

Los beneficios del álbum ilustrado para introducir contenidos curriculares de matemáticas en educación infantil.

The benefits of the picture book to introduce mathematics curriculum content in preschool

Resumen

Este artículo presenta los beneficios del álbum ilustrado *Press Here* acompañado de actividades guiadas para introducir contenidos curriculares de matemáticas en la etapa de educación infantil. A través de un diseño experimental se muestra cómo los alumnos de segundo curso de la etapa de infantil adquieren los conocimientos con mayor facilidad de forma individual. A su vez, este recurso literario innovador les permite interactuar con el libro incrementando su motivación e interés. Se muestra una mejora notable en el grupo experimental en el estudio posttest de los casos en la adquisición de los números (tanto en la gráfica como en la cantidad). Se concluye por tanto que el libro y las actividades guiadas mejoran el aprendizaje en la competencia matemática.

Palabras clave: álbum ilustrado, educación infantil, innovación pedagógica, aprendizaje, competencia matemática.

Abstract

This article presents the benefits of the picture book *Press Here* accompanied by guided activities to introduce the curriculum content of mathematics in the preschool stage. Through an experimental design it is proven that second year students of preschool acquire the content individually easier. At the same time, this innovative resource allows them to interact with the book increasing their motivation and interest. A remarkable improvement of the experimental group is proven in the acquisition of numbers (both in the graphic representation and in the quantity). Therefore, it is concluded that both the picture book and the guided activities improve the mathematical competence.

Key words: picture book, preschool, pedagogic innovation, learning, mathematical competence.

1. Introduction

Since immemorial times, human beings have had the need and the innate capacity of transmitting stories that in some cases have arrived until our days. This exchange of information, events or anecdotes that was passed down orally, from generation to generation, is currently transmitted in a written format. In this article we will focus on the picture book as a tool to transmit images where these gain special relevance towards words. It is the first contact that the child will have with literature, hereby its importance to offer some appealing images and a suitable topic to its age and interests. The chosen book is entitled *Press Here* by the well-known author and illustrator Herve Tullet. It is a predictable book where the child is the protagonist from the beginning because he can interact with it and images seem to come back to life. The objective of the experiment is to prove that it is easier to acquire numbers 1-3 associating the written format with the quantity apart from obtaining better learning outcomes with the aid of additional and guided activities.

2. Benefits of storytelling and CLIL for curricular contents

The art of telling stories or storytelling as Farrell states (1991) “Have been a means of instruction mainly addressed to preschool” (p. 38) because it provides young children access to culture and literature that they may not otherwise experience. In the same line, Gordon Wells (1988) notes that young children find it easier to assimilate new ideas when they are presented in the form of a story and that even older students look to anecdotes to help them understand new concepts and link them to their lives. Teaching through storytelling encourages teachers to think of the curriculum as a collection of great stories attached to our culture and also to specific content or topics increasing students’ motivation and interest because it is more personalized. As a response to this approach, different subjects such as History, Math, PE or Arts among others can be introduced through CLIL and storytelling. We will first define the term CLIL which was first coined in 1994 and stands for Content and Language Integrated Learning and consists of teaching language in a natural way attached to a specific content. This methodology is based on the 4 C’s: Content, Cognition, Communication and Culture and as we will analyze hereafter it presents multiple advantages for storytelling:

1.Stories through cognition: through visual literacy the student will be able to associate the images with the acquired knowledge, as well as predicting, guessing and rebuilding the meaning of the story.

2.Stories promoting content: as in the experiment to teach the specific content of mathematics, stories present a wide array of topics linked to the curricular content. Stories give the opportunity to contextualize and include new vocabulary, making it more feasible and easier to memorize.

3.Stories to introduce culture: students will be able to know other cultures, countries thus having a richer vision of the world and accepting other ways of living.

4.Stories to foster communication: because their images and appealing topics awaken students' interest and help them react either verbally or non-verbally to the story through images and words.

