Using Shapes as a Tool to Develop Kindergarten Writing Skills

by Pilar Cuervo, 2019 CTI Fellow
Charlotte East Language Academy

This curriculum unit is recommended for Kindergarten.

Keywords: Math, shapes, writing, Spanish, academic vocabulary, logical thinking, word wall, graphic organizer, compare, contrast, hands-on activities, alternative assessment.

Teaching Standards: See Appendix 1 for teaching standards addressed in this unit.

Synopsis: This curriculum unit integrates Spanish and Math. Its primary purpose is to promote writing in mathematics through the use of geometric shapes in kindergarten. This curriculum unit will contribute to developing student's confidence in their second language (L2), which is Spanish. This unit emphasizes the appropriate use of academic vocabulary and suggests creating a Math Word Wall. Students will learn and apply academic vocabulary when discussing and writing an informative text. This unit favors logical thinking through the use of graphic organizers. Students will compare and contrast shapes by using a Venn Diagram. The Venn Diagram will be a visual reference for a discussion. Students will be able to communicate mathematical ideas after analyzing similarities and differences between shapes. This unit will provide hands-on activities to engage students, encourage their curiosity, and set up significant prior knowledge before writing. By providing a variety of activities, this unit encourages students to show their learning in different ways. This unit presents the content in different ways including: reading, songs, and experiments. In this unit, continual assessment takes place and gives students different choices based on their interests and prior knowledge.

I plan to teach this unit during the coming year to 20 students in Spanish full immersion kindergarten students.

I give permission for Charlotte Teachers Institute to publish my curriculum unit in print and online. I understand that I will be credited as the author of my work.

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Introduction

The purpose of this Curriculum Unit is to strengthen my kindergarten students' math and writing skills using knowledge acquired through the CTI seminar experience and from research related to the seminar topic, which in this case is mathematical writing. This Curriculum Unit will be delivered in Spanish in a multicultural classroom. Due to my students' background, the research is highly related to diverse learners. As a teacher, it is essential to be prepared for the increasingly diverse student population, identify their needs, strengths, weaknesses, and options for action to develop appropriate learning opportunities. This unit takes into consideration not only the different learning styles but also the different cultures and backgrounds existing in my classroom, including my own. My experience as a Second Language Learner (SLL) allows me to be aware of language barriers and has helped me to better understand my student's diversity, accept it, and use it as a resource.

Regarding the mathematics content, this curriculum unit focuses on Geometry, specifically shapes. At the same time, it develops reading and writing skills while students learn a new language, Spanish. This unit will be implemented during the last week of May when students have learned enough vocabulary in Spanish to express thoughts and can write more. In this unit, students will explore different activities, using various strategies such as, whole group, small group, and independent workshops, to improve reading and writing skills.

Rationale

In my experience I have noticed that some people perceive mathematics as a static discipline based on numbers. However, mathematics is present in daily life and related to all areas of learning. As a field mathematics continues to grow, entering new fields, and generating new applications. Writing this curriculum unit is an excellent opportunity for me to learn new teaching strategies and for my kindergarten students to develop their thinking, reading, and writing skills. Expressing thoughts with precision and clarity is a skill that requires a lot of work, training, and effort. Wilkinson, Scott, Hiebert & Anderson (2016) mentioned in the "Prologue: Becoming a Nation of Readers", "that the most logical place for instruction reading and thinking strategies is in the content areas rather than in separate lessons about reading" (p.3). I believe it is common that students fail in math because they do not understand the meaning of words or do not understand the relationship that numbers or data have to solve a problem. Developing writing skills in math is essential because mathematics requires students to think about what the words mean. In mathematics, we must be precise in our thinking and language. This curriculum unit allows learning to be an active process through verbal and/or written expression, which leads students to focus on the understanding of concepts.

Demographic

Charlotte East Language Academy (CELA) is a K-8 language immersion Title 1 public elementary school located in the old Eastland Mall site in Charlotte. The school's mission statement is to "cultivate resilient and empowered learners who strive to positively impact a multicultural society" (https://charlotteeslanguageacademy.wearecms.com). This school opened for enrollment last year and for this reason our student population is only about 350 students in grades K- 7th. The students identify mainly as African-American and Hispanic with 99% of the families qualifying as low income. CELA offers a two-way bilingual program for all grade levels, in which both native Spanish and English speakers students share the same classroom serving as a language model for their classmates. However; in kindergarten, instruction is 100% in Spanish. Even though English and Spanish are the predominant languages in CELA, there are a wide variety of other cultural backgrounds and languages. For example, we have students from Nepal, Somalia, and Burma. My kindergarten class has 20 students, 60% girls (12), and 40% boys (8). From this population, 8 are native English speakers and 12 are native Spanish speakers. Nowadays, being Hispanic does not guarantee a student will speak fluent Spanish. In my experience many of these students are losing their mother tongue. CELA is "committed to excellence, and it has established a culture built on strong relationships with high expectations and mutual accountability which will result in high student achievement and teacher growth and development" (https://charlotteeslanguageacademy.wearecms.com). For teachers to achieve this goal, they frequently promote activities to practice social and emotional skills. Even though the behavior is not a problem in this school, the psychologist and the social worker are willing to provide services to those students who need extra support. There is also a school culture about respect and support between faculty. Teachers receive specific Professional Development (PD) to build a friendly and learning environment. One-way teachers can facilitate good relationships among families is using cooperative learning strategies where parents are invited to participate.

