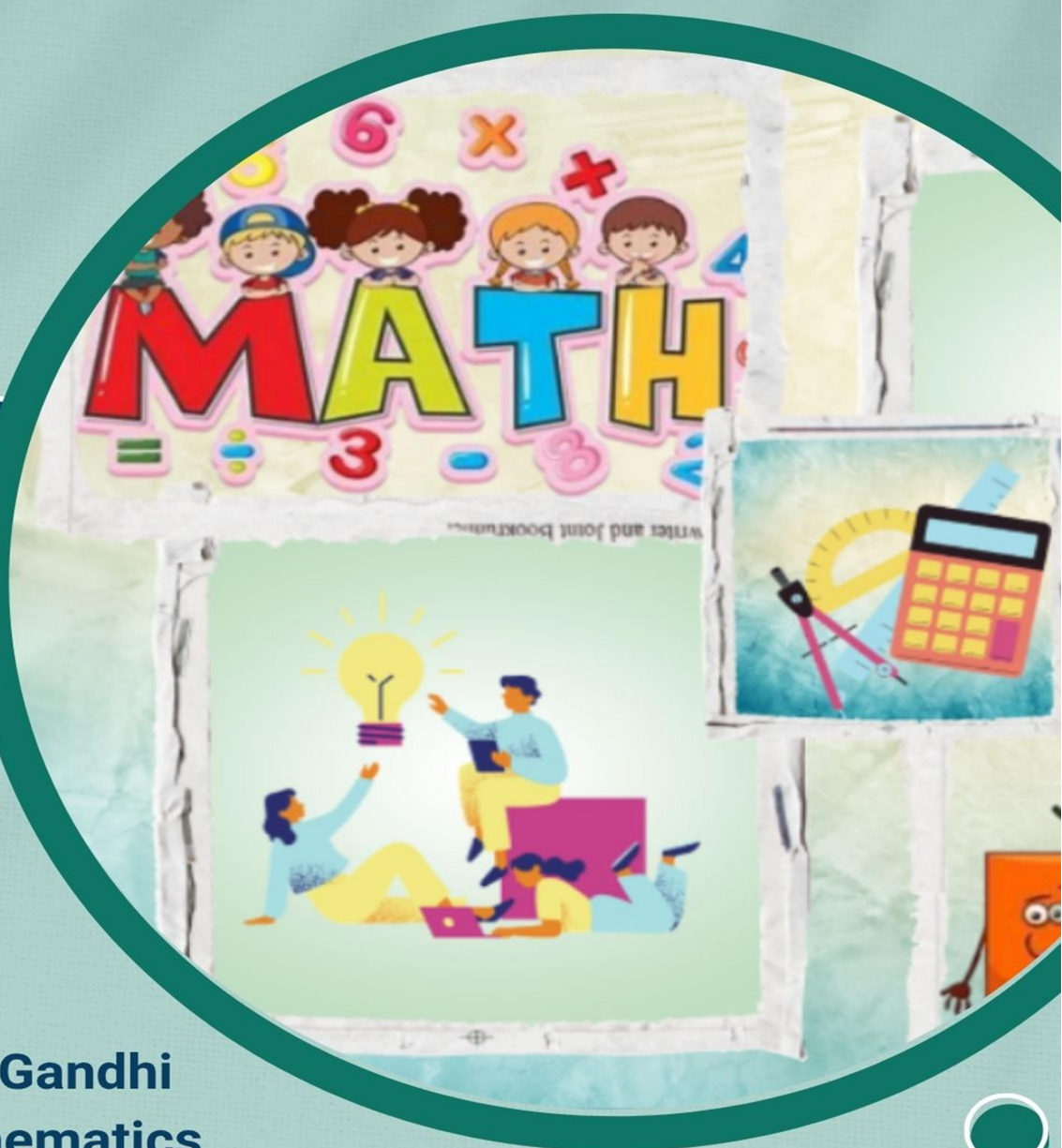


HACKATHON 2.0 SCERT UTTARAKHAND

CURRICULUM COMICS

Digital Storytelling for Engaging Mathematics Classrooms



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Curriculum Comics: Digital Storytelling for Engaging Mathematics Classrooms

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Background

One evening, while I was cooking in the kitchen, my son came in curiously. He was holding a box of laddus containing twelve of them.

"Mom," he asked, "How will you divide these laddus among the three of us (you, Dad, and me)?"

I paused for a moment and turned the question back to him, saying, "That's a good question. What do you think?"