Added to this, storytelling resembles to the natural acquisition of the mother tongue because the main source of input is through oral exposition, as Krashen stated in his *Natural Language Hypothesis* (1985), which helps the child to set structures and more complex mental connections. In the same line, Ellis and Brewster (2002) highlighted the importance “to develop an auditive comprehension from a general meaning, the ability to predict to guess the meaning or make hypothesis” (p.2)

3.Multifaceted picture books and its benefits

For the purpose of the study, the power of pictures in children's picture books signify how images enhance the comprehension of meaning intended by texts. According to Olshansky (2008), children intuitively understand the meaning of pictures well before they are taught how to read words on paper. This recent-creation genre dates back to 1950 with Wanga Gag's *Millions of Cats* and is mainly addressed to children due to their appealing and colorful images and being composed of around 500 words. Furthermore, they provide a natural platform where the text and the pictures come together, intricately weaving meaning into both the art/illustration and the written language (Martens et al., 2012).

One of the main challenges teachers encounter is the innumerable offer of picture books that when selected for foreign language contexts the illustrations are often

considered a mere support for the verbal text, valued for their synchronizing information only (Ellis & Brewster, 2002). As a response to this difficulty, we enumerate some criteria to select a good story as Andrew Wright (1995) stated: 1.The story should please the narrator, 2.The teacher will have to feel it to transmit it successfully, 3.It should attract children's attention, 4.The story should be feasible, 5.It should offer exemplary experiences, values, perceptions and attitudes, 6.It should give children a rich linguistic experience, 7.It should help teachers develop oral skills, improve their vocabulary, syntax and grammar, 8.It will be the starting point for a crosscurricular topic, a creative and productive work regarding the use of language, 9.It should have an appropriate length.

We will now analyze the main benefits of telling stories through picture books at preschool stage. Reading stories aloud will foster children's self-knowledge and autonomy through the interaction between the teacher and the students. As a response to this early age the teacher should introduce the story with much enthusiasm, motivation and dramatization. At the same time, autonomous learning, as Holec (1988) states "is the ability to have control over your own learning" (p.3), therefore this methodology should be accompanied by the teacher's support according to each students' resolution capacity. Added to these benefits, telling stories will increase children's interest to reading, previous to the literacy stage, as well as improve memorization, gaining vocabulary and a higher capacity for problem solving.

Among other objectives of picture books, we find favoring the knowledge of the environment through a process of discovery and representing different contexts and highlighting different social groups and experiences based on reality. To work this curricular content, we propose *Spot Goes to School* by Eric Hill for children to lose the fear to their first day of school and helping them to associate it with a fun and beautiful experience and to introduce different social groups you can find *All Are Welcome* by Alexandra Penfold.

Lastly, the appealing characters that are generally in the foreground will seem to be talking directly to the children inviting them to take part of the story, helping them to solve their problems or empathizing with them.

The picture book *Press Here*

Press Here by the author and illustrator Herve Tullet was published in 2015. It is a predictable book which invites children to make predictions through words, sentences or events that come next in the story and will increase their enjoyment and help them to build vocabulary. This interactive book is starred by a yellow dot that if pressed will embark children into a magical journey. By following the instructions, the audience will shake the book, tilt the page or press on the yellow dot and experiment that images come back to life, following the cause-effect pattern.

The experiment is composed of 3 sessions whereby the story *Press Here* will be told in each session with the help of children who will learn colors, numbers and quantities through cards and games implicitly.

2. Method

The research tries to prove that the use of picture books through storytelling and CLIL accompanied by guided activities increases concept learning in this case focused on mathematics.

Objectives

The main objective of the experiment is to prove that the picture book *Press Here* accompanied by guided activities is a really efficient resource to teach the numbers among students of second cycle of preschool education.

As specific objectives we highlight the introduction of an innovative literary resource to learn specific content, the use of interactive activities focused on stories as well as the increase of participation and motivation from the students' perspective, becoming the main agents of the learning process.

Context of the research

The present experimental study took place in the British School in Madrid during the course year 2019-2020 in the stage known as Nursery, which corresponds to the 1st year of preschool education in the Spanish curriculum. It is the first British School in Spain which receives the highest rating in all areas of the BSO (British School Overseas) due to an outstanding quality of education, development of spiritual, moral, social and

cultural development of students, the suitability of the owner and staff, the information offered to parents and caregivers and the leadership and school administration.

During the preschool stage students take part in the English National Curriculum, as planned in the United Kingdom, they receive a personalized attention according to their expected level and skills. Students' progress is recorded individually in all subjects through the whole school year.