Objectives

The goal for this curriculum unit is to promote writing in mathematics through the use of geometric shapes in my multicultural kindergarten classroom.

Content Research

Transfer skills and language acquisition

       The theory of mother tongue transfer initiates in the 1950s, by the behavioral psychologist, it was defined as "the process of automatic, uncontrolled and subconscious use of past learned behavior in the attempt to produce new responses" (Wang, & Xiang, 2016, p. 2208). Across the past few decades, this theory has been revised (Wang, & Xiang, 2016).
       From the 1960s to the1970s the function of transfer was related to the cognitive theory. Finally, from the 1980s up to now, linguists defined the word "transfer" not only as a mechanical action, but as an important learning strategy for language acquisition. It is also a complex cognitive process that is affected by several elements (Wang, & Xiang, 2016). Transferring skills is essential for language acquisition (Wang, & Xiang, 2016). Researchers have demonstrated that students learn new concepts, language, and skills based on their linguistic backgrounds and their cultural understanding (McIntyre, Kyle, Chen, Munoz, & Beldon, 2010). Cummins (1981) as cited in (Roberts, 1994) proposes the Common Underlying Proficiency model (CUP), in which, establishing that the "knowledge, skills, and concepts acquired in any language can be accessed through different languages" (p. 4). Cummins (1994) as cited in (Leali, Byrd, & Tungmala, 2012) affirms that academic skills developed in the first language (L1) can be transferred to the second language (L2), but will not occur until the student has obtained enough skills in L2.
       Some educators assume that students can effortlessly transfer their abilities acquired in their first language to L2. According to Schecter (1988), there are universal literacy concepts and skills, independent of the tongue, that can be transferred from one language to another without having to teach them. For example, content knowledge, higher-level thinking, habits and attitudes, meaningfulness of print are skills that can be transferred across languages. However; there are other skills and concepts that must be explicitly taught. Some of the skills that must be taught are: print directionality, grammar and orthographic features, vocabulary, and cultural schema. According to Palumbo & Willcutt (2006), as cited in Palmer, Zhang, Taylor, & Leclere (2010), not having adequate vocabulary is an important reason for ELL's reading difficulties. Although numbers and symbols could be similar in different cultures, classroom practice and research demonstrate that teachers must give explicit and frequent instruction to achieve deeper meaning for mathematics representations (Leali, Byrd, & Tungmala, 2012).

Geometric and Spatial Learning

       One study by Clements and Sarama (2009) finds that children have knowledge about shapes before instruction began. Hermer and Spelke (1996) confirmed that babies from an early age could use simple geometric properties of a room to search for something such as, a toy. In the same way, Newcombe & Sluzenski (2004 [in Clements & Sarama, 2009]) argue that "children use geometric information to place learning" (p. 167) and that the "functional use of such spatial knowledge for searching, which requires coding spatial information and forming and utilizing spatial relationships, develops over the toddler and preschool years" (p. 167). According to Clements & Sarama (2009) learning geometry and spatial reasoning is essential for children from 3 to 6 years old. The authors state that these skills support the learning of another mathematical knowledge and these learning experiences in preschool-age play a crucial role in future school success. Mathematical research shows that an early introduction to spatial thinking and geometric knowledge promote growth "in mathematical competence and other cognitive abilities, including IQ" (Clements & Sarama, 2009, p. 201). According to Uttal, Gregg, Tan, & Sines (2001 [in Clements & Sarama, 2009]) "only five-year-old can use higher-order spatial configurations or patterns to aid searches, probably because that is the age at which they develop the ability to perceive spatial figures in more than one way" (p. 168).

       "Spatial and geometric reasoning consists of many skills, including perspective taking, visualizing, locating, orienting, dimension shifting, path-finding, sliding, rotating, reflecting, diagramming, modeling, symmetrizing, composing, decomposing, scaling, map-making, and designing" (Davis, 2015 [in Schoreter 2017], p.26). Spatial and geometric reasoning is considered for some mathematics researchers to be "a gateway skill to the teaching of higher-order mathematics thinking skills (Clements & Sarama, 2011 [in Schroeter 2017], p. 26). This article also mentioned that spatial and geometric reasoning is seen as an essential skill for 21st-century Science, Technology, Engineering, Architecture, and Mathematics jobs (Verdane et. Al., 2014). Razel & Eylon (1990), as mentioned by Clements & Sarama (2009), assure that students who receive instruction in geometry are better prepared for all school tasks because they gain the necessary thinking tools and also show more writing readiness.

       The van Hiele theory explains the transition of how young children perceive shapes. This theory states study that individuals move through different levels of conceptualization starting at "level 1". Level 1 consists of the stage in which children can visualize and verbalize names of geometric shapes, although features such as sides, angles, and corners may not be yet clearly defined. According to the van Hiele Theory as described by Clements & Samara (2011), children first learn at a visual level. The visual level includes "visual and verbal declarative knowledge." That is, children visualize shapes and at the same time, verbalize words "circle" "rectangle." To help students move to the "sensory-concrete" phase, students are encouraged to find examples and build shape categories, which help them to take notice of the relevant features of objects (Sandhofer & Smith, 1999). Children who have not yet abstracted relevant attributes may call a figure "rectangle" because it "just looks like one" (Clements & Samara, 2011, p. 211).

