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## The use of manipulatives and education materials to teach young children about science and conservation

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THE USE OF MANIPULATIVES AND  
EDUCATION MATERIALS TO TEACH YOUNG  
CHILDREN ABOUT SCIENCE AND  
CONSERVATION

by

Jenny F. de la Hoz

A thesis submitted in partial fulfillment of the  
requirements for the degree of

Masters of Arts in Education

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The Use of Manipulatives to Teach Young  
Children about Science and Ocean Conservation

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¡Gracias a ti también Dios!

questioning of the effectiveness of those materials sent to the home. Showing how these materials help young children learn and enjoy science and how their families participate in teaching them science will ensure that the most meaningful portions of the *Splash Zone Family Kit* not be cut.

The program's history and background follows to help contextualize the evaluation project.

## **Background**

*The mission of the Monterey Bay Aquarium is to inspire the conservation of the oceans.*

In 2000, the Monterey Bay Aquarium opened an exhibit called the *Splash Zone* that focuses on young children and family learning. A program was developed to promote the family-learning experience in the exhibit with instructors from the Monterey Bay Aquarium.

The *Splash Zone* education programs were developed with input from exhibit designers, parents, musicians, artists, early childhood experts, authors, illustrators, researchers, and of course, educators from different areas: formal and informal (those who teach outside of schools), early childhood, environmental and science education. The experts told us that:

1. Young children learn through discovery and self-initiated activities. They relate best to what is familiar and comfortable. They use their entire bodies to learn, experience the world and express their ideas. For children to develop life-long conservation attitudes, values and patterns of behavior, they need frequent, positive experiences in nature.
2. The excitement and enthusiasm demonstrated by significant adults and family members is critical to the development of caring attitudes. When introducing



children, especially Latino children, to this wonderful, awe-inspiring world.

About two years ago, I began working with Head Start teachers, children, and families from Monterey and Santa Cruz counties. This community, made up of ninety percent Latinos, has warmly welcomed me as a member and fellow creator of knowledge. I am invited to family events and I am easily recognized when I walk around their neighborhoods. I have developed personal connections with these families, and this coupled with my own childhood and background, gives me a unique perspective on the way they see and understand the ocean. I hope to help you hear these families' voices as they share their experiences about science learning and the ocean.

### **Purpose**

The purpose of this project is a preliminary evaluation of the usage and effectiveness of the *Splash Zone Family Kit* (detailed below) in bringing the Monterey Bay Aquarium's ocean conservation message and science content into the homes of Head Start families. In the process, I hope to give voice to the ideas, comments, and concerns of Head Start parents and children, a group that is ethnically and economically underrepresented in the aquarium's general visiting audience. More broadly, the project will explore the science learning within the family, as a means of seeking ways of building on those learning processes in more formal education settings.

This project will inform changes to the curriculum and instruction of the Splash Zone Head Start Discovery Program. The research will not only inform my practice, but will also ensure that Head Start families receive materials that support early science literacy both in the classroom and in the home. Recent budget constraints have prompted

## Chapter 1

### Introduction

**Title:** The Use of Manipulatives and Educational Materials to Teach Young Children about Science and Conservation

*“If a child is to keep alive his inborn sense of wonder, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, the excitement, and the mystery of the world.”*

Rachel Carson (1965)

### Researcher’s Note

My name is Jenny de la Hoz and I am a Latina educator at the Monterey Bay Aquarium. When I was a little girl, I first learned to love the ocean by watching television. Even though I grew up going to the long strips of New Jersey’s sandy beaches, I did not usually find ocean animals on these summer outings. On the rare occasion I came across an animal, it would be usually a horseshoe crab. I counted myself lucky on those rare occasions. But on the television, I saw strange animals that were being seen for the first time by human eyes. I saw Jacques Cousteau don weird suits and immerse himself in crystal clear waters, among a myriad of colored fishes and odd looking invertebrates surrounding him. I told myself that I would explore this world some day.

It wasn’t until I was about twelve that I visited my first aquarium, but by that time I was hooked. I loved anything that had to do with the ocean, and I devoured any book or television program that taught me more about ocean animals. Everything that I learned about the ocean seemed beguiling and intriguing. So, when I became an educator at the Monterey Bay Aquarium six years ago, I made it my personal mission to introduce

young people to nature, feelings are more important than facts. Adult leaders and teachers don't need to be conservation experts to engender a conservation attitude in young children.

3. Children involved in active-learning early childhood programs are more likely to succeed in school and in life than children who attend a more teacher-directed program.

Thus, the *Splash Zone* education programs evolved into multi-faceted programs that not only involve direct contact with students but also with the teachers and families in the community.

The *Splash Zone Head Start Discovery Program* started with a very important partnership between the Head Start centers of Monterey and Santa Cruz counties and the Monterey Bay Aquarium. Head Start serves low-income preschool children. Ninety percent of Head Start families in our region are Latinos of Mexican ethnic and cultural background, the majority of whom have never visited the aquarium. Since the program began in 2000, the Monterey Bay Aquarium has served more than 1,500 Head Start families.

To meet the needs of this largely underserved audience, the *Splash Zone Head Start Discovery Program* includes:

- annual Head Start teacher workshops
- parent and caregiver workshops
- outreach visits to Head Start centers by bilingual aquarium educators
- two to three visits to the aquarium for the children and their chaperones (adult family members) which includes free transportation and entry
- *Splash Zone Family Kits* for families
- Resource materials for each preschool center, consisting of multiples of items in the *Splash Zone Family Kits*

As one of two bilingual aquarium educators, I provide workshops for caregivers and parents at the Head Start centers. The workshop orients the parents to the aquarium and

its staff, helps them understand their role as field trip chaperones, and introduces some activities they can do with their children to prepare for their visits. Each family attending the workshop receives a *Splash Zone Family Kit*. This kit contains the following materials that are used in the classroom and in the *Splash Zone* exhibit.

- The *Splash Zone* CD, a collection of lively music and songs by well-known children's entertainer Linda Arnold, provides an energetic and engaging source of content and an introduction to many of the concepts addressed in the exhibit and during the student exploration activities. Through the songs, students learn about the *Splash Zone* habitats and the animals that live there and make personal connections to the ocean.
- The book, *Sing Along and Play in the Splash Zone*, builds on the music and songs in the *Splash Zone* CD and contains more than 60 fun activities and projects families can do together. The activities promote language development and family explorations, and include art projects using recycled or inexpensive materials and simple things to do at home, in the kitchen or back yard.
- Head Start families also receive a *Splash Zone Coloring and Sticker Book*, plastic sea star and surf perch fish model, and the *Penguin Chick* book in English or Spanish. These resources enable them to continue the learning experiences at home and school.