Design of the experiment

The experiment has been carried out in two groups: a control and an experimental with the main difference that the former group counted with guided activities (presentation of flashcards, filling vocabulary, cards and manipulating circles of EVA foam). In both groups the main objective was to acquire numbers 1-3 and the picture book *Press Here* was used as a main axis.

Participants

The participants of this experiment belong to the first year of the second cycle of preschool. The sample is composed of 23 students: 10 belong to the experimental group (4 boys and 6 girls) and 13 to the control group (7 boys and 6 girls) as you can see in the following table.

Table 1 Distribution of the sample according to the group and sex

Measures, tools and variables

To assess these activities a tool created by the preschool teacher was used. The study consists of two sheets where numbers and quantities appear randomly. To test the reliability of the tool, two judges (both researchers) assessed the results that one of the teachers obtained and they were similar to those in the sample. Both judges coincided in that all the answers provided by the students had a Cohen's Kappa coefficient $k=1$.

For example, the student is shown the first paper (figure 1) and the teacher asks what number it is pointing at number one, the student answers and every judge assesses whether it is right or wrong. The same procedure will take place pointing at numbers two and three. Once being asked the number, we ask the student to match the numbers to their corresponding quantity. In the second paper (figure 2) the teacher asks the student what the number is being 2 in the first place, then 1 and finally 3 and they also need to match

the numbers with their corresponding quantity. To obtain a positive value the student has to answer twice to the same question on a different paper every time.

Figure 1. First paper of the assessing tool.

Figure 2. Second paper of the assessing tool

The variables of the study show us the mathematical competence of the students in the following aspects: 1) relate the number 1 with its spelling 2) relate number 2 with its spelling 3) relate number 3 with its spelling, 4) identify number 1 with its quantity 5) identify number 2 with its quantity and 6) identify number 3 with its quantity.

Procedure

The ten pre and post-test sessions were developed in the afternoon from 15:15 to 16:15. From 14:45 to 15:15 for the control group and from 15:15 to 16:15, 15 minutes more, in the case of the experimental group because these had to carry out the activities.

In the sessions of the control group the teacher reads the picture book *Press Here* and in the sessions of the experimental group the teacher reads the picture book and the students do the additional activities.

The reading aloud takes place with the children sitting on the floor in different rows facing the researcher who will sit in the center on a small chair. With the aim of activating students' attention, previous to reading, they will be given big flashcards, first with the red, yellow and blue colours and the numbers: in the first place the spelling and next the spelling and quantity (see figures 3,4,5,6,7, and 8) and they will read the picture book.

After the reading we will pass the flashcards

Figures 3. Flashcard with number 1

Figure 4. Flashcard with number 1 and its quantity

Figure 5. Flashcard with number 2

Figure 6. Flashcard with number 2 and its quantity

Figure 7. Flashcard with number 3

Figure 8. Flashcard with number 3 and its quantity

In the post-reading stage every student will have a paper to draw and colour number 1 (figure 9), number 2 and number 3.

Figure 9. Paper to draw and colour number 1

To consolidate learning, with the help of EVA foam circles they will proceed to do what the researcher is asking for 'pick up the yellow circle and hold it up, you place it in front of you, pick up a blue circle and place it in front of the yellow circle', this way the first day of the session you work number one, in the second session number two and in the third session number three. In parallel, the story will be introduced in each of the sessions because it will help students to tell the story or imagine what will happen, activating their capacity to anticipate and increasing their interest for literature.

Taking into account the short time span proper of this age, the students will be given time to carry out the activities. They will have to pass the cards in 3 minutes, the papers in 10 minutes and play with the circles in between 5 and 10 minutes. When they get distracted we will stand up and will do Ring Around the Rosy so they integrate the shape of a circle in a ludic environment and they can concentrate in the following task.

Experimental data analysis

The statistical tests were selected by previously proving the standardization process. The sample as we predicted due to its reduced number does not present standardization (Shapiro-Wilk test).

In the first place, the initial equivalence proves the level of knowledge of the groups through a U Mann-Whitney test, calculating the average range. Differences between the results in the control and the experimental groups are proven with the U Mann-Whitney test and the levels of acquisition of the different variables before and after the intervention in the control and in the experimental group are carried out through the Wilcoxon sign. To finish the size of the r Cohen effect is calculated in the experimental group where values ranging from 0,1 and 0,3 are considered small, up to 0,5 medium and over the effect is big (Fritz, Morris y Richler, 2012). Data were used using the statistical package SPSS 24.0.