       According to Smith (1989) as mentioned in Clements & Samara (2011), children can discern more attributes when comparing objects than constructing their definition. Constructing and consciously noticing the properties of geometric shapes requires reflection

and discussion. As educators, it is crucial to increase our knowledge about geometry, the mathematical processes, and instructional techniques. These are fundamental to improving our students' achievement by providing extensive opportunities to build a solid foundation for mathematics. The activities described in the next section are designed to provide opportunities for the students to build their knowledge about shapes and improve shape identification. These activities aim to be fun and build on students' interests by including art, songs, stories, and the use of manipulatives to encourage students to represent their mathematical ideas. Students will practice mathematical actions such as counting, creating, exploring, combining objects such as shapes, transforming, turning, rotating, duplicating, composing, decomposing, and drawing.

On the other hand, the teacher will develop effective instructional strategies to help students employ thinking strategies. Some of these instructional strategies include working with small groups and encouraging students to succeed as independently as possible.

Learner-Centered Model.

This unit favors "Learner-Centered Principles". According to Pintrich & Schrauben (in Carreiro, 2003), the learner-centered model focuses on the learner and the process of learning. In other words, "the individual and the individual's interactions and relations with the task and with others in the situation" (Carreiro, 2003, p.153). In this unit, students will connect prior knowledge with new knowledge when they first explain their criteria to sort shapes. Then, after analyzing, comparing, and contrasting geometric shapes, they will connect what they knew with what they learned in the hands-on activity and through interaction with their peers. Students also will translate their L1 to L2 to understand the vocabulary words in Spanish.

This unit aims to adjust to individual development of students' differences by allowing them to express their knowledge in different ways. Students will use critical and creative thinking when they have to draw their thoughts. According to motivational and affective factors, when students felt safe, this motivates them to learn. McDonough (2012) states, "that a learner's intrinsic motivation to learn is influenced by creativity, higher-order thinking, and natural curiosity to learn" (p.33). This unit encourages students to work independently and in small groups to enable them to create their responses and act as coaches for each other. Students feel motivated when they can start pronouncing some words in Spanish. They will advance their learning when they are expected to explain and support their answers. A variety of interactions and feedback from the teacher and peers allow students to apply, analyze, evaluate, and create knowledge. According to McDonough (2012), learning is most effective when the intellectual and emotional development of the learner encounters different opportunities for learning.

This unit presents the content in various ways, including reading, singing, and diverse hands-on activities. In this unit, a continual assessment takes place and gives students different choices based on their interests and prior knowledge. Froyd & Sympson (2010) mentioned that cooperative learning environments help to create opportunities for student-centered learning. One example of collaborative learning in this unit is when students analyze and discuss in small groups. The last part of this unit also has evidence of a student-centered classroom. Students make a presentation of their findings to an audience. This teaching unit integrates writing and math with the primary purpose of communicating

logical-mathematical thinking by writing.

Universal Design for Learning

This model highlights the importance of some factors involved in student engagement. Students need to have the perception that they are participating in activities of their interest and ones that represent a challenge. Likewise, developing meaningful relationships contributes significantly to increasing academic interest in students. According to Sokal & Katz (2015) schools should challenge students to do more than simply 'do school' but instead become profoundly and meaningfully engaged in their own learning. Some characteristics of meaningful learning require to use deep thinking, inquiry questions, relevant connection with other ideas, and conversations. Learning engagement involves cognitive and affective experiences. Universal Design for Learning (www.cast.org) is a framework designed to create access and success for all learners –based on the idea to design barrier-free environments. It is essential to involve strategies that promote communication, empathy, cooperation, respect, and compassion, develop interdependency roles, and group cohesion between students.

Writing in Math

Learning to write ideas in a clear, logical, and orderly manner is a long process that requires practice. It is essential to provide to our student opportunities to develop this skill at an early age. In my experience, kindergarten students are not confident in their writing skills, have short attention spans, and are on different developmental stages. According to Snyders & Bahnson (2014), "implementing writing workshops early in kindergarten classrooms is a beneficial practice for learners at all developmental levels" (p. 414). Writing workshops allow students to explore different texts, develop their creativity and imagination, and increase their belief in their writing abilities. During the writing workshop, students can apply writing strategies and techniques learned during mini-lessons. The writing workshop provides a learning atmosphere that assists with the formation of students' individual writing identities. "Daily writing mini-lessons influence the writer's identity as students associate themselves with the authors and illustrators explored during mini-lessons" (Snyders & Bahnson, 2014, p. 413). Time to think, write, and share enable students to adjust the writing process to their developmental writing stage. Recent surveys show that literacy instruction and writing tasks are rare in elementary math lessons (Banilower et al., 2013). It is usually more frequent to write in language arts, science, and social studies classes than in mathematics. We see so few examples of integration of writing and mathematics even though "the National Council of Teachers of Mathematics identified learning to communicate mathematically as a major goal for students" (Wilcox & Monroe, 2011, p 521).

Writing in math is a new practice for teachers and students. In my opinion, there are still many teachers who do not promote writing in mathematics because maybe they believe math is only related to numbers and short answers. However, mathematics has the necessary elements to develop logical thinking. Judit Moschkovich, (2015) recommends providing students with multiple opportunities to communicate their mathematical ideas and allow them to use different ways of communication. For example, this could include, participating

in discussions that focus on important mathematical concepts. To achieve this goal, the teacher must choose tasks that require more than just using numbers or symbols. According to the research in cognitive science by Bransford, Brown, & Cocking, (1999 [in Moschkovich 2015]) "people remember procedures better, longer, and in more detail, if they understand, actively organize, elaborate, and connect new knowledge to prior knowledge" (p. 46). In other words, writing is the way to communicate mathematical reasoning and express insights at all grade levels. In this curriculum unit, questions will help students to produce mathematical arguments.