He immediately replied, "Maybe we'll each get four laddus."

I smiled and asked, "How did you know that?"

He drew simple lines on a piece of paper to indicate equal parts: one for you, one for me, and one for Dad. Then again; then again, and then again.

I looked surprised and said, "Well! Could there be another way?"

He thought for a moment and explained, "Because twelve divided by three still equals four." By the end of our conversation, he had not only eaten a laddu, but also learned how division (a mathematical operation) is used in everyday life. That brief conversation gave me an idea: Why doesn't mathematics always begin like this in the classroom? If teachers could tell some interesting stories like this in the classroom, students would find mathematics less abstract and much more interesting. In today's technological age, students are constantly surrounded by multimedia—short videos, comics, games, and digital platforms that capture their attention. If storytelling can make mathematics meaningful, digital storytelling can make it equally impactful and lively.

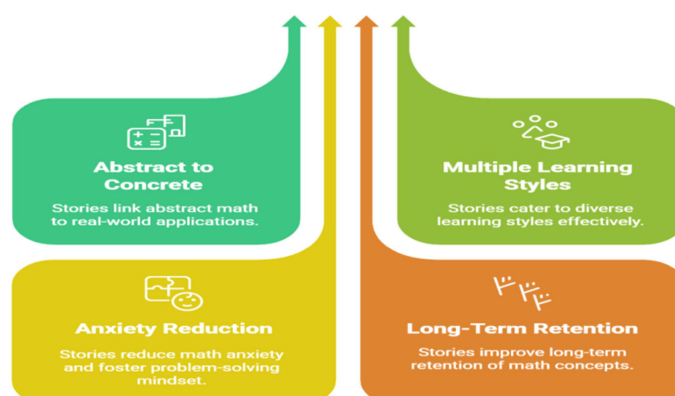
Concept Introduction

Storytelling in teaching is not a new idea. For generations, stories have been used by elders or parents to teach values, traditions, and even explain scientific principles in a memorable and relevant way. Today, the medium of storytelling is changing. In the technological age, stories are no longer limited to oral narration or printed books; they can be told through comics, animations, podcasts, videos, or interactive slides. This development provides

teachers with new opportunities to connect with students who are already immersed in the world of multimedia or are using multimedia for learning.

Digital storytelling combines the age-old practice of storytelling with modern digital tools like comics, animations, slides, and interactive videos. By placing mathematical problems within the context of a short, relevant story—such as distributing sweets, buying groceries, or planning a trip—teachers can spark curiosity even before formal instruction begins. This not only makes abstract concepts concrete but also promotes active engagement, collaboration, and deeper learning.

Digital storytelling in mathematics is the practice of embedding mathematical concepts into concise, relevant, and culturally meaningful digital narratives. Instead of starting lessons directly with formulas or definitions, teachers introduce mathematical problems through the context of a short, relevant story—a comic strip about a family's transaction with a shopkeeper while buying sweets, a short animation of friends measuring a cricket pitch, or a simple slideshow featuring a character facing a mathematical challenge. With modern digital tools like comics, animations, slides, and interactive videos, teachers can spark curiosity even before formal instruction begins. This not only makes abstract concepts concrete but also promotes active engagement, collaboration, and deeper learning.



Storytelling serves as a conceptual bridge and places mathematics in real-life contexts, sparking curiosity in many students and reducing subject anxiety. When students "experience" a problem in a story first time, they are more willing to explore the underlying mathematics concept. Furthermore, the use of digital media makes the story visually engaging, interactive, and accessible to diverse learners. Digital storytelling transforms the mathematics classroom environment into one where logic and imagination meet. It does not replace problem-solving or practice; rather, it prepares students to understand and apply mathematical concepts with greater interest and confidence.

The Impact of Narratives in Mathematics Education: A Transformative Change

Narratives/Stories provide context-specific, emotional connections and a framework for students to understand complex information. By integrating mathematical concepts into an engaging story, we can activate not only the logical parts of our students' brains but also the creative ones. This is a powerful pedagogical strategy based on constructivist learning theory. The goal is not just to entertain but to develop students' logical abilities. Through

this, students don't passively receive information; they actively construct meaning by following the story characters' journeys, leading to deeper and more lasting understanding. Integrating digital storytelling/storybook into the curriculum yields measurable results:

- **Sustained Engagement:** The sequential nature of the story (what happens next?) maintains students' interest throughout the lesson.
- **Deep, Conceptual Mastery:** Students understand the "why" behind the "what," moving beyond rote memorization to authentic application.
- **Teachers as Innovators:** Teachers become creators of powerful learning experiences rather than mere transmitters of information.
- **Building a Resource Repository:** Over time, a school or a group of teachers can create a comprehensive, reusable, and shareable digital resource of math stories, which can be used as a resource repository for years to come.