3. Results

In the first place we will present a descriptive statistic through the frequency tables of every variable of the study in the control and in the experimental group before and after its treatment and the overall punctuations of frequencies and percentages of the control and experimental groups of guesses among students before and after the implementation.

Table 2. Does it relate number 1 with the spelling? (pretest).

Table 3. Does it relate number 1 with its spelling? (postest).

There are not any significant differences in the variable relate number 1 with its spelling.

Table 4. Does it relate number 2 with its spelling? (pretest).

Table 5. Does it relate number 2 with its spelling? (postest).

There is a slight improvement both in the control and experimental groups, increasing from 84'6% in the control group in the pretest up to 92'3% in the postest. The same happens in the experimental group where there is an increase of 10%, obtaining a 90% in the pretest and 100% of guessing in the postest.

Table 6. Does it relate number 3 with its spelling? (pretest).

Table 7. Does it relate number 3 with its spelling? (postest).

This indicator shows a slight improvement in the control group turning from 76'9% of guessing in the control group in the pretest to 84'6% in the postest,

Table 8. Does it identify number 1 with its quantity? (pretest).

Table 9. Does it identify number 1 with its quantity? (postest).

This indicator shows a remarkable improvement above all in the experimental group because the percentage of guessing of the experimental group in the pretest is 50% and increases up to 90% in the postest. At the same time, we can see a small increase in the control group in the pretest that goes from 84'6 up to 92'3% in the postest.

Table 10. Does it identify number 2 with its quantity? (pretest).

Table 11. Does it identify number 2 with its quantity? (postest).

This indicator shows a slight improvement between the pretest control group (69,2%) and the postest group (84,6%), and there is a remarkable improvement between the pretest experimental group (60%) and the postest experimental group (80%).

Table 12. Does it identify number 3 with its quantity? (pretest).

Table 13. Does it identify number 3 with its quantity? (postest).

This indicator shows a slight improvement between the pretest control group (53,8%) and the postest control group (61,5%) and a remarkable improvement between the pretest experimental group (60%) and the postest experimental group (80%).

Table 14. Total scores of frequencies and percentages of the control and the experimental groups of students' guesses (pretest).

Table 15. Total scores of frequencies and percentages in the control and in the experimental group according to the students' guesses (postest).

We will now present the statistical inference, first with the U Mann-Whitney test (Table 16) through which we can contrast the following null hypothesis: there are not any differences in the average ranges of the dependent variables (pretest and postest) between both groups of the independent variable (control group versus experimental). Looking at the average ranges we prove the equivalence between the groups and how the experimental group has a lower score (in the pretest) being the postest of a higher punctuation.

Table 16. U Mann-Whitney test

In the following table (Table 17) the results of the statistical test are proven. Although several statistics appear, the used test is U Mann-Whitney but to estimate the associated probability two transformations take place (The U turns into W and the W into Z).

Table 17. Test statistics

The associated probability (Asump. Sig. (2-tailed)) to the U statistic in all cases is above 0,05, therefore the null hypothesis should be accepted and state that both groups (control and experimental) have equivalent results both in the pretest and in the postest. The sample is very small (23 students) and it is logical that overall there are not any significative changes. For this reason, we will study case per case to prove what happens in this analysis.

In the following table (Table 18) the different types of changes that take place in the scores of the pretest and postest are displayed in all cases. The negative ranges show that they obtain a higher score in the pretest than in the postest. The positive on the

contrary obtain a higher punctuation in the posttest and the ties show there has not been any changes, this is, they obtain the same punctuation on both averages (pretest and posttest).

Table 18. Ranges test with Wilcoxon sign

To know whether the change between the pretest and the posttest is significant you must see the table displayed below (Table 19):

Table 19. Statistics of Ranges Tests with the Wilcoxon sign

Although in the table says Z, the W Wilcoxon test is being applied. The probabilities under 0,05 statistically display significant differences between the pretest and the posttest and here it occurs with the experimental group.

Lastly, we will calculate the size of the r effect that is the result of dividing the Z value by the square root of the size of the group. In our case in the experimental group: $r=2,456/3,1=0,792$.