Assessment

Assessment is a crucial part of instruction. It determines whether the learning goals were achieved. Researchers, such as Petre (2014) discussed that traditional assessment only evaluates students' knowledge, but alternative assessment can identify skills that will be used in the real world. It is essential to understand how students learn and how language interferes with their learning process and assessments. Teachers can provide alternative assessment methods to enhance students' potential. I will include in my lesson alternative assessments, such as a portfolio that contains compositions, graphic organizers, and other products that show their improvement throughout the unit. In this way, they will have the opportunity to show what they know in different ways. I will be sure to give continuous feedback about their level of performance to increase their self-perception and influence their learning. Also, I will analyze the data carefully before planning the next step in this topic.

Instructional Implementation

Strategies

　　Using engagement strategies in the classroom is one of the principles of UDL. It refers to the implementation of classroom strategies intended to involve students with diverse needs in the learning process. The strategies selected are: *Word walls*; *Think-write-shar;, Interactive Storybook Reading*; and *Repeated Exposures* (Méndez, Crais, Castro, & Kainz, 2015. P.96). The mentioned strategies support the bilingual model in my school (which is full Spanish immersion in kindergarten) because they allow students to transfer their previous knowledge of English (L1) to Spanish (L2) and learn new vocabulary in the L2. Teachers must provide plenty examples such as: modeling sentences using the new vocabulary words, describing and demonstrating examples of the vocabulary word, and the sharing the meaning of the word. According to Leali, Byrd, & Tungmala (2012), these strategies will help students to transfer their previous knowledge from L1 to L2 (p. 102).

Table 1. *Lesson Plan*

Day	Activity	Resources
Monday	Activity/Word- Wall/Venn Diagram/ Play dough The teacher will paste the I can statement on the board: I can classify shapes by attribute. The teacher will show different shapes and the question. How can you classify these shapes? The teacher will ask students to read aloud the question. How can you classify these shapes? Students will discuss possible answers by pairs and will write it in a paper sentence strip. All the sentence strips will be posted on the board to be read. The teacher will present visuals, cards with Content Words Vocabulary, circle, square, rectangle, triangle, big, medium, small, straight line, inclined, angle, side, attribute. According to Echevarria, Vogt, & Short, (2008). "Content words are the key vocabulary words, terms, and concepts associated with a particular topic" (p. 59). In addition to academic vocabulary mentioned above, students will practice words to help to describe shapes such as it has; it seems, it is. The teacher will use visuals cards in Spanish but will clarify vocabulary in English if it is necessary. Cunningham (as cited in	Plastic Shapes Sentence strip Cards with vocabulary words: circle, square, rectangle, triangle, big, medium, small, straight line, inclined, angle, side, attribute. Ziploc bags with plastic shapes manipulatives Worksheet to register information Charts Venn Diagram Short Text with the shape description Play-dough

	Echevarria et al., 2008) suggest that teacher and students select words to create a Word Wall to the students can frequently revisit throughout the unit and use them in their writing and discussions. Students will work by pairs sorting the manipulatives (Ziploc bag with plastic shapes) and will record their observations on a worksheet about what are the features of the shapes. After that, they will get together on the carpet to discuss. The teacher will ask them for examples of shapes that they recognize in the classroom or at home with the features that they are describing. How do you know is that shape? What are some ideas you can think about this topic? As students orally provide their opinions, the teacher will write them in a chart. What is the difference you notice between the shapes you have? The teacher asks students to discuss it with a partner and encourage them to use the Word –Wall vocabulary. The teacher will repeat the students' ideas and will give positive feedback about their observations. The teacher will invite students to describe shapes together. During Interactive writing, the teacher and the student will write a short text describing each shape on a chart. Students will identify unknown words. The teacher will clarify unfamiliar words. Students, in pairs, will read the text and fill out a Venn Diagram comparing two shapes they select. The class will reflect on and discuss the results. As a conclusion, the teacher will paste a big chart on the wall; students will participate in writing the most used words for this topic. Students will model shapes with playdough. The teacher will observe if students apply new knowledge while modeling shapes.	

Tuesday	Activity Informative text/ Art Gallery Students will review the names of the shapes and their features. They will use their bodies to make shapes. The teacher will take pictures. Students will evaluate by looking at the picture if they create the represent the shape accurately. The teacher will have ready a set of 20 cards; three circles, three squares, three rectangles, three triangles, three rhombi, three hexagons, two trapezii. Each student will choose a card with a shape and will try to reproduce it accurately on a piece of paper by tracing lines with a ruler. Students will color it with watercolors. Students will form teams according to the card shape. The teacher will explain the activity, which consists of taking a tour around the school to find shapes. Students will look outside to find evidence of their knowledge about shapes. Each group will collect objects in a Ziploc bag for 10 minutes. After that, each team will classify the objects in shape categories. Teams will assign titles to their shape categories and will produce an informative text defining the selected shape. We will put all the writings together to make Art gallery and show students work. As a conclusion, the teacher will paste a big chart on the wall, and students will participate in writing the words most used for this topic.	Big Shapes Cards with shapes to make teams. 20 cards; three circles, three squares, three rectangles, three triangles, three rhombi, three hexagons, two trapezii. Paper shapes Watercolors Ziploc bags Sheet to write informative text Sheet to trace shapes Rulers
Wednes d ay	Activity/Write the end of a story / triangle puppet The teacher and students will create "The sad story of the triangle who walked upside down!!!" Children did not want to call him a triangle because they said there were no triangles like him. Those words made him feel very sad. He did not understand why children thought he was different from other triangles. One day, he sat on his door to observe each triangle that passed around. He did not	Plastic triangles Puppets (triangles) Paper sheet to write explanatory text Materials to create a puppet: Paper Eyes Markers Glue

