Story Telling with a Mathematical Flavor

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Abstract

Over the past six years, I have been working on a project that aims to help children explore Maths in a way that is fun and also incorporated in their day-to-day activities, in particular with the enjoyment of listening to stories. As such, I created a set of stories which make children fly with their imagination, and then think and solve several mathematical challenges. This idea evolved in two directions: book publishing and live story telling. Either way the aesthetical aspect was always a priority, together with the mathematical content. All together I wished to join the aesthetical pleasure of a good illustration with the fantasy of infant literature, and also with scientific experimentation and the development of reasoning, in general. In this paper I present the project and some of the results obtained.

Introduction

I belong to a project that began in 2005 at the Mathematics Department of the University of Aveiro and is named **EECM** (Escola de Educação Complementar em Matemática - School for Complementary Education in Mathematics**)**. This project appeared from the recognition of a lack of mathematical culture of the Portuguese society in general and the preconception against mathematics. Since the beginning, its action consists in developing activities *in non formal teaching* that are implemented in the community, including elementary schools.

When trying to create a context for some mathematical activities given to children aged 5 to 10, the idea of creating a set of stories for that purpose came up to my mind. I decided to have a common character through all the stories and this is how a new set of Pinocchio's Adventures came to birth. This time they are called *The Maths Adventures of Pinocchio.*

For some of the stories I built sceneries which I use for story-telling at the University of Aveiro where children are welcome to listen and participate (this activity is named "Stories with a Mathematical Flavour" - http://www.ua.pt/mat/PageText.aspx?id=9788). Up to now, more than 40 presentations have been made. While listening to the stories, several challenges are proposed. In addition, in the end of the story the children are asked to perform certain tasks related to what they just heard. Throughout these years, I witnessed a great enthusiasm from the children when listening and performing the activities.

The first two stories have already been published in a book, in 2009, by a Portuguese publisher - Âmbar (see [1]).

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The Book

The first volume of *The Maths Adventures of Pinocchio*, published by Âmbar [1] is all about flat figures. It's title is *The Forest of Flat Figures*. In the first story Pinocchio is reborn, now on a computer using a graphics program. He then goes to visit the forest of flat figures and gets to know several polygons. The second story is related to "round" shapes: circles, ovals and ellipses. The mathematical challenges proposed in the book include among others: building polygons using straws and thread, dividing square gardens into 4 equal parts (by drawing two straight paths) without damaging the bushes strategically placed in the garden; drawing big sized circles, ellipses and egg shapes; digitalizing numbers.

Since this project was planned to join the aesthetical pleasure of a good illustration with the fantasy of infant literature, high quality illustrations were made by Ângela Luzia with an aesthetical care which is typical from infant literature, but not so common in school or activity books. Figures 1 and 2 show the book cover, the beginning of the first story and an inside page:

Figure 1: *Cover and first double page of The Maths Adventures of Pinocchio.*

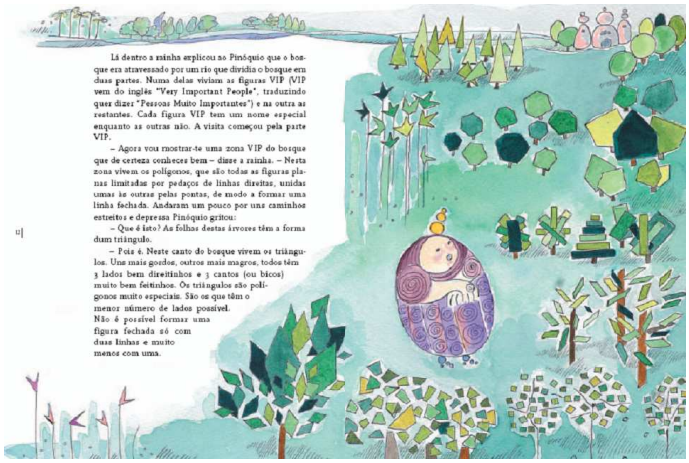

Figure 2: *An inside illustration of the forest of flat figures.*

It is our goal to continue publishing *The Maths Adventures of Pinocchio*. Also, we are preparing an

English version of the stories to try to bring these stories to English speaking countries. Any contributions towards accomplishing this goal are very welcome.

Live Story Telling

The first story of *The Forest of Flat Figures* is the story I told more often. This is partly because I built a scenery for the story that enriches the activity very much. I created trees on cardboard with polygonal shapes which were covered with different materials producing a rich texture and a particular artistic result. Figures 3 and 4 illustrate the scenery and the activities for both stories of the book. The second story of the book, *The great Party*, is an extension of the first, with trees on cardboard now with "round" shapes (see Figure 5, left side, and some details in Figure 4, right-most position).

Figure 3: *The Forest of Flat Figures – scenery and activities.*

Figure 4: *Details of the scenery (left – first story; right-most – second story).*

The third story, *The Solids City*, also has a scenery. It was built together with children from different schools, ages 3-10. It is about a city of geometric solids where each block has its type of shapes (see Figure 5, right side).

The story that comes next in the collection is about a dice which loses its spots. Along this story children learn that in all dice opposite faces sum up to 7. With this knowledge they are able to perform magic, by guessing the number of spots of the hidden face when we throw a dice. Further on, they

(intuitively) learn Gauss' formula for summing consecutive integers when I ask them to count all the spots of the dice and suggest using faces in pairs to get to 3 x 7 = 21. In the end of this story children are asked to draw the spots of a proper dice on a plain cube net. The results are illustrated in Figure 6 with some dice made by pre-school children aged 3 to 6.

Figure 5: *Sceneries for the second (left) and third (right) stories..*

Figure 6: *Dice made by children aged 3-6.*

Conclusions

Story telling with mathematics has proved to be an exciting way to achieve several goals: learn mathematics, develop an aesthetical sensibility, integrate different aspect of life, make way for future learning and develop a positive relation with mathematics. We intend to continue to promote this type of activities in the future.

References

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