The Big Idea: "Curriculum Comics" - An Overview

Here, I'm introducing the idea of "curriculum comics," a special category of digital storytelling that brings mathematical concepts to life through engaging visual narratives. This approach aims to make mathematics more relevant, interactive, and memorable for students. By incorporating stories and comics into lessons, we can transform abstract concepts into meaningful, real-world experiences. Here I am sharing the link of the comic that I have created and used to present the idea and explain the process of designing the format of the comics.

<https://read.bookcreator.com/yshvKfZNv8VKUS3arqBUJBruUKh2/l8SpRiOfTm-bhHIAvPLP6A>

Technology Tools Used: Google Doc, Canva, Pixton and Bookcreator

Link to Hackathon Theme / SDGs: This idea is in line with the Hackathon theme 'Digital Tools for Education and Social Change' and 'SDG 4-Quality Education'.

A Step-by-Step Guide for Teachers to Create 'Curriculum Comic'

You don't need to be a tech-expert, a professional artist, or a storyteller to create a story or digital story as a powerful teaching tool. This systematic workflow enables any teacher to create an engaging digital story. A teacher needs to follow these steps:

1. Contextualize the Concept: Identify a mathematical concept (e.g., probability, ratio, profit-loss, etc.) from your curriculum and connect it to a relevant, real-world scenario. Think about everyday problems students face: saving money, scoring runs in cricket, or planning a trip.

2. Develop a Story: The EACR (Elements-Actions-Conditions-Results) framework is a structured approach to narrative design, specifically designed for educational purposes. It provides a simple yet robust four-part blueprint for creating stories that seamlessly

integrate learning objectives with an engaging plot. By following this framework, a teacher can ensure that the story's purpose is not merely to entertain, but to lead the student to a specific conceptual understanding. Create a simple story outline using this framework because it provides a clear and organized structure for your story:

i. E - Element: This is the first step that provides the foundation for the story. It introduces the characters and their initial situation.

- **What:** The story begins with the who, what, and where of the story. It involves setting a relevant scene and introducing a character or group of characters that the audience can relate to.
- **Purpose:** Lowering the cognitive barrier to entry. By starting with a familiar setting and relatable characters, you create a safe and accessible entry point into the story, preparing students to engage and grapple with the upcoming problem.
- **Example from a comic:** The comic begins by introducing two friends, Ravi and Krishan, and their shared situation of saving money in a piggy bank. This everyday context makes the story immediately relevant and interesting to students.

ii. A - Actions: Actions are the catalyst of the narrative. This is the stage where the characters' actions or a new event, a problem, or a need that needs to be resolved are introduced.

- **What:** The key event or decision that disrupts the initial situation and presents a challenge. This is the "why now?" of the story.
- **Purpose:** To create a sense of urgency and highlight the limitations of the current situation. This action advances the plot and, most importantly, establishes the need for the mathematical concept you (the teacher) are about to introduce.
- **Example from the comic:** Ravi and Krishan decide to count their savings. The act of manually adding up the daily amount over time becomes a bit boring. That's when this action reveals a problem that requires a more efficient solution.

iii. Conditions(C): This is the most important component of educational storytelling. Situations are the rules, variables, mathematical bridges, or constraints that help define the problem and naturally lead to a mathematical solution.

- **What it is:** The moment when an underlying mathematical pattern or principle is revealed. It's the "Aha!" moment when the characters realize that the situation is not random, but follows a specific, predictable rule.
- **Purpose:** To clearly connect the story's problem to an educational concept. This stage serves as a bridge between the narrative and the curriculum. The situation becomes a key, opening the door to a mathematical solution.
- **Example from a comic:** The characters realize that their savings follow a specific pattern: a certain amount is added up every day. This situation can be defined as an

"Arithmetic Progression," and the application of the formula becomes a logical and necessary next step.

iv. R-Result: The final stage is the result, where the problem is resolved. The characters apply the educational concept (depending on the circumstances) to achieve a successful outcome.

