Joint Efforts for Innovation:

Working Together to Improve Foreign Language Teaching in the 21st Century

Dolors Masats, Maria Mont & Nathaly González-Acevedo (Editors)

A book for the curious and passionate 21ˢᵗ century language teachers and teacher trainers.

Tired of reading about the wonders of technology enhanced project-based learning but not knowing where to seek inspiration to start to adopt this teaching approach? A team of in-service teachers, teacher trainers, pre-service teachers and researchers have worked together to present a simple, engaging and practical book to offer fellow education professionals stimulating ideas for their teaching practice.

Joint efforts for innovation: Working together to improve foreign language teaching in the 21st century offers:

- ➢ Inspiring classroom projects and innovative teaching experiences.
- ➢ A compilation of digital tools and resources for the foreign language classroom.
- ➢ Pioneering proposals to open up the classroom doors.
- ➢ Problem-solving and inquiry-based tasks that promote team work.
- ➢ Honest reflections from practitioners on their classroom practices.

This book includes

- ➢ accessible examples of teacher-led classroom research small-scale studies.
- ➢ calls for teachers to do research in their classrooms.
- ➢ personal accounts on the importance of school internships for pre-service teachers.

This book is an invitation for practicing teachers and teacher trainers to be creative and to develop learning skills, literacy skills and life skills.

Are you ready to become an innovative 21ˢᵗ century educator?

JOINT EFFORTS FOR INNOVATION: WORKING TOGETHER TO IMPROVE FOREIGN LANGUAGE TEACHING IN THE 21ST CENTURY

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Front cover photo: Maria Mont

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Tangram Animals: Creating a game as a vehicle for learning

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Introduction

Tangram Animals: Creating a game as a vehicle for learning is an interdisciplinary project that gives 5th graders the possibility of creating a tangram game while learning Maths, English, ICT, Art and Catalan. The main objective of the project was to use the game of tangram as the guiding thread, a sort of motivational element, that encouraged students to learn and acquire teamwork skills. All the sessions were carried out during the English class and the one-hour-a-week Maths class in English. A wide range of activities offered the students the opportunity to develop 21st century skills.

Figure 1. 5th graders helping younger students play *Tangram Animals* during the break

Tangram Animals was the final product students produced at the end of the project, a game created to be played during the break. Children in our school have the chance to play boardgames, once a week, as a form of entertainment. In those occasions, 5th graders take the role of game assistants. That is why I suggested they create a new type of game. They enjoyed the idea and easily got immersed in the world of tangrams.

Project contents and learning objectives

This project aimed at getting students to develop positive feelings towards learning Geometry while designing and creating an artistic production in the form of a game. It was organised around a series of challenging tasks that enabled learners to develop reading comprehension and writing skills and the communicative abilities required to speak in front of an audience. The tasks also fostered learners' imagination and improved their ICT literacy.

Table 1 presents the project's specific learning objectives and the corresponding assessment criteria.

Learning objectives	Assessment tasks
1. To discover the origins of the tangram.	1. Answering explicit, implicit and referential questions about the text.
2. To talk about shapes, sizes and colours.	2. Identifying tans through the game *"Is this your shape?"*
3. To make a tangram.	3. Manipulating the tans to create shapes.
4. To boost visual-spatial orientation skills.	4. Rearranging the seven tans to complete images or create new ones.
5. To activate oral communication through a tangram dictation.	5. Listening to their peers' instructions to arrange the tans correctly.
6. To investigate and observe geometrical figures.	6. Creating specific polygons using one or more of their tans, without overlapping them.
7. To discover the relations between area and perimeter.	7. Sharing reflections after observing several polygons created with the seven tans.
8. To foster writing.	8. Describing an animal that can be created with the tans.
9. To develop ICT skills.	9.1. Typing the description of an animal. 9.2. Designing a PPT as a support to present the project.
10. To promote artistic skills.	10. Creating a game for the school: designing boxes with the descriptions of the tangram animals on the cover and the tans inside.
11. To foster a critical and respectful attitude towards learning.	11.1. Showing interest and involvement on the tasks. 11.2. Developing positive attitudes towards cooperation and teamwork.
12. To improve the communicative skills.	12. Presenting the project and the final product (a tangram game) in front of an audience.