Throughout all program aspects, I model caring, respect, and enjoyment of the ocean and natural environment and more importantly, I also model that a Latina can know and do science. All of the exploration activities focus on age-appropriate concepts and skills identified in the *Head Start Child Outcomes Framework* – a list of federal standards that the children must meet at the end of their Head Start experience. All of the *Splash Zone* classroom and family activities are designed to meet specific curriculum needs of preschool and primary age students and their teachers. Each activity addresses science concepts outlined in the *California State Science Standards*, *National Science Education Standards*, or the *Head Start Child Outcomes Framework*.

## Project Focus

As mentioned earlier, this project is a preliminary look at the effectiveness of the *Splash Zone Family Kit* in helping to instill an ocean conservation ethic and teach basic science concepts in the homes of Head Start families. Many of these educational materials and manipulatives are also used within the exhibit space during *The Splash Zone Discovery Program*. The following questions will focus my project:

1. Which, if any, materials or manipulatives from the *Splash Zone Family Kit* do Head Start families actually use?
2. How do families use the *Splash Zone Family Kit* materials or manipulatives in their homes? What do the children do with them? What has become meaningful to them? How are the parents involved? What stories can be told about the usage of these materials in their home? At school? While they visited the aquarium?
3. What are the words, themes, and concepts used by children and adults when playing with the materials? Do they reflect any of the terms and/or language used during programming? Do they reflect any of the terms and/or language used in their classrooms? Do the conversations show affective connections to the ocean or to nature by the stories they relate or the words they use to describe ocean animals? Do their actions with the toys relate any information about their connections to the ocean? What do the parents say about the language development? Have they noticed their children using more ocean-related words or asking more questions about nature?
4. What is their ease in speaking about ocean-related subjects? What experiences can the parents relate about their visit to the aquarium?
5. Which materials or manipulatives from the *Splash Zone Family Kit* do Head Start teachers use in their classroom? How are they used? To what extent does the usage of the materials by the families reflect the usage by the Head Start teachers?

The answers to these questions will be compiled in a report to aquarium administrators who determine the allotment of available resources to the program. In addition, data gathered from this project will inform the presentation style and theme of the parent workshop in which the materials are presented. Currently, the workshop informs parents of their responsibility as chaperones and provides them with some ocean

natural history background. The results will inform whether I am providing enough information to the adult learner to help them facilitate learning science in the home. Finally, observing the use of the materials will also inform the aquarium's efforts to improve family learning.

## **Chapter 2**

### **Literature Review**

#### **Introduction**

The Monterey Bay Aquarium is a unique institution of learning. It is a place where people of all ages come to enjoy ocean animals. Some people come with the idea that they will learn something new; others just come to have a good time with their families. No matter what their purpose, we at the aquarium hope to influence and inspire them to caring about and conserving the ocean. Doing this with audiences that are socially, economically, and culturally different from each other can be a challenge. But aquariums, zoos, and museums (informal learning centers) have learned ways to educate and better serve their ever-changing audience. They have also drawn from experts in other fields of study. The sharing of these ideas has generated vast discourse and many topics of research. What follows is a review of the literature around three of these topics: families learning in informal learning centers, language as a conduit of learning, and playing as a way of learning. Connecting these topics are Lev Vygotsky's theories on knowledge acquisition. His research, presented throughout the chapter, is the theoretical backbone of my project and has impacted the way I have done this project.

## Informal Learning Centers and the Changing Demographics

Informal learning centers are places where people can acquire new information about distant lands, intriguing customs, and fascinating animals. They are places where we “(choose) what, why, where, when, and how we will learn” (Falk & Dierking, 2002, p. 9). John Falk and Lynn Dierking, (2002) two seminal researchers in the field of learning in informal learning centers, coined the term *free-choice learning* for the type of learning that happens in these settings. These places came into vogue at the beginning of the 1900’s with a new philosophy called the “visual education movement” (Melton, Feldman, & Mason, 1935, p. 1). Suddenly, people were interested in bringing paintings, sculptures, relics, and artifacts – visual elements- into their neighborhoods where they could see and learn first-hand about other places, cultures, and scientific ideas.

At first, museum going was an outing for the upper class, but eventually as the middle class adopted education as a means of class improvement, museums became available to the general public. “A decade ago, the average visitor to the Museum of Modern Art was a white, 55-year-old woman with a household income of \$70,000 a year. Today, that typical art-lover is just as likely to be a man, and his household income has dropped to \$50,000” (Budick, from Future Newsday.Com, *Exhibiting a little pizzazz*, paragraph 8). Museum visitors have changed a great deal.

Recent visitor demographic studies show, “(f)amilies comprise more than half the visitors to the nation’s museums” (Dristas, Borun, & Johnson, 1998, p.5). The term family is being used as defined by Dierking and Falk (1994), as “a social group containing at least one child and one adult” (p. 57). At aquariums, families comprise

64% of the visitors (Morey, J. 2003). In response to this fact, there has been a surge of interest in how families acquire knowledge in informal learning centers.

Falk and Dierking (1994) helped to determine what family learning looks like in museum spaces. “Performance indicators” (Dristas, Borun, & Johnson, 1998, p. 18) such as asking and answering questions, reading text aloud, or pointing to objects in the exhibit are behaviors they identified to gauge family involvement or learning in exhibits. Families arrived at the informal learning center with agendas “which strongly influence behavior and subsequently, should strongly influence learning” (Dierking and Falk, 1994, p. 61). One study of family learning in museums conducted by the Philadelphia Informal Science Education Collaborative (PISEC) showed that family discussions could be used as performance indicators of learning.

The PISEC group looked at family learning in exhibits at four museums on the east coast of the United States, and concurred with a previous study that found “66% of family behavior at an exhibit was about acquiring or transferring information and an additional 5% was about relating this information to past or future experiences of other family members” (Dristas, Borun, & Johnson, 1998, p. 6). Using the performance indicators outlined by Dierking and Falk (1994), they connected family learning to actions in the exhibit and showed families negotiating levels of knowledge beyond those with which they entered the museum. What the PISEC group did not help determine, nor Falk and Dierking for that matter, was if family cultural or background changed the performance indicators. Still they helped determine that by creating environments in museums where families can cluster around an exhibit, museums can foster the learning that occurs within Vygotsky’s Zone of Proximal Development (ZPD).