	notice anything unusual. All the triangles were just like him! But... wait a minute; he walked upside down! With the point down! Do you think he is a triangle? He needs someone who can help to explain if he is a triangle or not. Can you help him? Students will explore by turning and rotate triangles. After that, they will produce an explanatory text to express their reasoning about if it is a triangle or not. All the answers will be read. Students will discuss the topic. Finally, students will create a triangle puppet to represent the story or create a new one.	
Thursday	Activity/ Jigsaw/ Create a shape book Students will be organized into groups of four. Each student in the team will receive a text related to different types of shapes. Students will guess what shape is and will look for students who have the same shape. Students will meet with members from another team who were assigned with the same shape to discuss the information. After mastering the knowledge, students will return to their original team and will teach them all that they learn about different types of shapes from the other group. Students will classify by teams 20 flat paper geometric shapes that are the same color, and different sizes through discussion and agreement between the members of the group. They will place them in a graphic organizer. The team that is more accurate will be the winner. Students will create their shapes book.	4 sets of 20 flat paper geometric shapes the same color, different size Graphic organizer Text to guess the shape
Friday	Activity/Celebration with parents/Tangram To close the Curriculum Unit, we will invite parents to come and work with their children and celebrate the new knowledge about how to classify shapes. Students and their parents will explore the seven shapes of the tangram together. They will use cards with instructions to create new shapes. They will investigate how many other shapes can be created with	Invitations for parents Tangram Cards with instructions to create new shapes (Teachers Pay Teachers) Paper shapes Markers Glue the song of the Shapes. Youtube. Cantando Aprendo a hablar. "Círculo, cuadrado, rectángulo" https://www.youtube.com/watch?v=57 llm 6URZDk

	only triangles or squares. They will create questions or games to share with their classmates. They will also create a new shape with different paper shapes. Finally, students will sing the song of the Shapes. Youtube. Cantando Aprendo a hablar. "Círculo, cuadrado, rectángulo." https://www.youtube.com/watch?v=57llm 6URZDk	

Assessments
Group pre-assessment to determine what they know about shapes.
Ongoing assessment by observing students' interactions to check understanding and provide feedback.
Outcome assessment where students will select according to their preferences different ways to demonstrate their knowledge, for example, by using oral language while presenting their findings, or using drawings and models to communicate results and explanations of their investigations to an audience.

Appendix 1: Teaching Standards

Implementing teaching standards

Writing

W.K.2	Use a combination of drawing, dictating, and writing to compose informative/ explanatory text in which they name what they are writing about and supply some information about the topic.

Speaking

SL.K.5	Add drawings or other visual displays to descriptions as desired to provide additional detail.

Math
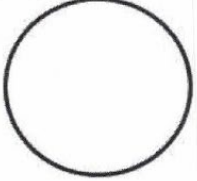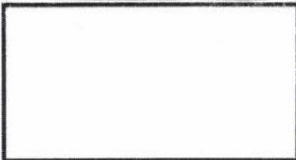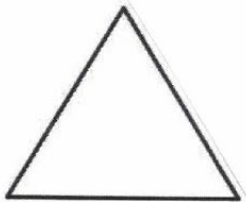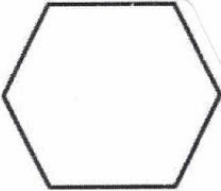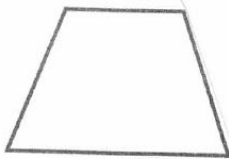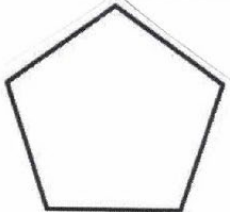
Geometry

NC.KG.2	Correctly name squares, circles, triangles, rectangles, hexagons, cones, cylinders, and spheres, regardless of their orientations or overall size.
NC:KG.4	Analyze and compare two- and –three dimensional shapes, in different size and orientations, using informal language to describe their similarities, differences, attributes, and other properties.
NC.KG.6	Compose larger shapes from simple shapes.

