
Cybersecurity



Facilitator Guide: How to Prepare for This Lesson



Lesson 11 – Encryption Methods

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About this Facilitator Guide

This facilitator guide provides the details to help you enable students to complete the lesson on **Encryption Methods – How can encryption methods help digital information to be transferred securely?**

Instructions for using the SCORM files in Blackboard and Canvas can be found at this [link](#). Instructions for using Flipgrid can be found in this guide.

While this lesson is designed for online learning, you will find information in this guide about In-Person Learning Adaptations to help you facilitate your students who may be completing this lesson in the classroom instead of online. Call-outs will provide guidance on how to adapt various activities for in-person learning.

Before You Get Started

Before you get started with this lesson, please be sure to:

- Read through the facilitator guide.
- Download SCORM. (You will only need to add SCORM once. After that, you will be set to use SCORM for any remaining lessons.)
- Review the Rise lesson.
- Prepare any resources needed for the lesson.
- Set up Flipgrid.

Flipgrid Instructions – Setting up Flipgrid

Both educators and students will need to set up Flipgrid for use.

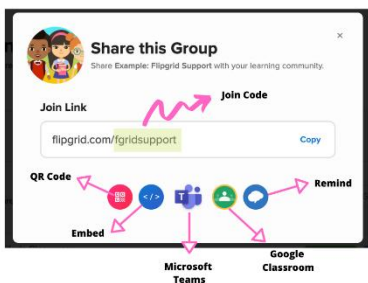
Educator Step-by-Step Guide

Set up your free educator account at [Flipgrid.com](https://flipgrid.com) and create a **Topic** for the class. Please copy and paste the heading from the facilitator guide that pairs with the Flipgrid so that the topic aligns with student expectations. A Topic is a discussion prompt for students. Students respond to the Topic with a short video using our fun, social-media-style camera. Students can watch and comment on videos from peers, with the educator in complete control.

1. Create a Topic

Topics start the conversation in Flipgrid. Just write a prompt and include anything for students to review before responding, such as videos and links.

When you create a new Topic or Group, a Join Code is automatically created for it. To share the Join Code to your Topic or Group, login to your educator account and select the blue Share button to access your Join Link and Code, as well as other ways to share your discussion.



The Join Code also creates a Link. Copy/paste the link in emails, texts, social media, Google Classroom, or other websites to invite your students to join! You can download/print QR codes for students to scan on the Flipgrid app. The Flipgrid app and flipgrid.com offer a QR scanner on the homepage.

The student receives the Join Code in the form of a link, a code, a QR code or a guest username and password. The student can then enter a student username, or a password.

2. Set Access and Share

After creating the Topic, choose how students will access it. If they have email addresses, add the domain (everything after the @ symbol in their email address). If students do not have email addresses, create usernames for each student. Invite families and guests by adding a guest password.

Share the Topic by using one of the Share buttons or copy and paste the unique Join Code wherever you connect with your community.

3. Students Respond

After entering the Join Code, students gain access by logging in via email or username.

Students can share their voices by recording a short video with Flipgrid's fun, simple, and powerful camera. It's packed with everything they need to tell their story, including text, emoji, inking, boards, screen recording, and the ability to upload clips!

References:

[Educator Step-by-Step Guide](#)

[Educators: A Teacher's Guide to Flipgrid \[YouTube\]](#)

[Educator Guide to Flipgrid](#)

Student Step-by-Step Guide

A student can create a video to submit to the educator in a few easy steps!

1. Locate the Join Information from Your Educator

Your educator would have given you one of these ways to join the discussion:

- A Join Code (e.g., FGrid3567, a591dc5d) or a QR code
- A Join Link (e.g., <https://flipgrid.com/FGrid3567>, <https://flipgrid.com/a591dc5d>)
- If you don't have a school-provided email, then a unique username or guest password

Flipgrid works on most web browsers and mobile devices. Microsoft Edge or Google Chrome is recommended for the best web experience. For easy access to Flipgrid, download the Flipgrid extension. On mobile devices, download the free Flipgrid app for iOS and Android devices.

2. Join the Discussion

Get the educator's discussion by using the link or code provided by your educator in Step 1.

- If you have a Join Link, click on that link.
- If you have a Join Code,
 - Go to your web browser and enter <https://flipgrid.com>. You'll see an area to enter a Join Code. Type the Join Code and press Enter on your keyboard.
 - On a mobile app, enter the code.
- If you have a QR code, scan the QR code with your device camera or the Flipgrid mobile app.

You'll see a prompt to log in. Enter a student username or a password. If your student username or password is not working, be sure to double-check the case and space sensitivity.

Tip: If you're prompted to log in, choose Google if your school uses Google Classroom, Docs, and Drive. Choose Microsoft if your school uses Word, OneDrive, or Microsoft Teams.