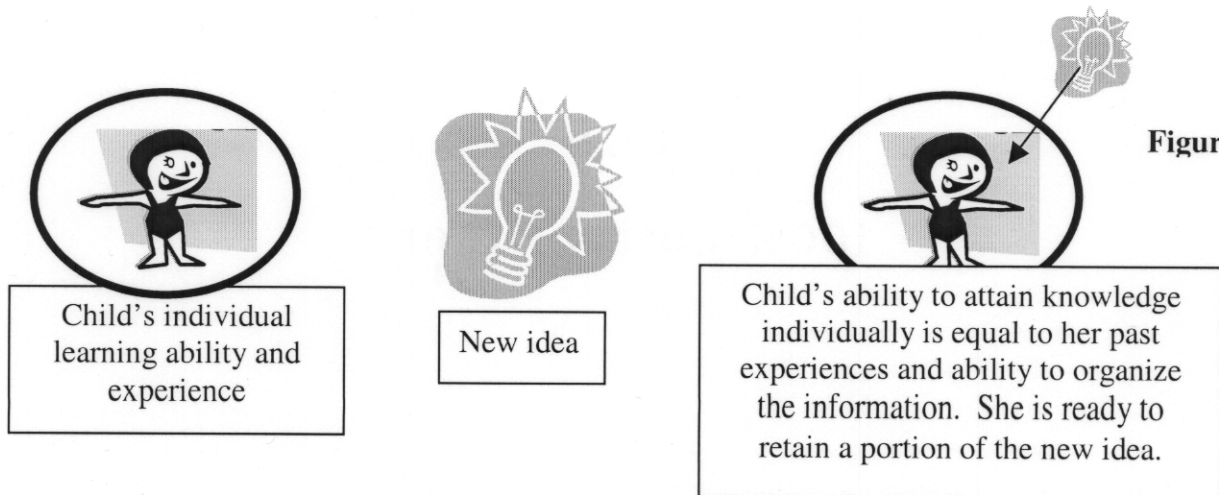


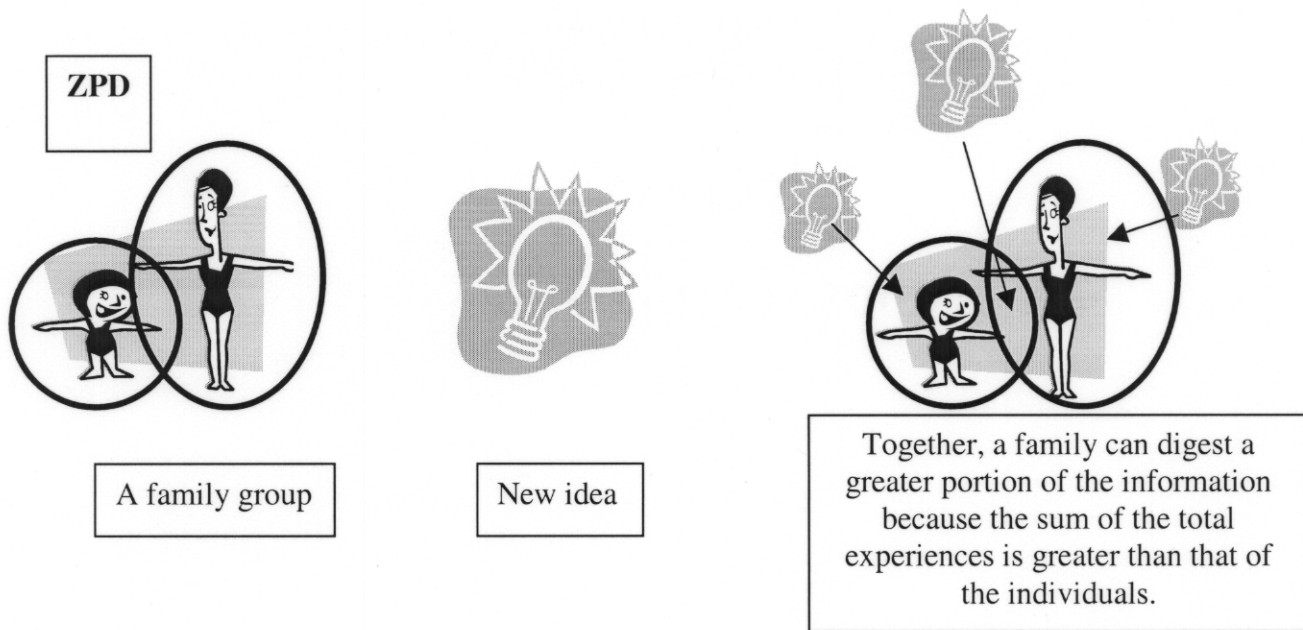
**ZPD: Socializing Family Learning**

The central fact about our psychology is the fact of social mediation. Higher mental functions in the individual have their origins in the social life of the individual.

L.S. Vygotsky, *Mind in Society*

ZPD or the Zone of Proximal Development set forth by Lev Vygotsky in the early 1900's is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, Marxists Writers web site, ZPD section). In other words, a child can attain a certain knowledge level in a learning experience but the child's knowledge can be enhanced when she or he navigates through the same learning experience with an adult. (Figure 1) This augmentation of knowledge can also happen for the parent as he or she interacts with the child. The augmentation is reliant on the "social mediation" or the shared interactions between individuals. Thus, a family unit in an informal learning environment can learn more together than they could individually. Through discussion around the themes and ideas presented, the family unit can more effectively tackle new and foreign concepts (Wells, 1999; Ash 2003).





ZPD helps explain why it is important for informal learning centers to create opportunities or exhibits that encourage group and family learning. In fact, programs that encourage group learning seem to work best for culturally diverse audiences. Slavin's (1989) research showed that group learning was the preferred style of learning by children of Latino-descent. Dierking extended this idea by adding a home component to a science program.

Dierking piloted a program, called *ASK Science*, that extends science learning beyond the school and informal learning venues. With help from community leaders in Maryland, she recruited African American families in urban areas to create science activities that can be done in the home. Although still not published, she found that children learn and retain science concepts when they were reinforced in the home (Lundmark, 2002). Similarly, a group in Los Angeles called the Self Reliance Foundation has created a program called *Celebra La Ciencia*. This program is building

coalitions between schools, informal learning centers, and families to bring hands-on learning opportunities to Spanish speaking families. Through such activities such as science festivals, they believe that they will help increase “Latino student participation in science programs and overall achievement in science” (*Celebra La Ciencia* website, Project Summary).