The size of the r Cohen is big with values ranging 0,1 and 0,3 they are considered small effect, until 0,5 medium and over this value big (Fritz, Morris y Richler, 2012).

4. Discussion/Conclusions

As exposed in the theoretical framework of the article in this experiment we will analyze the benefits of storytelling and CLIL to introduce the curricular contents of mathematics (specifically numbers one, two, three) in the preschool stage. After choosing a predictable picture book as Ellis and Brewster (2002) state, students develop a capacity to predict what will happen next and even make hypothesis “if I go to the next page the circle may have disappeared”. Although the protagonist is a circle, in the end, an abstract figure for an adult it comes back to life through the story because it changes its color, it multiplies and moves through space, gains the confidence of children who on occasions think that instead of a circle it could be a cheese, the moon or any circular object they can imagine. At the same time, being narrated to a group and allowing the reader to interact with the book, there is a special link between them that fosters cooperative learning because all students will want to express what happens next and carry out the activities linked to the story.

Despite their short age, students get really engaged with the story and empathize with the character getting to be surprised, laugh, be scared and even believe that they themselves press on the circle and are able to change the story. This conveys a higher concentration and interest for problem solving.

Firstly, after the analyzed results there are not any significant differences between the experimental and the control group in the posttest as observed in table 19 and by comparing their final scores they are equivalent. However, when analyzing how many students improved their score from the pretest to the posttest in every group is where we find differences. In the experimental group we find that 7 students have improved towards 4 students who improve in the control group (table 20), this is turning it into percentages it can be compared: 7 out of 10 in the experimental group is 70% towards 4 out of 13 in the control group which is 30%. Therefore, there are 40% cases that improve in the experimental group regarding the control group, displaying the experimental group a “big” size effect according to Cohen.

All this, together with the lack of similar investigations show us we are in front of a research that proves the efficiency of the picture book *Press Here* with guided activities to learn the numbers for students in the second cycle of preschool education. The students have improved their mathematical competence that proves there has been a significant learning. For this reason, we consider relevant to do similar investigations with a bigger sample to continue progressing in the benefits of using picture books to introduce curricular contents in the preschool stage.

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Tables y Figures.

Tables

Table 1. Distribution of the sample per group and sex

Group	F	M	Total
Experimental	4	6	10
Control	7	6	13

Table 2. Does it relate number 1 to its spelling? (pretest).

GROUP			Frequency	Percentage	Valid	Percentage
Accumulated percentage						
CONTROL	Valid	No	1	7,7	7,7	7,7
		Yes	12	92,3	92,3	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	1	10,0	10,0	10,0
		Yes	9	90,0	90,0	100,0
		Total	10	100,0	100,0	

Table 3. Does it relate number 1 with its spelling? (postest).

GROUP			Frequency	Percentage	Valid	percentage
Accumulated percentage						
CONTROL	Valid	No	1	7,7	7,7	7,7
		Yes	12	92,3	92,3	100,0

		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	Yes	10	100,0	100,0	100,0

Table 4. Does it relate number 2 with the spelling? (pretest).

GROUP			Frequency	Percentage	Valid	percentage
Accumulated percentage						
CONTROL	Valid	No	2	15,4	15,4	15,4
		Yes	11	84,6	84,6	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	1	10,0	10,0	10,0
		Yes	9	90,0	90,0	100,0
		Total	10	100,0	100,0	

Table 5. Does it relate number 2 with the spelling? (postest).

GROUP			Frequency	Percentage	Valid	percentage
Accumulated percentage						
CONTROL	Valid	No	1	7,7	7,7	7,7
		Yes	12	92,3	92,3	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	Yes	10	100,0	100,0	100,0

Table 6. Does it relate number 3 with the spelling? (pretest).

GROUP			Frequency	Percentage	Valid	Accumulated
Percentage Percentage						

CONTROL	Valid	No	3	23,1	23,1	23,1
		Yes	10	76,9	76,9	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	1	10,0	10,0	10,0
		Yes	9	90,0	90,0	100,0

Table 7. Does it relate number 3 with its spelling? (posttest).

GROUP			Frequency	Percentage	Valid	percentage	
Accumulated percentage							
CONTROL	Valid	No	2	15,4	15,4	15,4	
		Yes	11	84,6	84,6	100,0	
		Total	13	100,0	100,0		
EXPERIMENTAL	Valid	Yes	10	100,0	100,0	100,0	

Table 8. Does it identify number 1 with its quantity? (pretest).

