a firm understanding of how they work before working with students
  - MERGE Cubes can be requested from your local office [AYP Committee](#)
  - For this activity, it is preferable to use tablets owned by the school. Contact the teacher ahead of time and ask if they can provide the tablets. The AR apps must be installed onto the tablets prior to the lesson, so ask the teacher if they would carry out the installation. Refer to the “Options for Content on MERGE Cube” section below for suggested apps to have installed. Most MERGE Cube apps do not need Wi-Fi during the lesson if they are already installed
  - Please watch this [unboxing video](#) for set-up tips
  - Also ask the teacher to make sure all tablets are completely charged prior to the lesson
  - Work with the teacher ahead of time to figure out a room arrangement where the students can gather into groups of 3-4. These groups will try out the MERGE Cubes together in Activity 2 and carry out the group design work together in Activity 3. Knowing their students, the teacher may also want to pre-compose the groups in order to get the most out of the activity and minimize disruptions
  - Gather a few interesting stories of AR use or technology development from the news in case there is time to share them during the lesson
  - Print necessary handouts
Options for content on MERGE cube

<table>
<thead>
<tr>
<th>App Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Body for MERGE Cube</td>
<td>A holographic human body</td>
</tr>
<tr>
<td>THINGS for MERGE Cube</td>
<td>Try out different MERGE Cube apps</td>
</tr>
<tr>
<td>Galactic Explorer/MERGE Cube</td>
<td>Planets in the palm of your hand!</td>
</tr>
</tbody>
</table>

Lesson length:
45 minutes
Considerations for facilitating virtually (via Google Hangout, WebEx, or Skype)

Much of this lesson can be delivered virtually via Google Hangout, WebEx, or Skype. The educator you are working with may have a preference on technology, so defer to them. Benefits of this include schedule flexibility for both the classroom and facilitator and elimination of travel time. Keep in mind the following elements when transitioning this lesson to a virtual format:

• Start off with a clear personal introduction - share with the students where you are (generally) geographically and some detail about your job and career journey. This will help develop a personal and engaging connection with the classroom. Consider teaching the class with a colleague as well!

• Make sure the video/sound is working well up-front!

• Share the printable handouts with the teacher in advance, as they will need to print and distribute on your behalf. Discuss with the teacher in advance what you will need and the timing on when to distribute the materials

• Edit Activity 2 – Since the students will not be using the MERGE Cubes in person, show them a Cube in action through the virtual session. This will take some practice

• Don’t be afraid to engage with the students by asking questions as you go through the lesson and show videos!

Lesson outline

**Introduction**: (1 minute, Large group activity)

• Greet the students and introduce yourselves. Explain that you’re from [Company]. [Insert quick sentence or two about the Company]. Explain that you’re here to talk with them about some of the incredible emerging technologies that are changing our lives

• Let them know that today we’re going to focus on the exciting world of Augmented Reality, or AR

**Activity 1: “What is augmented reality”** (7 minutes, Large group activity)

• Overview: Before telling the students what Augmented Reality is, get them thinking and talking right away. Engage them in conversation and pull out their thoughts on what the term means

  - Ask the students if they have ever heard of “Augmented Reality,” or “AR.” Lead a brief discussion and ask them questions such as, “What is Augmented Reality? Has anyone in this room ever used AR or seen it used? If so, what? Does anyone know what the word “augment” means? Does anyone know, or can you offer a theory, on the difference between Augmented Reality and Virtual Reality? How are they also similar?” Take some thoughts from the students for a few minutes

  - Now pass out the “Augmented Reality” visual handout and add to and clarify the students’ understanding of what AR is and what it’s not. Go over the definition of AR and tell them that “augment” simply means “to make something better by adding to it.” Tell them that the primary difference between AR and VR is that AR adds to the world that you see around you, and VR blocks out your entire view and helps immerse you in a simulated world. Both use similar technologies, both are meant to add to or enhance the user's experience, and both have lots of potential for different uses
Augmented Reality

What is AR?
Augmented Reality uses technology to enhance, or augment, your experience of the real world around you. It superimposes computer-generated visuals or information onto your view of your surroundings.

What is AR used for?
AR can help you tour a new city, chase cartoon critters around town, or redecorate your room. In the future, it may help you carry out a surgical operation or fix a space station.

- Healthcare training
- Sightseeing
- Maintenance and repair
- Navigation
- Gaming
- Marketing
- Education
- Interior design

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As you go over the handout, be sure to point out thoughts that the students already covered, which will help them feel heard and validated.