Projects like these suggest that socialization aspect of learning, particularly with those of the same cultural group and family, helps children reach higher levels of knowledge (Delgado-Gaitan, 1992; Delgado-Gaitan, 1993). But how is that information transferred?

### **Family Learning**

A word without meaning is an empty sound, no longer a part of human speech. Since word meaning is both thought and speech, we find in it the unit of verbal thought we are looking for. Clearly, then, the method to follow in our exploration of the nature of verbal thought is semantic analysis, the study of the development, the functioning, and the structure of this unit, which contains thought and speech interrelated.

Lev Vygotsky, *Thinking and Speaking*

According to Vygotsky, most learning occurs through discussions and the use of words. Vygotsky contended that words are the tools used by children to help them shape understanding. With words, children learn to problem solve and ask for help from the community of knowledge. “Language arises initially as a means of communication between the child and the people in his environment” (Vygotsky, Marxists Writers web site, ZPD section, paragraph 33). The child learns to use words to navigate through everyday experiences and to help her make meaning of the world around her. By attributing the same communal word to an experience or an idea, the child creates

connections to a community and, eventually, connections to the way that community sees the world (Falk & Dierking, 2000).

Eventually, this external speech turns into an internal dialogue that not only helps the child organize ideas but also awakens her to a learning process that “operate(s) only when the child is interacting with people in her environment and cooperation with her peers” (Vygotsky, Marxists Writers web site, ZPD section, paragraph 34). In other words, by having conversations with people from her or his cultural group about an idea or experience, the child is allowed to cognate or process the idea and is also given access to that culture’s particular method of organizing information – methods that have proven effective over time and usage. The child is given tools to look at the idea and then she stores it in her mental storage area which reflects the organizational techniques of her/his culture as well as her/his own individual methods. Conversation helps the child to check on her/his reasoning and then internalize that knowledge (Crowley & Callanan, 1998).

New studies on brain function and learning show that learning is best done when learners are able to draw from their pre-existing knowledge or understandings including those that are culturally or family based (Bransford, Brown, & Cocking, 2000). This “initial understanding” must be engaged in order for “new knowledge and concepts” to be grasped or the learner will “revert to their preconceived understandings outside of the classroom” (Bransford, Brown, & Cocking, 2000, p. 73). The best way for learners to connect with this prior knowledge is to engage with those who are familiar with their learning style, such as parents. According to Jensen (1998, p. 19), “Children learn how to react in hundreds of simple cause-and-effect situations with parents,” which then impacts the way that children react to learning environments. Preconceived notions and

ideas can be countered or explained through conversation or discussion within the family learning zone. These discussions are then organized into personal knowledge through the internal speech or dialogue that Vygotsky spoke about.

Early childhood educators such as Karen Gallas (1995) agree that children must talk their way into understanding. In her book, Talking Their Way into Science, she describes methods employed in her classroom that help foster personal understanding. She has created “Science Talks” or a method of mapping students’ discussions to decipher meaning. “By examining the structure of children’s thinking in Science Talks, I can trace the logic and consistency of their ideas...” (p. 28). Gallas (1995) believes that children construct knowledge around natural phenomena, and that this information can be heard in their conversations around science. She regards these conversations as important means to help nurture their curiosity into greater levels of understanding.

Doris Ash, from the University of California, Santa Cruz, studies conversations and the negotiation of family knowledge in informal learning centers by bringing families into exhibits and videotapes the family’s conversations while in the exhibits. She has found that families use a variety of tools, language being the one she analyzes, to negotiate ideas they may not be familiar with. She believes that “language is how experience becomes knowledge...[it] is a tool that “mediates activity and thus connects humans not only with the world of objects but also with other people” ” (2002, p. 7). Thus, analyzing the conversations of families can give us a view into their internal cognitive processing. Ash’s current research is looking into “group dialogue as a tool for analysis,(to) address: linguistic minority family conversational patterns in an aquarium... and detail the role of reflective conversations in building understanding, both in and out

of museums.” She accurately recognized that “(c)hildren from culturally and linguistically diverse, non-English backgrounds represent the fastest growing school-age population in the United States, yet museum research often leaves out families from these backgrounds.” Other researchers (Ash, 2003; Pérez-Granados & Callanan, 1997) recognized this missing piece.

Maureen Callanan and Deanne Pérez-Granados are other researchers doing work with families around conversation. Callanan, a psychologist from the University of California, Santa Cruz, researches the creation of language and scientific thought in preschoolers. Pérez-Granados is an assistant professor of education at Stanford University trained in psychology, whose research focuses on children’s development within a socio-cultural perspective. Together they have looked at Mexican-descent families’ conversations during home play and in informal settings such as museums to understand how parent and siblings’ interactions with young preschoolers impact their language and learning. Callanan and Perez-Granados (1997) use language to analyze child learning and add that there is multidimensionality to family learning:

Because many of the parents we interviewed were educated in Mexico and were monolingual speakers, the older siblings in their families may serve an important role as linguistic bridges and “cultural brokers” into the predominantly English-speaking U.S. school system (1997, p. 32).

They note that there are many experts available to a young child, and that knowledge is not held by the adult but by the collective whole. A common cultural bias is the belief that adults are the primary holders of information, but as immigrant families come to this country and acculturate, knowledge may be held by others that are not adults (Suárez-Orozco, 2001).

Harriet Tenenbaum from Harvard University has also studied parent-child conversations of Mexican-descent families and also cautions about biases. She has found “that Mexican-descent families with varying levels of formal education value critical thinking and inquiry about school-related topics” (2002, p. 241). This is true despite the “variability in...families’ instructional conversations [which] has been linked to generation of immigration and educational background” (p. 228). So even though a family may not speak English, they may still attribute great values to learning, and these values are communicated in their primary language. Thus, it is important to take each family as a unique group of individuals brought together by a common home culture and not make assumptions based on their socioeconomic or cultural background. Rather, recognize the commonalities in families, and use those as common grounds from which to start asking questions and creating programs. Analyzing their conversations can help us understand their thoughts, but as the PISEC group showed before, actions, such as performance indicators can give us another perspective of families learning together.

### **Playing is Learning in Different Places**

Play is the source of development and creates the zone of proximal development. Action in the imaginative sphere, in an imaginary situation, the creation of voluntary intentions and the formation of real-life plans and volitional motives – all appear in play and make it the highest level of preschool development.