- **What it is:** The culmination of the story, where the problem is resolved and the narrative tension is released.
- **Its purpose:** Demonstrate the real-world utility of a mathematical concept. By showing a successful outcome, you reinforce the student's understanding and prove that learning is valuable, relevant, and practical.
- **Example from the comic:** The characters use the "arithmetic progression" formula to quickly and accurately calculate their total savings, proving that mathematics is an effective tool for solving real-world problems.

3. Creating Design for Digital Comic: This stage involves presenting the written story in a visual format and moving beyond traditional paper comics, creating comics digitally using online or app-based tools. Storyboarding is essential at the beginning of the creation process. Storyboarding involves dividing the script into individual panels (scenes), identifying which visual elements will appear in each panel. It's crucial to outline a proper flow for presenting the story and mathematics concepts through characters, backgrounds, and dialogue. This flow helps students to develop their understanding of mathematics concepts by stimulating curiosity in the story. Next, work on creating the visual world in each panel using digital tools like Canva, Plxton, Storyboard, etc.

i. Fundamental Elements of a Comic



When creating a digital comic, it's also essential to pay attention to the fundamental elements, as these are integral to the visual grammar of storytelling. **Panels** control pacing, **Gutters** fill in gaps by activating the reader's imagination, and **bubbles (Speech & Thought)** give **Characters** a voice and inner life. Using these intentionally transforms a series of images into a clear, engaging, and emotionally charged story that students can easily understand.

When designing the entire comic, we need to keep in mind that we must incorporate **cultural contexts** (such as local markets, festivals, or sports) to make learning meaningful. When we draw examples from students' everyday lives and cultural environments, and present them in a meaningful way, reflecting their local context, mathematics appears less abstract and more connected to their world. Students can more easily connect with the circumstances around them, deepening their understanding and making learning memorable.

4. Incorporating comics into classroom teaching:

After designing a comic, it's time to incorporate it into daily classroom teaching so that it becomes a regular part of the learning process rather than a one-time activity. Comics can be used as story starters to introduce new mathematical concepts, capturing students' attention and curiosity from the outset. You can incorporate digital storytelling into classroom teaching through the following suggested process. You can adapt any step of the process to suit your situation, convenience, and classroom.

I. Introduce a digital story:

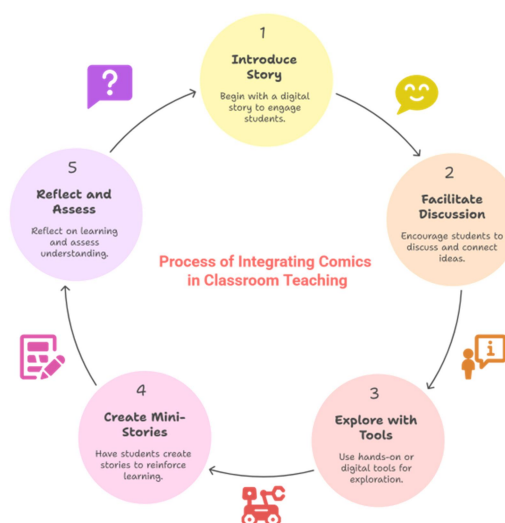
- Begin the lesson with a short, engaging digital story (comic strip, animation, or slideshow) where a character faces a real-life problem related to the target maths concept.

II. Engage students through discussion:

- Ask guiding questions from the story: "What is happening here?" "How can we solve this problem?"
- Encourage pair or group discussion so that students can connect the situation to their prior knowledge.

III. Explore the concept with practical/digital tools:

- Provide students with manipulatives (counters, paper strips) or digital tools (GeoGebra, interactive slides, etc.) to model and test their solutions.
- Move from story context → representation → formal maths concept.



IV. Create mini-stories for students:

- Ask students to design a short 2-3 panel comic, simple animation, or quick sketch to show how they solved the problem. This step reinforces understanding and gives students ownership of learning.

V. Reflect and Evaluate:

- Conclude the activity with a short reflection: "What did you learn from this story?"
- Use exit tickets, quick quizzes, or student-created stories as formative assessment evidence.

Learning Outcomes:

By the end of digital storytelling-based mathematics lessons, students will be able to:

- Recall key mathematical terms and ideas presented through digital stories.
- Explain mathematical concepts in relation to real-life contexts presented in stories.
- Use mathematical concepts to solve problems arising from story scenarios.
- Compare different problem-solving strategies inspired by stories.
- Assess the effectiveness of their own and their peers' solutions in relation to the story context.
- Create-Develop their own short digital or visual stories that demonstrate mathematical thinking.
