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Abstract

We like to tell stories. We tell stories about mathematics, about mathematicians, and about doing mathematics. We do this because we enjoy it and because the students like it. And we do it because we believe that it is an effective instructional tool in the teaching of mathematics. There is ample literature to support the enjoyment of storytelling on the part of both the story teller and the story listener. There is also an abundance of data that suggest that telling a story creates more vivid, powerful and memorable images in a listener's mind than does any other means of delivery of the same material. There is beauty in a story well told, and there is beauty of a story that can move a listener to think, to imagine, and to learn. This paper deals with how a teacher can make mathematics teaching-learning interesting by storytelling.

Key words: mathematics teaching, story-telling

Storytelling in mathematics as a medium for creating a classroom in which mathematics is appreciated, understood, and enjoyed. Students' mathematical activity can be engaged via storytelling. Students are introduced to many mathematical stories of different kinds, such as stories that provide a frame or a background to mathematical problems, stories that deeply intertwine with the content, and stories that explain concepts or ideas. Moreover, a teacher can create a framework for creating new stories, ideas for using and enriching existing stories, as well as several techniques for storytelling that make telling more interactive and more appealing to the learner. The knowledge of these techniques is important for those who teach mathematics, or teach teachers to teach mathematics. This method is of interest to those who like stories or like mathematics, or those who dislike either mathematics or stories, but are ready to reconsider their position.

What Is A Story ? When dealing with mathematics, we may not be used to thinking in terms of telling a story. In fact, the task of learning mathematics seems quite remote from anything to do with stories. It might be that we occasionally tell a mathematical story in the course of teaching children, but it is only an incidental case. This is a very shortsighted view of the potential of stories in teaching and learning of mathematics. Through stories mathematics turns more accessible to students, as well as more engaging.

Definition of story : It is a narrative unit that can fix the affective meaning of the elements that compose it. A story is a unit of some particular kind; it has a beginning that sets up a conflict or expectation, a middle that complicates it, and an end that resolves it. Stories are a powerful structure for organizing and transmitting information, and for creating meaning in our lives and environments. A story as a particular kind of narrative unit that orients our emotions to the events presented through the narration. That is, stories make us feel. And in this, stories are unique. We ascribe emotional meaning to events, and to people, and to our own lives by plotting them into partial or provisional stories. We orient ourselves emotionally to our environment by involv-

ing it in our stories. The value of story to teaching is precisely its power to engage the students' emotions and also, connectedly, their imaginations in material of curriculum.

In our description of how to teach mathematics, we are not concerned with fictional stories about the topic, but rather we are concerned with how we can shape the topic to enhance its attraction to students. In doing this, we will not be falsifying anything, or giving precedence to entertaining students over educating them. Instead, we will be engaging them. We see engaging students with mathematical activity as a crucial aspect of successful education as, and it is the real vividness and importance of this subject in which we want to engage students. In summary, the great power of stories is in their dual mission: they communicate information in a memorable form and they shape the hearer's feelings about the information being communicated. Unfortunately, the telling of stories is an infrequent and seemingly off-task activity in mathematics classroom.

Why story telling ?

We tell stories in the mathematics classroom to achieve an environment of imagination, emotion, and thinking. We tell stories in the mathematics classroom to make mathematics more enjoyable and more memorable. We tell stories in the mathematics classroom to engage students in a mathematical activity, to make them think and explore, and to help them understand concepts and ideas.

Different Techniques Of Story Telling : There are several techniques for storytelling that makes telling more interactive and more appealing to the learner. There is a framework that may help potential storytellers create their own stories, as well as ideas as to how existing stories can be enriched and adapted for the needs of any particular audience. By such means, more teachers and more colleagues will story-tell in their classrooms.

Advantages Of Stories In The Classroom : Using stories in a classroom can serve many additional and different purposes. Stories may spark interest, assist in memory, and reduce anxiety. They can create a comfortable and supportive

atmosphere in the classroom, and build rapport between the instructor and the students. Creating interest with a story is an important initial step. Describing a chain of events may engage students, create excitement, mystery or suspense, and motivate thinking about a particular problem. Stories may convey passion and enthusiasm.

They may also introduce ways of thinking and acting like their heroes, create empathy, and make the material more accessible and memorable. Stories in which students identify with the heroes may also make the lesson more relevant and more vivid. Stories that involve specific examples may help students relax as they provide something to hold to when moving to general theory or technical detail. In general, a classroom story can serve as a purposeful break from the routine, creating a refuge to return to and to seek more stories. What is mentioned above about the different purposes of stories is true for any subject matter, including mathematics. What is special about the use of stories in the mathematics classroom is that they can assist in understanding difficult concepts and ideas, and assist in solving problems.

Stories of Different Kinds : Stories emerge in different form and kind. Some are real while others are fictional, some are written in prose while others are in verse, some make us think and others make us wonder. Initially stories developed as part of the oral culture, as the medium for preserving heritage and recording history. Later, with the development of print culture, books and newspapers became the main sources of stories. We are concerned with teaching and learning of mathematics, and making this subject come alive in the classroom. As such, we use stories of all the possible kinds presented in all the available media. Though 'story' is defined at times as a 'sequence of events', it is not the events that are of our interest here. We distinguish the kinds of stories not by their structure but by the kind of engagement with mathematical content the story brings.