Lev Vygotsky, *Play and Its Role in the Mental Development of the Child*

Prevalent in all cultures is the idea of play, a time when parents provide instruction and communicate their values. Most of the knowledge-generating talk occurs

when children are playing. Falk and Dierking (2002) say “creative play is the way that children investigate their physical and social worlds” (p.69). During creative play, children talk and mimic adults in their environment. Head Start teachers are trained to seek and take notes on discussions that go on during creative play. They help create these talking opportunities by allowing for what they call ‘small group’ work where the child decides which thematic area or center (i.e. house area, block area, etc.) they will play in with others in their class. While at these centers, the teachers interact with the children by asking them questions like, “Why are you doing that?” “What is happening here?” and “Tell me what you are making?” The notes they take are subsequently used to determine where the child is physiologically and developmentally. Looking at the way children talk when they play can give us an insight into their mental processes, since at the preschool age, play is how children learn.

Play is an important part of a young child’s life. Through it, children can do more than learn language and social norms. Vygotsky pointed out that play is probably the one time when children get to address their needs and expectations without imposed limitations. Of course, if children are playing together and their desires are at odds, this can cause some disharmony (If you have siblings, you may recall some incident when your needs were disrupted). Research supports that play is developmentally important for young children.

Starting with Piaget (1976) and Erikson (1976), psychologists have touted the need for play as a means of reconstructing “sophisticated representations of the world” (Shine & Acosta, 2000, p. 45). Smilansky and Shefatya (1990) believe that children derive new meaning by recreating their life experiences in play and in museum exhibits



where they can “discern the main characteristics of roles, combine scattered experiences in new ways, concentrate on a given them, (and) observe reality in relation to themselves” (p.30).

Those of us who work with young children understand the importance of play. Furthermore, we also know the importance of parents in play: “Family educators... anticipated that parent involvement in pretend play at the museum will enhance parent-child time at the museum, encourage children to reveal their thoughts about the world to parents” (Shine & Acosta, 2000, p. 45).

Play is one of the tools that parents use to help them understand their child’s internal processes. Tennebaum and Leafer (1997) found that the gender of parents may impact the way they did this. “Mothers...were more concerned with challenging their children’s thinking than were the fathers...[who] were more interested in playing...[thereby] stimulating the child’s cognitive development” (p. 11) in a different way.

So, play is the activity that not only helps parents pass on important bits of cultural information but it also helps them understand what their children are thinking. Furthermore, play can gives us an idea of how parents talk with their children and what types of information they find important to pass along. A parent will more like feel compelled to share with their child certain attitudes about school, behaviors, nature as examples. What they say will impact what the child perceives as important

## **Conservation Triad**

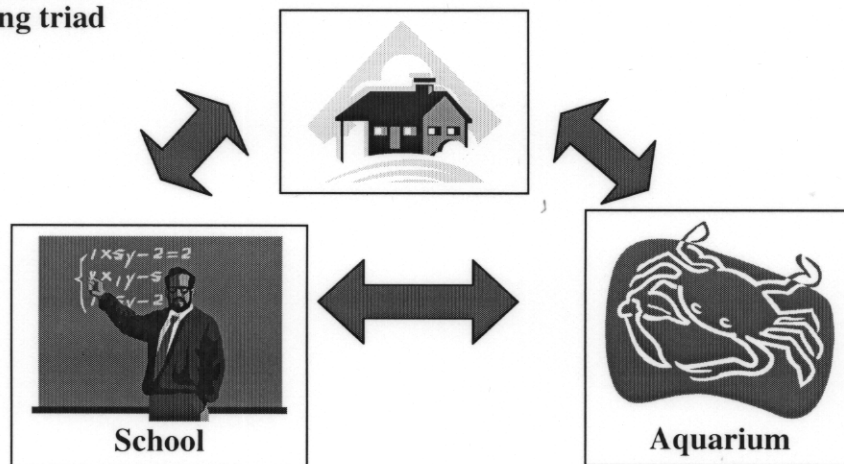
Play is one of the main reasons that the *Splash Zone Discovery Kit* was created. In order to facilitate the transmission of the aquarium's conservation message to young children, multiple places of learning/playing (homes and schools) need to be accessed. So we sent home the same materials that were being used in the aquarium and in the classroom. Reasons for this came from a study conducted at the aquarium.

In 2000, Chris Parsons conducted a study at the Monterey Bay Aquarium called "Preparing parents-chaperones for school field trips." She wanted to learn if the self-guided programs had any impact on the conservation attitudes of students. In this study, she found that students who did self-guided programs at the aquarium scored significantly lower on the conservation attitude scale than those who participated in programs lead by aquarium educators (2000, p. 4). Interestingly enough, the students' and the parents scored similar attitudinal scores while their teachers' scores were much higher, demonstrating to us that attitude held by the children more strongly reflect that of the parent than that of the teacher. This research showed us that children adopt the attitudes of their parents over their teachers. This does not mean that the teacher's role is not important. It just shows that if true attitudinal change is to occur, parents must be included in the learning process. Because of this study, we really wanted to make sure that there was a three-fold approach to the *Splash Zone* program to ensure that the child would receive the maximum benefit from this program.

The importance of schools is also clear. There is no denying the fact that school plays an important part for young children, particularly those whose parents come from another country. Children learn American societal norms and language at school and

teachers are an important link to that learning, especially in the Head Start Program. That is why the Monterey Bay Aquarium provides training for Head Start teachers. But we also wanted to make sure that the conservation message was getting into the home where the attitudes of the parents would surely impact the children. If we were to inspire people to care for the ocean, we needed to make sure that we solicited all the adults involved in nurturing a child. In effect, we created a conservation learning triad, with links between the home, the school, and the aquarium (Figure 2). By doing this, we hoped to truly foster a connection for the ocean at an early age, the first step to creating ocean conservationists. And we have an idea of what helps create positive conservation attitudes.