GROUP			Frequency	Percentage	Valid	percentage
Accumulated percentage						
CONTROL	Valid	No	2	15,4	15,4	15,4
		Yes	11	84,6	84,6	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	5	50,0	50,0	50,0
		Yes	5	50,0	50,0	100,0
		Total	10	100,0	100,0	

Table 9. Does it identify number 1 with its quantity? (posttest).

GROUP			Frequency	Percentage	Valid	percentage
		Accumulated percentage				
CONTROL	Valid	No	1	7,7	7,7	7,7
		Yes	12	92,3	92,3	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	1	10,0	10,0	10,0
		Yes	9	90,0	90,0	100,0
		Total	10	100,0	100,0	

Table 10. Does it identify number 2 with its quantity? (pretest).

GROUP			Frequency	Percentage	Valid	percentage
		Accumulated percentage				
CONTROL	Valid	No	4	30,8	30,8	30,8
		Yes	9	69,2	69,2	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	4	40,0	40,0	40,0
		Yes	6	60,0	60,0	100,0
		Total	10	100,0	100,0	

Table 11. Does it identify number 2 with its quantity? (posttest).

GROUP			Frequency	Percentage	Valid	percentage
		Accumulated percentage				
CONTROL	Valid	No	2	15,4	15,4	15,4
		Yes	11	84,6	84,6	100,0
		Total	13	100,0	100,0	

EXPERIMENTAL	Valid	No	2	20,0	20,0	20,0
		Yes	8	80,0	80,0	100,0
		Total	10	100,0	100,0	

Table 12. Does it identify number 3 with its quantity? (pretest).

GROUP			Frequency	Percentage	Valid	percentage
Accumulated percentage						
CONTROL	Valid	No	6	46,2	46,2	46,2
		Yes	7	53,8	53,8	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	4	40,0	40,0	40,0
		Yes	6	60,0	60,0	100,0
		Total	10	100,0	100,0	

Table 13. Does it identify number 3 with its quantity? (postest).

GROUP			Frequency	Percentage	Valid	percentage
Accumulated percentage						
CONTROL	Valid	No	5	38,5	38,5	38,5
		Yes	8	61,5	61,5	100,0
		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	No	2	20,0	20,0	20,0
		Yes	8	80,0	80,0	100,0
		Total	10	100,0	100,0	

Table 14. Total scores of frequencies and percentages in the control and experimental groups regarding the guesses (pretest).

GROUP			Frequency	Percentage	Valid	percentage
	Accumulated percentage					
CONTROL	Valid	,00	1	7,7	7,7	7,7
		2,00	1	7,7	7,7	15,4
		3,00	1	7,7	7,7	23,1
		4,00	2	15,4	15,4	38,5
		5,00	1	7,7	7,7	46,2
		6,00	7	53,8	53,8	100,0
		Total		13	100,0	100,0
EXPERIMENTAL	Valid	,00	1	10,0	10,0	10,0
		3,00	1	10,0	10,0	20,0
		4,00	2	20,0	20,0	40,0
		5,00	3	30,0	30,0	70,0
		6,00	3	30,0	30,0	100,0
		Total		10	100,0	100,0

Table 15. Total frequency scores and percentages of the control and experimental groups of students' guesses (posttest).

GROUP			Frequency	Percentage	Valid	percentage
	Accumulated percentage					
CONTROL	Valid	1,00	1	7,7	7,7	7,7
		3,00	1	7,7	7,7	15,4
		4,00	1	7,7	7,7	23,1
		5,00	2	15,4	15,4	38,5
		6,00	8	61,5	61,5	100,0

		Total	13	100,0	100,0	
EXPERIMENTAL	Valid	4,00	2	20,0	20,0	20,0
		5,00	1	10,0	10,0	30,0
		6,00	7	70,0	70,0	100,0
		Total	10	100,0	100,0	

Table 16. U Mann-Whitney test

Ranges

GROUP		N	Average range	Range additions
Total pretest	CONTROL	13	12,69	165,00
	EXPERIMENTAL	10	11,10	111,00
	Total	23		
Total posttest	CONTROL	13	11,46	149,00
	EXPERIMENTAL	10	12,70	127,00
	Total	23		

Table 17. Statistics report a.