Table 1. Overview of the project learning objectives and assessment criteria

Table 2 presents the project's contents and relates them to the corresponding curriculum areas.

Connections with Catalan Curriculum	
Maths Specific Competences	**Maths Key Contents**
Problem solving dimension • Competence 2. Answering questions to solve a problem and checking the correctness of solution proposed. **Reasoning dimension** • Competence 4. Making conjectures related to everyday situations and verifying the results **Connections dimension** • Competence 6. Stablishing connections between different mathematical concepts.	• Geometrical (2D and 3D) figures: elements, characteristics and properties. • Geometrical transformations. • Equivalences.
English Specific Competences	**English Key Contents**
Oral communication dimension • Competence 3. Interacting orally using basic appropriate strategies in accordance with the communicative situation. **Reading dimension** • Competence 5. Using the basic, visual and discursive characteristics of a text format to understand it. **Writing dimension** • Competence 8. Producing simple written texts. **Multilingual dimension** • Competence 12. Using multilingual strategies to communicate.	• Oral fluency skills. • Managing communication and information. • Reading aloud skills. • Using specific vocabulary to describe animals. • Searching information in paper and digital sources. • Text adequacy, coherence and cohesion. • Connectors and punctuation marks. • Nonverbal cue element. • Sociolinguistic and cultural aspects in texts.
Art Specific Competences	**Art Key Contents**
Instruments and applications dimension • Designing and creating multidisciplinary artistic productions.	• Interest, appreciation and respect for (own and others) artistic productions.
Digital Specific Competences	
Instruments and applications dimension • Competence 2. Using the basic functions of text editors to present digital data and create multimedia presentations. **Citizenship, habits and digital identity dimension** • Competence 9. Promoting healthy habits when using technology. • Competence 10. Making a critical, safe and responsible use of ICT tools.	

Table 2. Overview of the project competences and key contents

Project Outline

Getting Started

During academic year 2016-2017, the 5th graders in our school were responsible for the correct management of a weekly session in which, during the break time, students of different ages could play boardgames. "How could we create a new game based on the tangram?" was the question used as a trigger to start the project. However, additional questions would soon arise: "What do we know about tangram games?", "What is a tangram game?", "Can we learn maths playing tangram games?" To start, we decided to investigate the origins of the tangram.

Implementing the project

We started reading an abridged text[1] about the tangram. It provided students with key information about this Chinese puzzle: the type of tans, the history of the game, the large number of possible shapes that can be created by arranging the tans differently, etc. That data awakened great interest in the students who soon were eager to manipulate the tans. To check their comprehension of the text, I prepared explicit, implicit and referential questions. The answers to explicit questions were words or sentences that could easily be located in one of the text passages. The answers to implicit questions could be found by interpreting clues in the text. Finally, to answer referential questions, students had to make connections between the information in the text and their prior knowledge about the game.

A tangram is composed of seven tans: two small triangles, one medium triangle, one square, one parallelogram, and two large triangles. To help students become familiar with the names of the shapes and their characteristics, they were first invited to play the game "Is this your shape?" in pairs. It consisted of trying to guess the shape of a tan that a classmate had chosen by asking questions such as "is this your shape?" and paying attention to the answers given ("No, my shape is not a triangle", "No, my shape is not big", "No, my shape is not green"). They had to ask as many questions as necessary to discover the right piece. Second, students could play with the tans, using them to create their own shapes or to solve puzzles[2]. This second option was more challenging because students had to figure out how the shapes were placed to build up a particular image. In any case, students had to consider the ancient rules of the game, which established that the pieces must lie flat, that they must all be connected and that they must not overlap.