Appendix 2: Worksheets

Nombre _____

Reconociendo Figuras

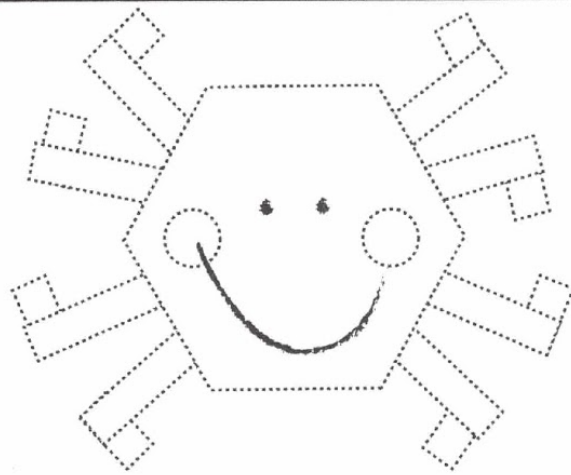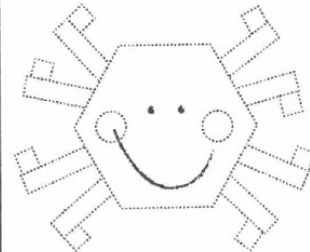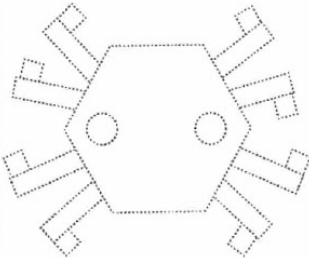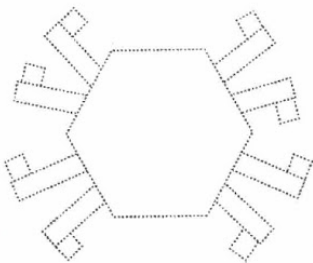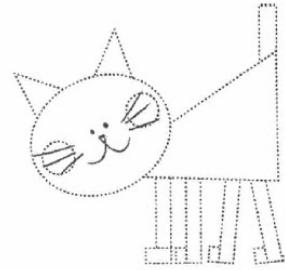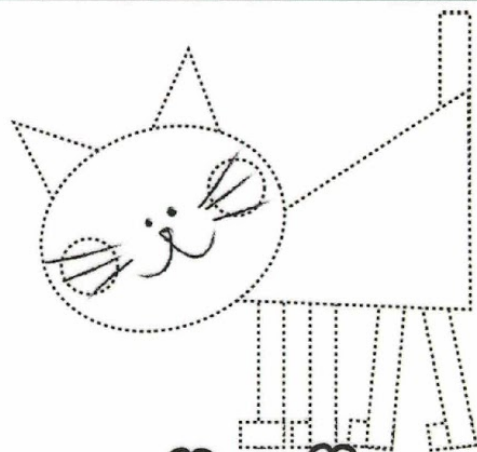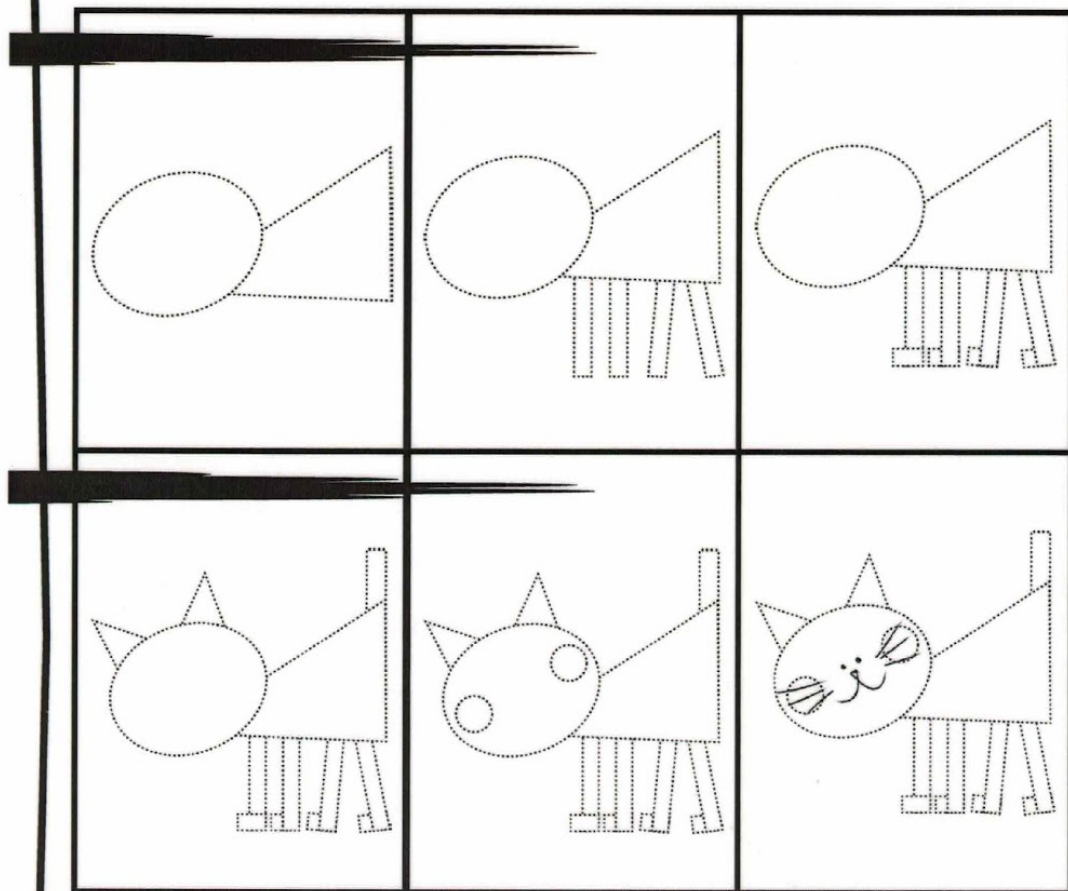|		
nombre _____ lados_____	nombre _____ lados_____	nombre _____ lados_____
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SHAPE SPIder
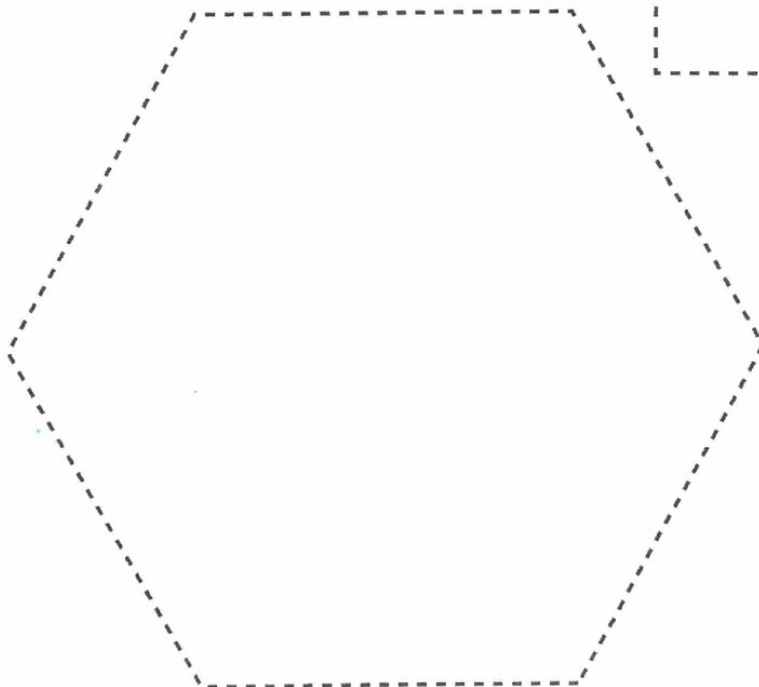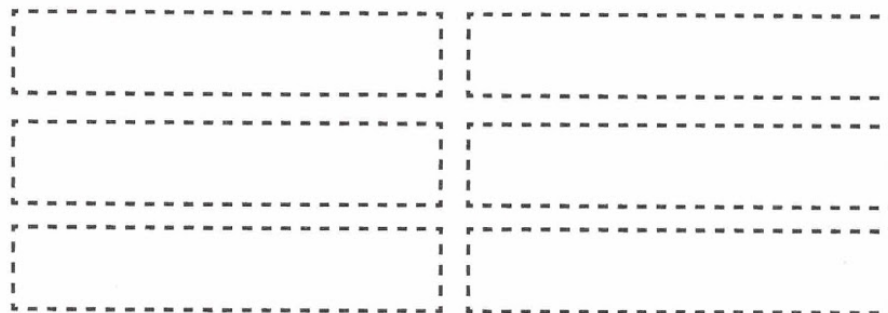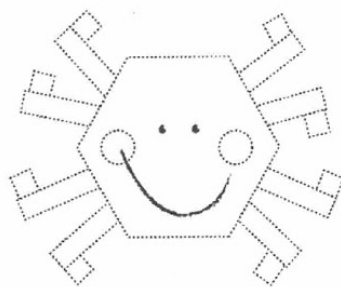
Make a Shape Spider