	Total pretest	Total posttest
U Mann-Whitney	56,000	58,000
W Wilcoxon	111,000	149,000
Z	-0,586	-0,512
Asymptotic Significance (bilateral)	0,558	0,609

	Asymptotic Significance (bilateral)	0,059
EXPERIMENTAL	Z	-2,456 ^b
	Asymptotic Significance (bilateral)	0,014

a. Range test with the Wilcoxon sign

b. Based on negative ranges

Figures

Figure 1. First sheet with the assessment tool



Figure 2.



Figures 3. Flashcard with number 1

1

Figura 4. Flashcard with number 1 and its quantity

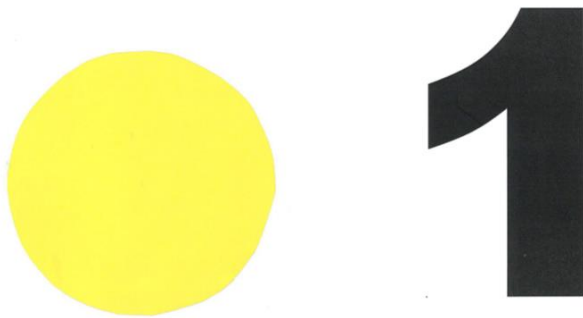


Figure 5. Flashcard with number 2

2

Figure 6. Flashcard with number 2 and its quantity

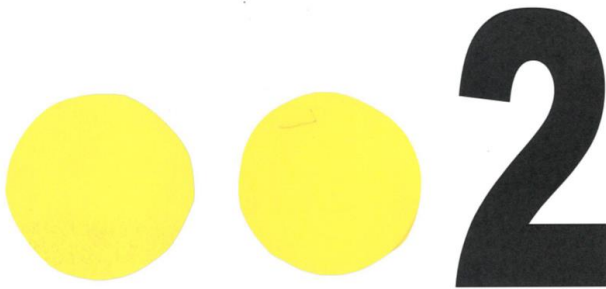


Figure 7. Flashcard with number 3



Figure 8. Flashcard with number 3 and its quantity

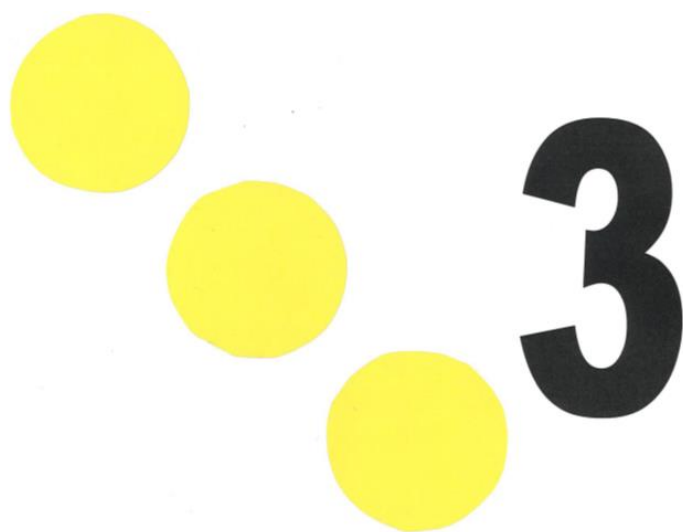
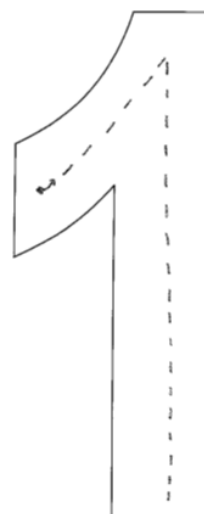
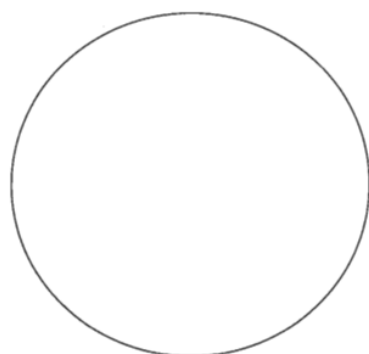


Figure 9. Sheet to draw and colour number 1.



Alumno: _____