Figure 2. Checking comprehension when playing the game 'Is this your shape?' and when solving puzzles

After playing tangram, children were asked to carry out a set of mathematical activities. To cater for different learning styles and multiple intelligences, I offered my students three different ways to make a tangram[3]. The first option was to use a 4 x 4 grid as a template. The second option consisted of drawing their own pattern and cutting it out. As a third option they could create a tangram without using a template, just by following simple and visual guided steps. After completing their tangrams, students accepted a new challenge: arranging the tans in a square to create a double sized tangram of fourteen tans. They discovered that the only possibility to create such a tangram was to compose a new double sized squared piece by cutting the original squared piece into four triangles.

Figure 3. Children making their own tangram and solving the challenge to create a square using fourteen tans

In order to promote communication I designed a tangram dictation. Students formed groups of four. Each group had a 3 x 3 grid. Two students in each group had to give instructions to the other to create a tangram shape. Before playing the game in groups, we performed a small demonstration. Seven students acted as tans and had to follow the instructions given by the group to move around the classroom (e.g. 'Paula, stay in the middle', 'Mireia, take Martí and place him to the left of Teia'). Then students did the same in groups. This gave students the possibility of practising prepositions and how to give commands in English. Then we did the same but using tangram pieces that we placed on the ground. This time students took turns to instruct a classmate on how to arrange the tans to form a shape. After completing this activity, students were ready to work in teams and play the tangram dictation. The methodology used to prepare students

for the dictation was based on the philosophy defended by Rosa Sensat's a+a+ maths group, which I am part of, and that defends that experiential and game-based activities are necessary to help children understand and learn complex mathematical concepts.

Figure 4. Practising how to give instructions and doing a tangram dictation

To understand the mathematics in the game, I set children challenging geometry activities created by Laura Candle[4]. Thanks to them, we could describe various shapes and their attributes, we learnt to use precise mathematical terms, we managed to create specific polygons with one or more tangram pieces, and we were able to draw our findings on a chart. We paid special attention to the type of polygons we could create with seven tans and dealt with the concepts of perimeter and area. I encouraged students to make hypothesis about the perimeter and the area of the different polygons. They could also use strings to measure the sides of the shapes, which helped them drew their conclusions. It was very rewarding for me to listen to a student proclaim that all the polygons had the same area because all of them had been made with the same number of pieces and shapes. She was also delighted and enthusiastic about her discovery.

Figure 5. Investigating, observing, discovering and developing abstract thinking

The idea of creating a game with animal silhouettes came up during the English class. In pairs, they looked for an animal that could be made with a set of tans and described it with the help of teacher. The descriptions had to include the name of the animal and information related to its appearance (size, colour, weigh, parts of the body), its abilities, its likes and dislikes, its habitat, its behaviour, and its diet. If they judged it necessary, they could also add other special details. When their descriptions were completed and corrected, they typed them and printed them. In the art class they laminated and glued the descriptions on the top of a

box cover. Then they produced two sets of seven tans. One set was used to build the silhouette of the animal in the description and glue it inside the box cover to provide players with the answer to the puzzle, the other set was put in the box to be used to play the game. All the boxes were stored inside a bigger one.

It has got long ears. They can be as long as 10 cm. It is herbivore (plant eater). It lives underground, in burrows. A group of burrows is known as a warren. A young one is called a kit (or Kitten). They live in groups. They reproduce very quickly. They are born with their eyes closed and without fur.