**Figure 2:**  
**The conservation**  
**learning triad**



Hungerford and Volk, two environmental education researchers, outlined a theorized behavioral system for change that goes beyond the causal theory of knowledge-awareness. They explicate the Hines Model of Responsible Environmental Behavior and theorize categories that may help place individuals on a form of continuum from which

educators could then begin. At the core of their theory is an idea ‘environmental sensitivity.’ “Environmental sensitivity...defined as an empathetic perspective toward the environment,” (1990, p. 261) seems the most “troublesome for educators who understand its importance” (1990, p. 264). Indeed, as an environmental educator, I would have to say that ‘environmental sensitivity’ is an entry level to form any type of conservation-ethic. There is no possible way to move a learner to care for something they have no connection with. For me, it is proven time and time again when I see the faces of children experiencing their first sea star. After the children have had their personal experiences with the animal, they will be more likely to care and want to conserve its home or habitat. From personal experience, this desire for conservation increases with their animal encounters. Hungerford and Volk connect ‘environmental sensitivity’ to “an individual’s contact with the outdoors in relatively pristine environments either alone or with close personal friends or relatives” (1990, p. 264). So in order for us to create children who care about the ocean, not only is it important to have their parents care, but it is also important to have the parents experience nature with the child. By providing opportunities for families to learn together in informal learning centers, in exhibits where they can discuss and experience elements of the ocean, we can create groups of people with a greater ZPD around the topic of ocean conservation than if we just taught the child alone.

### **This Project**

So the research shows us a couple of things:

- Informal learning centers are excellent places for families to come learn together.

- Informal learning centers can create areas where learning happens through socialization therefore allowing families to use their ZPD (Zone of Proximal Development) and collectively increase the amount of knowledge garnered.
- Families learn most often negotiate new information by talking their way through new subject matter.
- Play is often one of the ways that young children and families can learn together.
- Children need to receive instruction from multiple sources that includes the parents and their home culture.
- The ZPD of environmental sensitivity can increase if people share experiences in nature with their families.

But are we having an impact in the way that families view the ocean? All the research above points to creating the conservation learning triad, but which if any messages are getting into the home? Are we even doing this with the accurate sensitivity to our audience? By answering these questions, not only will we be better informing our program, but hopefully giving voice to an audience that is still underrepresented in museum studies – the low social economic and ethnically diverse family.

### **Chapter 3**

#### **Methodology: Including their voices**

The design of this project is a preliminary summative evaluation with the purpose of assessing the usage and effectiveness of the *Splash Zone Family Kit* in bringing the Monterey Bay Aquarium's conservation message and science content into Head Start families' homes. A summative evaluation relies on qualitative and quantitative data and

naturalistic inquiry, in order to make judgments about program effectiveness. The final assessment of such an evaluation helps determine if the program or product should continue and/or should be expanded (Patton, 2002). Since the project is only a preliminary look, it is limited to in its scope and depth. To ascertain conclusive determinations of the effectiveness of the *Splash Zone Family Kit* would require more participants and other tools. But this project can give us a better idea of our audience and help create better tools for future evaluation. The research that I conducted utilized both qualitative and quantitative methodologies. The questionnaires gave me an idea of frequencies and trends, and the two interviews gave me some personal stories about the manipulatives in homes. By gathering both quantitative information, through questionnaires, and qualitative data through interviews, my hope is that we will hear the voices of these families so they can give us an idea of how to better serve them.

## **Participants**

*Head Start Teachers.* I solicited teacher questionnaires via mail from Monterey and Santa Cruz Head Start programs. The Head Start teachers that returned the questionnaires varied greatly in their expertise and educational background. All of the teachers have at least a college certificate (equivalent to an associate's degree) that focuses on early childhood education. Some of the teachers have a bachelor's degree, and some have graduate school training. A few of the teachers have been teaching only a couple of years and others have been head start teachers for fifteen years. All of the teachers speak English, many of the teachers are bilingual, but some are more fluent in

Spanish. All of the teachers are dedicated and connected to their community of parents. They work with on-site social workers that help identify the needs of the children and their families to give them holistic services.

I sent out 56 teacher questionnaires and received 17 back via mail and fax. The letter and questionnaire can be found in Appendix A. The questionnaires asked the teachers about their use of the manipulatives in the classroom, where they kept them, and asked them to relate any anecdotes regarding the use of manipulatives. These questionnaires did not ask for names or the names of the center where the teachers worked to help prevent any incidental identification and also it helped the participant give unregulated feedback.

In addition, I chose two of the 41 Head Start sites from which to solicit parent questionnaires. The school sites chosen had teachers who had participated in The Splash Zone Teacher Summer Institute Program (SZTI). This is a special week-long summer training program that gives teachers a deeper understanding of the natural history of animals in the Splash Zone exhibit and supplies them with developmentally appropriate curriculum ideas to help their students get more out of their aquarium visits. Although we give a special one-day training to all the Head Start teachers in these counties, teachers who participated in this training received additional coaching in hands-on science teaching in their classrooms as part of their participation with the institute. I chose these sites because I think thought that the teacher might be more prepared to provide greater opportunities within their classroom to use the manipulatives and would encourage parents to use them as they have. I also know that teachers who have done the

SZTI program have a special connection to the aquarium and would help support this research.

***Head Start Families.*** The children and families for the program were already pre-selected by Head Start program economic standards. In order for families to qualify for the Head Start preschool program, they must prove that they live under the poverty level, which is \$18,000 for a family of four. The majority of the families either spoke Spanish only in their homes or spoke Spanish and English. Few of the families only spoke English in the home. Because of their low economic standing, many of these families rarely come to the aquarium. So the families are provided with transportation from preschool centers to the aquarium so that the children and their families can visit the aquarium 2-3 times during the school year. In addition, parents are given an orientation to the aquarium in a parent meeting at which they receive the *Splash Zone Family Kit*. The outline for the information presented at this meeting can be found in Appendix B.

## **Procedures**

***Head Start Family Questionnaires.*** From these families, I received 38 out of the 56 family questionnaires that were distributed in centers whose teachers had attended the SZTI program (see above). The questionnaires and aquarium materials were given to parents and caregivers (ranging from ages 16 through 99) during one of the monthly parent meetings held at the preschool centers. The questionnaire can be found in Appendix C. I gave the families a 40-minute presentation about their visits to the aquarium, which animals they could expect to see, what their responsibilities were and then solicited their help with my research. I addressed any questions they had about their



children's aquarium or the confidentiality of the research. I conducted the meetings bilingually, so that all families received the same information. Families were asked to fill out the forms on a volunteer basis and then give them to the site teacher at a later time. When the families returned their questionnaires, they were then given a sea turtle poster.

### ***Head Start Family Home Interviews.***

During the parent meeting at which I presented the project, volunteer families were solicited to be interviewed in their homes with the children using the materials given to them. This was to get a closer picture of how two specific families actually used the materials in their homes. Two families were selected, one that is primarily Spanish speaking and lived in Monterey County and one that was primarily Spanish speaking but also spoke English and lived in Santa Cruz County. I don't believe that a family's geographic location, that is whether the family resides in Monterey or Santa Cruz County, was of great statistical importance. Many of these families have similar backgrounds due to their qualifying for Head Start. Access to science manipulatives is determined by economic rather than geographic factors.