3. Record and Submit

Once you've joined, you'll see your educator's Topic, or discussion prompt. Follow the instructions and when you're ready to record, click the red Record a Response button or the Flipgrid logo for the camera to start.

When you're using the Flipgrid camera, you can record a video in these three easy steps:

- Tap to record: Tap the record button on the bottom to start. Add fun stickers, filters, text, and more. Tap the arrow on the bottom-right to advance.



Review your video: Trim, split, rearrange, or add more. Tap the arrow on the bottom-right to advance.



Submit your video: Edit your cover image and name, add a title, or attach a link. Then submit!

The Flipgrid camera offers a lot of fun and creative ways for you to share your ideas and voice! [Check out all the camera features here](#). Learn [how to import a custom video](#) or [how to include a screen recording](#).

References:

[Getting Started: Students](#)

[Getting Started with Flipgrid - Students \[YouTube\]](#)

Using Editable PDFs

Most lessons include the use of an editable PDF for students to capture responses to questions and other activities.

Guiding language is included in the lesson to help students access and use the editable PDFs where they appear.

For students who will be using Chromebooks, students will need to use the Print to PDF function to save their editable PDFs to their device. Here's how to do this:

- 1) Open the editable PDF and select CTRL +P.
- 2) Open the file destination where the file will be saved to.
- 3) Select Save as PDF.
- 4) Select Print. Your document is now "printed" as a PDF file which will save your work.

PDFs cannot be submitted via the Rise activities. If you plan to collect these documents for career planning portfolios or grading, you will need to coordinate that with your students.

To view a video on using Flipgrid and editable PDFs in the lessons, select this [link](#).

Ask an Expert Interviews (Optional)

You may choose to include an “Ask an Expert” interview in this lesson.

An interview provides an opportunity for students to talk with and ask questions of experts who work in various professions to learn about their career journeys, current job roles and responsibilities and glean valuable insights.

Additionally, interviews also provide the following benefits:

- Real-world information about careers.
- An awareness of the workplace habits and interpersonal skills needed to succeed in any job.
- Further encouragement to go to college or post-secondary training, apprenticeship etc. and get ready for the career of their choice.
- An understanding of the fact that each person’s career journey is unique and that most people encounter obstacles and challenges that they must overcome to reach their goals.

When selecting experts to participate in the small group interviews, look for “down to earth” people who you think are good speakers and who would be comfortable talking to young students, ages 12 to 14. An ideal ratio is one expert per every five students.

There are two options that can be used if you choose to use an Ask an Expert Interview:

- Schedule a Zoom/Skype call with an expert in the field.
- Find an existing YouTube video of an expert to share with students.

In-person Learning Adaptation: For in-person learning, project/share the Zoom/Skype call with an Expert with your class. YouTube videos may also be projected/shared in-person. You can consider facilitating further discussions on the key takeaways from the session and/or a specific topic discussed in the session.

Review the following resource for additional information:

[Career and College Exploration Experiences: Planning for Success](#)

How to Implement this Unit

For students to get the most value from this unit, please plan on implementing all lessons in this unit, in sequential order.

When it may not be possible to implement the entire unit, we recommend implementing the following lessons to support optimum student learning based on time available:

- Best Practice: All 12 lessons in order
- Mini unit: Lessons 1 through 4 (5 is an optional addition)
- Standalone lessons: 1, 2, 3, 4, 5, 6, 7, 8, 9, and 12
- Trios: Lesson 9, 10 and 11

Alignment of Learning Outcomes

The program learning outcomes for Possible Futures 2.0 are:

- A. Gain awareness of and exposure to a wide array of careers.
- B. Increase self-awareness and begin to form their potential occupational identity.
- C. Develop employability skills.
- D. Develop foundational technical skills as appropriate.
- E. Be positioned to make more informed educational choices.
- F. Transition to high school with an actionable plan for next steps.

The curriculum learning outcomes for the Cybersecurity unit are:

1. Students learn the basics of digital life and cybersecurity.
2. Students explore career options within the cybersecurity industry.
3. Students identify their strengths and interests in the field of cybersecurity.
4. Students connect their strengths and interests in the field of cybersecurity to potential careers.
5. Students explore local labor market data and education opportunities for careers in the field of cybersecurity.

The Arizona Career Literacy Standards for grades 5 through 8 can be found at this [link](#).

The Arizona Computer Science Standards can be found at this [link](#).

This lesson's learning outcomes align with the program learning outcomes (PLOs), curriculum learning outcomes (CLOs), and Arizona Career Literacy Standards (CLSs) as follows:

CLOs	Lesson Learning Outcomes	PLOs	CLSs	CSSs
1	Understand different types of encryption.	D	2.0, 5.0	NI.C.1
1	Apply methods of encryption to model secure transmission of information.	D	2.0, 5.0	NI.C.1

Tracking Completion of Lessons

If you are using SCORM Cloud or Canvas with the lessons in this unit, completion tracking options are available. If you are not using either platform, please determine if and/ or how you plan to track completion of lessons by students.