There are stories that frame or provide the background for a mathematical activity. For example, if our hero has to solve a problem to save a princess, any problem appropriate for the given group of students can be embedded in the story. There are some stories where mathematical engagement starts and some stories continue alongside mathematics. Thus, we distinguish between stories that introduce, and stories that accompany and intertwine with mathematical activity.

There are stories which explain. This introduces a new kind of story – a story that explains. Division by zero, division by a fraction, and the manipulation of negative integers are but a few examples of concepts that students find hard to understand and explaining with stories will be helpful. Variation on a story can help in solving a problem or gaining a better understanding of a solution.

Another kind of story is a story that asks a question. In schools today we are more familiar with 'word problems'. These word problems start in kindergarten with apples that Jack and Jill put together and continue with tenth grade trains that

leave stations at different times and aim to arrive sometime somewhere, periodically changing the speed of their travel. However, a closer look at such stories reveals that they are not really stories at all. They have been stripped of the details and emotions that help to orientate a listener's feelings. What is left is an empty shell of a story with emphasis on the question mark at its end. Ironically, such problems evolved from true stories that presented a riddle or a puzzle. It is our intention to return to these roots, at least in some problems, and to re-create the story of the word problem. A joke as a short, at times very short, story. There are several jokes relevant to specific mathematical content. Jokes can help both as a pedagogical tool, and as an assessment tool.

An Engaging Story : This is a classic story of Karl Friedrich Gauss as we would tell it to our students. Although Karl Friedrich Gauss (1777-1855) would eventually grow up to be a brilliant mathematician (some would even say the greatest mathematician), as a child he was more than a handful for his teachers. At heart Karl was a happy boy who liked nothing more than to tease and play tricks on his friends. One day, while he was still quite young Gauss was being particularly jovial in class. He had finished his work early and had proceeded to disturb his classmates with his mischievous antics. One of his favorite tricks was to imitate quite ordinary, but annoying sounds. He was very good at imitating the sound of creaking wood – as in a creaking floorboard or a creaking chair. Some teachers took this better than others, but no one took it worse than Mr. Schmidtsenburgersnoff. Mr. Schmidtsenburgersnoff was Karl's teacher when Karl was 9 years old. He was an overbearing man who was a stickler for discipline and made no bones about dishing out severe punishments for even the slightest misbehaviors. On this particular day Schmidtsenburgersnoff was in a worse mood than usual. So, annoyed with Karl's joking around, he walked down the aisle to the back of the classroom where Karl was sitting and set a task for him that he was sure would occupy young Karl for the remainder of the day. "For your pestilence, Karl, I will ask you to add up the numbers from 1 to 100!" he barked. All of Karl's classmates were stunned into silence. This was by far the most severe punishment the teacher had ever given out. Poor Karl they all thought, this time the teacher had surely broken him. As the teacher turned to walk back to his desk at the head of the class every child in the room stared at this humorless and evil man. Just before he got to the front of the class the creaking sounds started. Mr. Schmidtsenburgersnoff spun on his heels and stared at Karl. Surely young Karl couldn't be done already. The entire class stared, their collective breath held in anticipation. "The sum is 5050!" The classroom erupted into laughter. Once again Karl had gotten the best of the teacher. This was too much! Mr. Schmidtsenburgersnoff stared at Karl and in a very icy voice said, "You are wrong, and as punishment for your pestilence you will come up to the board and work out the



sum in front of the whole class."So, Karl simply walked up to the blackboard and while Mr.Schmidtsenburgersnoff strutted around in front of the classroom, Karl wrote out the following:

$$1+2+3+4+5 + \dots + \dots + 98+99+100$$

$$1+100=101$$

$$2+99=101$$

$$3+98= 101$$

$$50 \text{ pairs} \times 101 = 5050$$

The laughter in the classroom erupted again. Mr. Schmidtsenburgersnoff turned to the board. At this point he was blinded by his rage and he did not see the details of what was written there. He saw only gibberish. The intolerant behavior of one student was bad enough, but the whole class behaving as they were was too much! He turned to the class and roared, "For your intolerable behavior I assign you all the following tasks." And he walked to the board, erased what Karl had written there and wrote up the following three tasks.

Find the sum of the first 200 whole numbers. Find the sum of the whole numbers from 201 to 300. Find the sum of the first 1000 whole numbers. Can you figure these out ?

This example of a story introduces a powerful strategy, often referred to as "Gauss 'pairing method.'" As a story, it adheres too many of the general elements that all good stories have. There is a plot, there is a discernable beginning, there is conflict, resolution of conflict, imagery, human meaning, wonder, and humor.

Finally, a teacher should know how to incorporate stories in planning for instruction. The teacher should know how existing stories can be shaped and modified to serve a desig-

nated group of students. Different kinds of stories to tell in the mathematics classroom are; stories that provide a frame or background, stories that introduce, stories that accompany or intertwine, stories that ask a question, and stories that explain. Furthermore, the nature of a story may change, taking on different shapes in different contexts. Stories that accompany are usually told or read by a teacher. Other kinds of stories can be started by a teacher and then completed, or at least participated in, by the learner. We considered these components as means towards the goal of students learning mathematics through engaging in a meaningful activity.

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