

Instructional Scenario

Hidden Language



Course/Duty Area: Programming/Exploring Programming Concepts (Encoding and Processing Data)

Scenario:

In Mr. Davis's programming class, the students were buzzing with excitement. They had conquered the syntax of Python, built simple games, and even dabbled in artificial intelligence (AI). But Mr. Davis had a new challenge for them: "Today, we delve beneath the surface. We're going to learn the hidden language of computers."

He introduced them to the binary number system, a concept that seemed alien at first. How could numbers be represented with only two digits? Mr. Davis explained how computers perform even the most complex calculations using this seemingly simple system. He also unveiled the mysteries of the American Standard Code for Information Interchange (ASCII) and Unicode, showing how each character was assigned a unique numerical code. Students began to see the computer not just as a machine, but as a sophisticated translator, interpreting the world through this intricate system of codes. They learned how images were broken down into pixels, each pixel represented by a combination of colors, and how music was transformed into a series of digital signals.

Sarah, a quiet observer, was particularly intrigued. She started to see the world through a new lens, every word, every image, every sound, reduced to its fundamental components. She wondered, "How can I manipulate this hidden language? Can I create my own codes, my own digital art?"

Mr. Davis, sensing her curiosity, challenged the class to delve deeper. "Research how different types of data are encoded," he said. "Explore the magic of data compression. And most importantly, try to understand how this knowledge can be applied to the world around you."

Big Question:

How do computers encode and process different types of data, and why is understanding the binary number system, ASCII, and Unicode essential for programmers?

Focused Questions:

1. What is the binary number system, and how does it represent data in computers?
2. How do ASCII and Unicode enable computers to process text and symbols?
3. Why is it important for programmers to understand data encoding methods?
4. How does the choice of encoding standard influence data compatibility and accessibility?

Student Project or Outcome:

Students should investigate a specific type of data (e.g., images, music files, text documents) and explore how the data is typically encoded and stored. They will create a presentation or a short video to explain their findings to include

- focused questions
- the impact of different encoding schemes on file size and quality
- the potential applications and real-world implications of their exploration and investigations.

Project-Based Assessment:

Code challenges: Students demonstrate ability to

- convert between decimal and binary numbers
- convert character encoding schemes (ASCII and Unicode).

Teacher Resources:

- [Binary Converter](#)
- [Khana Academy Convery to Binary Video](#)

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