SHAPE Cat

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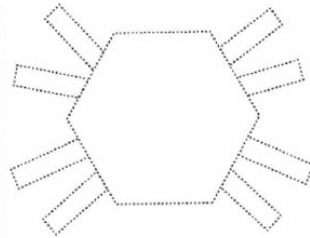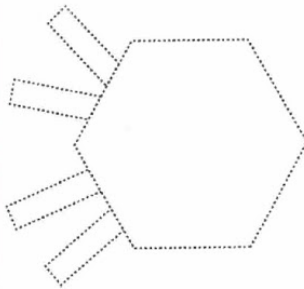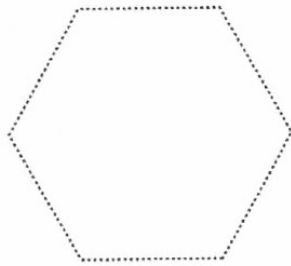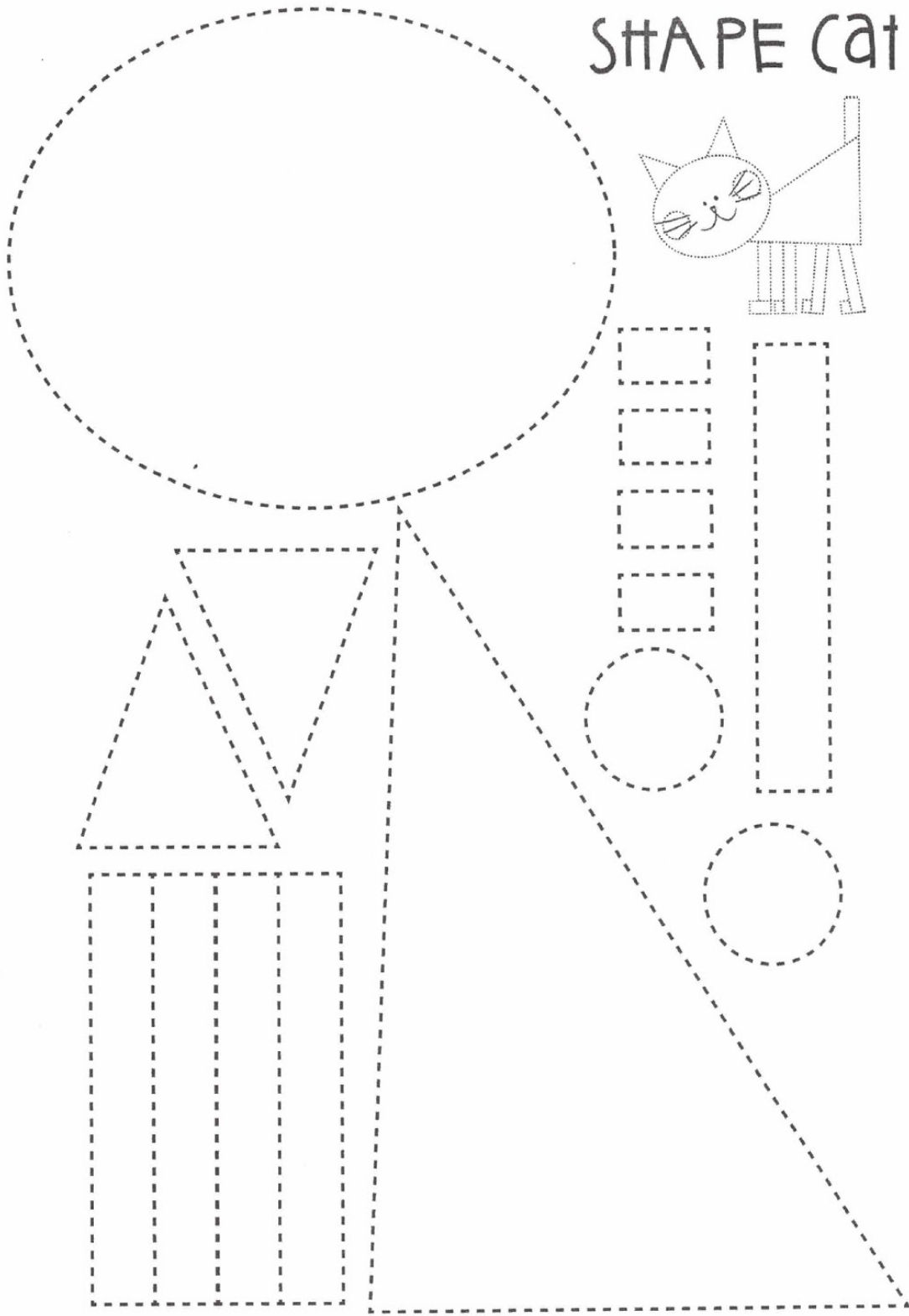
Make a Shape Cat