**Activity 2: “Augmented reality in the palm of your hand”**
(20 minutes, Small group activity)

- **Overview:** Give all students some time to experience interacting with Augmented Reality.
  - **Note:** Be sure to brief the students on how to properly use the MERGE Cubes and tablets and go over the Activity instructions **before** you distribute the Cubes and tablets to the groups. If you distribute the materials first, you’ll most likely have a hard time keeping the students’ attention for the instructions.
  - Tell the students that they are going to get a quick taste of what it’s like to explore Augmented Reality. Let them know that they will have 3 minutes per student to explore a few of the preloaded apps.
  - Hold up a MERGE Cube and ask the students what they think it is. Let them offer a few theories and then explain that it’s called a MERGE Cube, which when viewed and manipulated through a mobile device, turns into augmented reality computer-generated images that you hold in your hand. Tell them that a wide range of apps for the Cube are available in the Google Play and App Stores.
  - Give them a quick briefing on the three apps that are available for them to explore, and show them where they can find the apps on the tablet:
    - **Mr. Body for MERGE Cube** – A holographic human body
    - **TH!NGS for MERGE Cube** – Try out different MERGE Cube apps
    - **Galactic Explorer/MERGE Cube** – Planets in the palm of your hand!
  - Encourage the students to explore the apps and consult their team if they have questions.
  - Now ask the teacher to form the students into their **pre-composed groups of 3-4** while you distribute a Cubes and tablets to each group. Be sure to instruct the students to not touch the materials until you tell them to.
  - Tell the students that they have 60 seconds to determine the order that they will go in. Time them and make sure they’ve determined an order before beginning. Ask them to remember their numbers. Let them know that you’ll run the exploration time in **3-minute rounds**. In the first round, students #1 will use the Cube, and so on.
  - Set a timer for 3 minutes and tell the students that round 1 will now begin. You’ll need to circulate during each round and help troubleshoot and guide the students through getting the most out of their time.
  - As the 3 minutes is winding down, let the students know that their time is almost up. At the end of the round, ask the user to pass the Cube and tablet to student #2. Begin round 2 and again set the timer for 3 minutes. Keep working in 4-minute rounds until all students have experimented with using the Cube.
  - Once you’ve gone through all of the rounds, work with the teacher to **collect all of the equipment**.
  - Hold a quick debrief before moving on. Ask them questions like, “What was that like? How real did it feel? What was your favorite part of the experience? What was challenging about it? Why do you think it’s called a MERGE Cube?”
Activity 3: “Designing your own AR experience” – Team design challenge
(10 minutes, Small group activity)

• Overview: Have the students **share their ideas** for how using AR can be used to assist people in various tasks
  
  – Remind the students that, as we saw before, AR can be used for many different things such as navigation, maintenance and repairs, design, and gaming. Tell the students that it’s now time to **put their innovative thinking and creativity skills to the test**. Tell them that their challenge is to quickly work in the same small teams to design an innovative, experiential AR app to help a user **fix something, teach something**, or **play something**
  
  – Read the challenge out loud to the teams. Let them know that they will have only **15 minutes** to design their AR apps and develop their presentations
  
  – Pass out the “Designing Your Own AR Experience” handout (see below) as well as sheets of paper (or space on their whiteboard) and markers for them to create their presentations. Then have them get to work!

Activity 4: “Innovation presentations”
(5 minutes, Large group activity)

• Overview: Have the students **share their ideas** for using AR to assist in various tasks
  
  – Have the teams quickly **deliver their presentations**
  
  – After each presentation, quickly **highlight** particularly innovative thinking and problem solving
  
  – Tell them that their ideas and designs are creative and worthy of being made a reality
Wrap up and supplemental activity (2 minutes, Large group activity)

- Point out that innovative companies are working with clients to combine Augmented Reality technology with other emerging technologies (the rest of the Essential Eight – Drones, Virtual Reality, Artificial Intelligence, 3D Printing, Blockchain, Robotics, The Internet of Things) to solve big problems around the world. This is called convergence when you’re using more than one of these technologies together to solve a problem.

- Remind the students that AR is already a part of their lives. They may already use it every day on their phones.

- Remind them that the world of Augmented Reality is only getting bigger, and it will need clever designers and developers like them.

- Also encourage them to share at least two things they learned or figured out today about AR with friends or family.

- Thank the students for contributing and working with you to explore the exciting world of Augmented Reality. Tell them that you’re impressed by their ideas, their creative problem solving, and their teamwork.

- If you have extra time, you can:
  - Have students continue to explore the MERGE Cube apps.
  - Have students find real-world examples of AR in action on their smartphones or think of examples in their homes, school, or community.
Designing your own AR experience

Team design challenge

Your team’s challenge:

1. Think about how you might use an interactive AR app to help a user fix something, teach something, or play something

2. Work together to design an AR app that would serve that task

3. Create a presentation to share your AR app idea. Be sure to include the following:
   • Tell us what purpose your app serves and who would use it
   • Create mock-up drawings of what your app looks like in action

4. You will have only 1 minute to give your presentation, so be brief!
Thank you