I contacted the families before hand and set-up a time to interview them in their homes. During the conversation, I told them that I would be there for one hour and that prior to going to their homes. I would be sending them consent forms for them to review and sign the day of the interview. (Appendix D) I then arrived at the time we had set aside and I interviewed families in their homes for one hour. The interviews were recorded with a videotape recorder and were conducted in an informal conversation style eliciting information from the families about their use of manipulatives.

Before I began the interview, I explained to the families that the project is confidential, and that the videotape and information would be kept under lock and key at the Monterey Bay Aquarium's Education Department. The videotapes would be used for informing changes to the *Splash Zone Family Kit* and the *Splash Zone Discovery Program*. I and other educators of the Monterey Bay Aquarium would be the only ones to view the videotapes. These educators would be able to see the videotape but they would not know any personal information about the families such as names and ages. Finally, I informed the families that they could stop the interview at any time.

I began all interviews by showing the families how the video camera worked and what they looked like in the little monitor. Many of these families do not have access to a digital recording camera and/or have never seen themselves on a 'TV'. This was usually a good icebreaker with a lot of laughter. I then proceeded by going over the form they received in the mail and asking if they had any questions. I then asked the parents quick personal questions to which I also volunteered some personal information. This gave them a chance to know me better and also made the children feel more relaxed around me. (Questions to the interview are in Appendix E.) I had the parents relate information about their aquarium visits, and they also prompted their kids to answer. Later in the interview, I had the children show me where they kept the items given to them and to show me what they liked to do with them. Throughout the visit I did a lot of the video recording, but sometimes I had one of the restless children do some of the video recording until he or she got tired. The children seemed to enjoy holding the little digital camera and it allowed for the parent to be at ease to answer questions.

Whenever I could, I took notes, but most often I just made sure that the recording device was close enough so that their answers were clearly understood. I made sure to keep the interview as close to the promised one-hour as possible. After the interviews were done, I made sure to thank the families that helped and gave them passes for the aquarium. These interviews were subsequently transcribed, translated, and analyzed looking for common themes and answers to interview questions.

## **Chapter 4**

### **Results**

This is a project conducted to evaluate the effectiveness of manipulatives to instill an ocean conservation ethic and teach basic science concepts in the homes of Head Start families. The data is outlined as follows

1. Families and Materials: What materials do families say they use? How do they use them?
2. Teachers and Materials: What do teachers use? How do they use them?
3. Language and Experiences: What language is used by teachers and families? Can any of their words, phrases, or activities be traced to phrases or activities done at the aquarium?
4. Ocean conservation: Do families feel more connected to the ocean than before their aquarium visit? Do they have a desire to learn more about the ocean?

#### **Families and Materials**

I first set out to learn which materials families used. I received 33 completed the questionnaires from families. Parents were able to check as many boxes to indicate the

manipulatives that their children used. Table 1 shows the rating of the items from the families.

**Table 1**

**Manipulatives families said they used.**

Used by families	Number of responses
Plastic Sea Star	28
Penguin Chick	27
Plastic Fish	23
<i>Splash Zone CD</i>	21
<i>Splash Zone Sing Along and Play CD Book</i>	18

Their answers told us that the Plastic Sea Star, closely followed by the Penguin Chick, were the items most used by children in their homes.

When I asked parents in an open-ended response question which item they thought was the children's favorite, most told us that the plastic sea star was their child's favorite (Table 2). I also asked the parents to tell us which item was their favorite. The also liked the plastic sea star but most liked the *Penguin Chick* book best. Some parents gave us more than one answer or chose not to answer this question.

**Table 2**

**Favorite manipulatives of children and parents.**

Children's Favorites According to Parents	Number of Responses	Parent's Favorites	Number of responses
Plastic Sea Star	13	<i>Penguin Chick</i>	14
<i>Penguin Chick</i>	11	Plastic Sea Star	8
<i>Splash Zone CD</i>	11	<i>Splash Zone CD</i>	4
Plastic Fish	5	Plastic Fish	3
<i>Splash Zone Sing Along and Play CD Book</i>	5	<i>Splash Zone Sing Along and Play CD Book</i>	1

I also asked parents what they and their children liked to do with their favorite manipulatives (Table 3). The top activity always entailed some form of reading activity for both children and parents.

**Table 3**  
**Favorite activity with manipulatives by children and parents.**

What Children Like to do with Items	Number of Responses	What Parents Like to do with Items	Number of Responses
Read through book with parents/pretend to read to parents	13	Read to them/Have them read to us	15
Listen/dance/sing	10	Learn things & songs	7
Play or take to the shower	9	Stick to places like refrigerator	7
Stick it to places like a refrigerator	8	Dance and sing	3
Play	4	Count animals in books	2
Likes to go to sleep with it	2	Play with child in the bathtub	1
Learn	2		
Stick stickers	1		

Examples of common comments from the families about how they used their favorite manipulative include:

- El libro del *Pinguino Polluelo* le gusta que se lo lee todas las noches le gusta mirar todos los animalitos. (*The book of the Penguin Chick, he likes to read it every night and he likes to look at the animals.*)
- La estrella plástica del mar la preferida, juega con ella cuando se baña. (*The plastic sea star is the favorite; she plays with it when she takes a bath.*)
- El CD de Splash Zone porque le gusta bailar y cantarlo. (*The Splash Zone CD because he likes to dance and sing it.*)
- Utiliza los tres pero más, el pescado cuando se baña también el libro para leerlo en la noche y él lo lee a nosotros, su estrella la tiene pegada en la ventana. (*He uses all three but mostly the fish when he bathes, the book we read at night and he also reads it to us and his sea star is stuck to the window.*)

I asked the families I interviewed more specifics about their favorite manipulatives. When the interviewed parents were asked about which item was their child's favorite and what they did with them, both families replied the *Splash Zone CD* and one also included the Plastic Sea Star.