Appendix 3: Resources

Materials for classroom use:

- Plastic Shapes
- Sentence strip
- Cards with vocabulary words: circle, square, rectangle, triangle, big, medium, small, straight line, inclined, angle, side, attribute.
- Ziploc bags with plastic shapes.
- Worksheet to register information.
- Venn Diagram.
- play-dough
- 20 Cards with shapes to make teams; three circles, three squares, three rectangles, three triangles, three rhombi, three hexagons, two trapezii.
- Watercolors
- Rulers
- Plastic triangles
- Puppets (triangles made with construction paper and a popsicle)
- Paper sheet to write explanatory text
- Materials to create a puppet: paper, eyes, markers.
- Glue
- 4 sets of 20 flat paper geometric shapes the same color, different size
- Graphic organizer
- Text to guess the shape (Tiene 3 lados y puedes encontrarlo en una rebanada de pizza) (It has 3 sides and you can find it in slice of pizza
- Invitations for parents (I used a construction paper, students decorate it with small paper shapes)
- Tangram
- Cards with instructions to create new shapes (I used Teachers Pay Teachers)
- The song of the Shapes. Youtube. Cantando Aprendo a hablar. "Círculo, cuadrado, rectángulo" https://www.youtube.com/watch?v=57llm6URZDk

Annotated Resources for Students

Song of the Shapes. Youtube. Cantando Aprendo a hablar. "Círculo, cuadrado, rectángulo"
    https://www.youtube.com/watch?v=57llm6URZDk
    This song will help students to practice shapes´s names in Spanish.

Murphy, S. J., & Simard Rémy. (2016). Captain Invincible and the space shapes. New York:
    HarperCollins Childrens.
    This book is about the adventure of a boy and his dog in the space where they encounter
    all kind of dangers, but their knowledge about shapes assist them throughout this journey.

Greene, R. G., & Kaczman, J. (2001). When a line bends-- a shape begins. Boston, MA:
    Houghton.
    This book describe and show 10 shapes that can be created by simple bending of a line

Annotated Resources for Teachers

Wang, R., & Xiang, X. (2016). On the Function of Mother Tongue Transfer in English
    Vocabulary Acquisition. Theory & Practice In Language Studies, 6(11), 2208-2214. doi:
    http: //dx.doi.org.librarylink.uncc.edu/10.17507/tpls.0611.19
    This reading explains the importance of connecting the L1 with the L2 of the students to
    achieve more effective learning.

Sarama, J., & Clements, D. (2009). Early childhood mathematics education research learning
    trajectories for young children. New York: Routledge.
    These authors explain in a very detailed way the whole learning process of geometric
    shapes from an early age and its impact on the development of logical thinking.

Snyders, C. S., & Bahnson. (2014). 'I wish we could make books all day!' an observational study
    of kindergarten children during writing workshop. Early Childhood Education Journal,
    42(6), 405-414.doi: http: //dx.doi.org/10.1007/s10643-013-0625-2
    This reading shows how to increase the creativity and interest of our students to enjoy
    writing by using their experiences.

Walker Olivia. Geometry Shape. Teacher Pay Teacher. Free online material.
    https://www.teacherspayteachers.com/Product/Shape-Worksheets-Geometry-Worksheets-
    Kindergarten-Grade-One-FREE-1927158
    I obtained the cat and spider worksheets from this link.

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