Lesson 11 Components

Guiding Question

The guiding question is intended to provide a focal point for each lesson. This lesson's guiding question is:

- **How can encryption methods help digital information to be transferred securely?**

Lesson Overview

In this lesson, students learn about the methods for encrypting data. They learn about public and private encryption through methods like RSA and AES. Then, the students see how encryption protects their personal devices and social media.

Learning Targets

By the end of this lesson, students will be able to:

- Understand different types of encryptions
- Apply methods of encryption to model secure transmission of information

Vocabulary in this Lesson – Flip Card Activity

Students should use the flip card activity to familiarize themselves with key vocabulary terms and definitions for this lesson.

- **AES:** Advanced Encryption Standard, encryption method.
- **Public Key:** A decryption tool available to all people whether or not they are the intended recipient of a message/data.
- **Public Key Encryption (Asymmetrical encryption):** Uses two sets of encryption keys, one public and one private to send data. Everyone can see the public key, while the end-user will only have the private key.
- **Private Key:** A tool to decrypt a message that only the end-user has access.
- **End-User:** The person who is receiving the service or message.
- **Public Key:** A decryption tool available to all people whether or not they are the intended recipient of a message/data.
- **RSA:** (Rivest–Shamir–Adleman) is another advanced encryption method.

Intro to Encryption – Video Block

In this section, students are introduced to encryption and how it helps in sending and receiving private data or messages. The students watch a video titled [What is Encryption and](#)

[How Does it Work](#) in which a simplified real-world example is used to explain public and private key cryptography.

In-person Learning Adaptation: For in-person learning, the facilitator can show the video via a projector or a Smart board and ask students to discuss any queries or observations on the video.

Public and Private Encryption

In this section, students learn more about public and private key encryption. To learn more about how public keys are accessible to all, while private keys are only available to those that the messages are sent to, the students review a short article titled [How Does Public Key Encryption Work](#).

After reviewing the article, the students are prompted to practice encrypting a message. The method they are asked to use is a simplified version of how public and private key encryption work; however, in the real application both the private and public key are scrambled text that only receivers and senders know how to encrypt.

The students are prompted to complete the activity in the **Private Key Encryption** section of this lesson's editable PDF.

In-person Learning Adaptation: For in-person learning, the facilitator can share the article on how public key encryption works via a projector or a Smart board and then ask the students to practice coding a message by completing the activity given in the PDF.

Symmetric and Asymmetric Encryption Overview – Video Block

In this section, students learn about examples of encryptions, such as RSA, which is commonly used for encrypting emails; and AES, which is commonly used for wireless security or HTTPS on websites. The students also learn about the following benefits of using these keys for sending data.

- Verification of sender's data
- Safe transfer of data
- And faster encryption time

The students then watch a video titled [How Public Key Encryption Works](#) in which they are given an example of how public and private key encryptions work, and the differences between symmetric and asymmetric encryption. After watching the video, the students are prompted to list some differences between public and private keys in the **Public and Private Keys** section of this lesson's editable PDF.

The students then review the following articles to learn about RSA and AES encryptions:

- [AES Encryption](#)
- [RSA Encryption](#)

After reviewing the article, the students are asked to answer the questions for each form of encryption in the **AES and RSA Encryption** section of this lesson's editable PDF.

In-person Learning Adaptation: For in-person learning, the facilitator can share the video via a projector or a Smart board and then ask the students to list the differences between public and private keys. The facilitator can then share the articles on RSA and AES encryptions with the students and ask them to write down notes based on what they have learned.

Closing Reflection

In this section, students are asked to reflect on how their day-to-day life has benefited from encryption technology and note down their response in the **Closing Reflection: Kinds of Encryption** section of this lesson's editable PDF. The students are also prompted to:

- Review an article on [Types of Encryption](#) to learn about the 6 kinds of encryptions.
- Complete the 6 **Kinds of Encryption** section of this lesson's editable PDF.

In-person Learning Adaptation: For in-person learning, the facilitator can share the article with the students and conduct a final discussion on how different types of encryption are used in day-to-day life.

Thinking About Your Future

At the end of the lesson, students will see the following statement in Rise: "In this lesson, you learned about how encryption can help ensure the safe transfer of data."

Before the next lesson, think about how you might respond to this question:

- What do you think would happen if we did not use encryption?

Career Pathways

Share the following with your students: “It’s never too soon to start exploring future career options!”

Students can access the resources at this link, [PipelineAZ Information Technology](#).

Lesson Completion

At the end of the lesson, students will see the following message in Rise:

In future lessons, you will explore the world of hacking.