Description of the animal

Box

Tangram solution

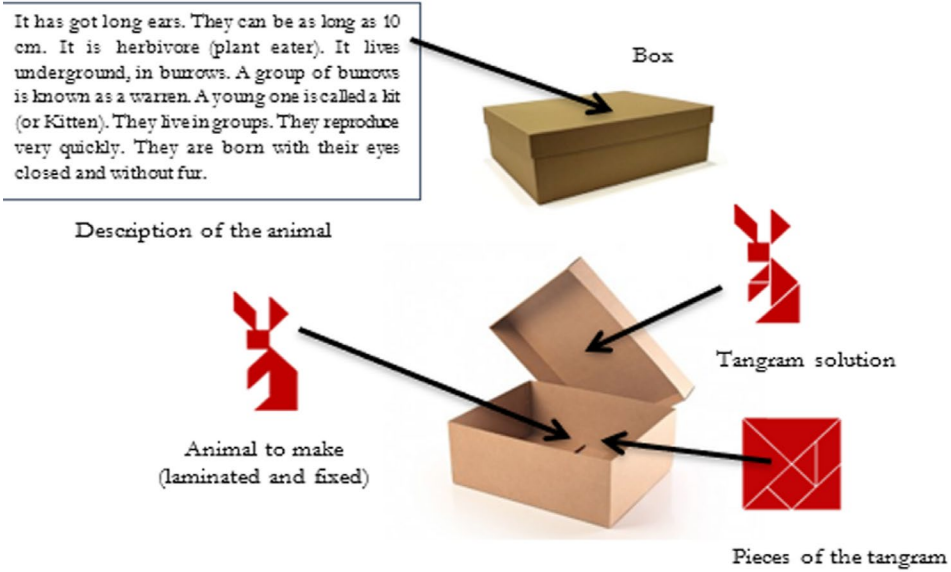Animal to make
(laminated and fixed)

Pieces of the tangram

Figure 6. Steps to create the boxes for the game

Students also created the instructions to play the game and glued them on the cover of the big box. The instructions explained to the players that to play the game they should take one of the smaller boxes, read the description of an animal on the cover, identify that animal, check if their answer was correct, try to make the silhouette of the animal using all seven tans and finally check if they had produced the correct silhouette by looking at the solution inside the cover.

Presenting the project final product

After having created 23 boxes with descriptions of animals, one more step was missing: presenting the game to all students in the school. To prepare this task, students were organised in small groups. Each group had to prepare an oral presentation to summarise the process of creating the game and to present the rules to play it. They had to create a PPT to support their presentation. To create visual slides, they could include some of the photographs they had taken while they were preparing the game. Each group was in charge of presenting the

project and the game to another class. They created a checklist to decide what they would say and to use it as a self-assessment tool afterwards.

Figure 7. Stages of the project and presentation of the final product

When the project was finished, I asked all my students to write, this time in Catalan, how they would value the experience and I invited them to reflect on their personal learning process. I would like to remark on one of the views they shared: "We had the feeling of doing several subjects at the same time and that was great fun". I was satisfied as they described with their own words the objective of a cross-disciplinary project such as ours.

At the start of the project, I had presented them the rubric I wanted to use to assess them. I would focus on their attitude in class, on whether they cooperated and helped one another, on the quality of their descriptions (good contents, correct presentation, right structures and accurate vocabulary), on the design

of the box (originality) and on their use of English to address me and their peers. The results were good. They got deeply involved in the project, and even enjoyed playing the game in class. They loved being the protagonists of a school project and liked watching a recording of themselves on the school website. That made them become aware of the large number of linked activities they had really carried out, of how hard they had worked and how rewarding their learning outcomes were. And they did it all in English!

Concluding remarks

Thanks to *Tangram Animals: Creating a game as a vehicle for learning,* students, families and teachers were convinced that cross-disciplinary projects promote significant learning and allow students to look at the world from different angles, through different disciplines. Moreover, a common goal always stimulates participation, enthusiasm and collaboration with peers. The adoption of the project-based learning approach in class has many benefits because critical thinking, motivation, team work and cooperation are guaranteed.

Acknowledgements

Notes

1. The texts about the origins of the tangram we used were https://www.siammandalay.com/blogs/puzzles/62356035-spotlight-tangram-puzzles and also https://www.parentingscience.com/tangrams-for-kids.html

2. The images used as silhouettes of the animals were found on this webpage https://www.tangram-channel.com/tangram-puzzles/animals-easy/

3. The options to make a tangram were taken from http://www.fun-stuff-to-do.com/support-files/how-to-make-a-tangram.pdf and http://www.fun-stuff-to-do.com/support-files/how-to-fold-a-tangram.pdf

4. The geometry challenging activities created by Laura Candle can be found at: www.lauracandler.com

5. The video of the project can be seen on the school website https://agora.xtec.cat/escolalacustaria/gep/gep-projects/