The Hernandez family from Watsonville consisted of 29-year-old mother, Karina, her eight-year-old son, Braulio, her four-year-old daughter, Carin, her two-year-old daughter, Yesenia, and her two-month-old baby, Susana. Their father was working at the time. Carin is the one that attends Head Start in Watsonville and Braulio was home because of a school holiday. They primarily speak Spanish in the home but English is also used as both parents use English for their jobs. Karina is currently a stay-at-home mom, but she has done house cleaning in the past where she has learned her English. She says she is able to use both languages but feels most comfortable expressing herself in Spanish. Karina Hernandez from Watsonville said the CD was her families' favorite:

El CD por la música y por que se divierten bastante. Todo es bonito para ellos pero el CD lo disfrutan un poco más. Los libros cuando se los leemos les interesan bastante porque aprenden cosas. Pero con el CD se mueven, brincan, saltan. Con todo juegan.

*The CD for the music and because they really have fun. Everything is nice for them but they enjoy the CD a little more. The books, when we read it to them, they think are interesting because they learn things. But with the CD they move, jump, skip. They play with everything.*

The Ramirez family from Salinas consisted of 24-year-old mother, Maria, her four-year-old son who was in Head Start, Alberto, and her six-month-old baby, Luz. Maria's 54-year-old aunt, Angela, was visiting during the time of the interview. This family is representative of many of the single-parent families I encounter in Head Start.

Maria is a stay-at-home mom doing occasional babysitting for some money pay but also relying on government assistance. The Ramirez family spoke Spanish in the home.

When asked what her son does with the sea star, Maria Ramirez from Salinas replied:

Ah pues corre de un lado para otro. Corre aquí, por toda la casa y la pone allí en todas partes adonde pega, y adonde no. Y cuando encuentra a donde se pega dice ¡bravo, ya sé a donde se pega!

*Well, he runs from one side to the other, here, all over the house and puts it there and everywhere it sticks and where it doesn't. And when he finds a place where it sticks he says "Yeah! Now I know where it sticks!"*

To ensure that the parents' voices were clear about what they thought was really important for their children, I also asked them to tell me which item their child or family used least (Table 4). Most parents listed the plastic fish and listed the fish not sticking as the main reason for the lack of usage.

**Table 4**  
**Manipulatives families said they used least.**

<b>What Parent's Say Children Use Least</b>	<b>Number of responses</b>	<b>Reasons Why Children Use Least</b>	<b>Number of responses</b>
Plastic Fish	11	not fun/doesn't stick	6
<i>Splash Zone Sing Along and Play CD Book</i>	7	only used it for a little bit	5
None- we use all of the materials	6	have no place to listen to it	2
<i>Splash Zone CD</i>	4	because it is in English	2
Plastic Sea Star	3	likes to dance instead	1
<i>Penguin Chick</i>	0	gets scared	1

I asked both of my interviewed families which item they would choose if they could only chose one of the five items, now knowing how their children uses them. Both said the *Splash Zone CD* and one added the *Splash Zone Sing Along and Play CD Book*.

(We provide the *Splash Zone* CD in the back of the book but it also comes separately.)

The book is written in English, so I asked her about how she thought families that didn't read English would use it. She gave her reason for why she thought they would still use it, though its usage would be limited

**Jenny:** Y el libro aunque esté en inglés, ¿usted cree que todavía se puede usar?

**Karina:** Sí

**Jenny:** Porque usted lee el inglés, pero si las familias no leen en inglés, ¿lo usarían?

**Karina:** No mucho, aunque les interesa realmente, como no saben lo que están diciendo pues no lo pueden leer.

**Jenny:** ¿Si lo pudiéramos traducir?

**Karina:** ¡Andale! Si porque si está en español y los que saben realmente español, les interesa lo que están leyendo. Sin embargo los que no leen en inglés solamente están viendo los dibujos, no lo que les está explicando el libro.

**Jenny:** *And the book, even though it is in English, do you think they can still use it?*

**Karina:** *Yes*

**Jenny:** *Because you read English, but if families don't read English, would they use it?*

**Karina:** *Not much even though they could be really interested, since they don't know what it is saying, well they can't read it.*

**Jenny:** *What if we translated it?*

**Karina:** *Yeah! Because if it is Spanish and those that really know Spanish, would be interested in reading it. Yet, those who don't read English are really only looking at the pictures, not what the book is trying to explain.*

I think in an effort to show me why the *Splash Zone* CD was their favorite item both families did little performances for me with the music. This was interesting because there were obvious differences in extroversion in families. Angel Ramirez from Salinas was much shyer than his Watsonville counterpart, but his mother made him perform for me with the CD.

**Angela:** Pon tu disco, hijo

**Maria:** A ver papi, ponte a bailar ¿Cuándo comienza la música?



**Maria:** Baila pues

**Angela:** *Put on your record Money.  
(Alberto moves to put the CD in the player)*

**Maria:** *Come on honey begin to dance. When the music begins?  
(Alberto nods yes. Music begins)*

**Maria:** *Well, go ahead and dance then*

### Teachers and Materials

With the hopes of gauging which adults were influencing the children's activities and possibly their attitudes, I asked the teachers to tell us what item they thought was the children's favorite item. 17 teachers responded to the questionnaire. Table 5 shows us that their idea of what the children liked differed from the parents' responses but were similar to what the teachers said was their favorite. Some teachers gave us multiple answers.

**Table 5**

#### Children favorite manipulatives according to teachers.

<b>Children's Favorite According to Teachers</b>	<b>Number of responses</b>
<i>Splash Zone CD</i>	9
Plastic Sea Star	4
<i>Splash Zone Sing Along and Play CD Book</i>	2
All items	2
<i>Penguin Chick</i>	1
Plastic Fish	1
<i>Busy Penguins book/Penguin puppet</i>	1

We see that these results are more inline with what the teachers said was their favorite item. I also asked them what they liked to do with the items. Their favorite item was the *Splash Zone CD* because they liked to use it for large group activities (Table 6).

**Table 6****Teachers' favorite manipulatives and activity.**

<b>Teacher's Favorites</b>	<b>Number of Responses</b>	<b>Teacher's Favorite Activity</b>	<b>Number of Responses</b>
<i>Splash Zone</i> CD	9	Use items to talk about sea animals	10
<i>Splash Zone Sing Along and Play</i> CD Book	5	Used during large group activity	9
All items	3	Used as a preparation for aquarium trip	3
Penguin chick	3	Used <i>Splash Zone Sing Along and Play</i> CD Book to plan activities	3
Plastic Sea Star	0	All items are great to use any time	3
Fish	0		

Examples of their answers:

- I really enjoy using the *Splash Zone* CD. It's fun to make up movements to the songs and to get the children involved.
- I like all of them; they are fantastic and very helpful as I plan my science, animals and ocean lesson plans or activities. But, if I have to choose one of them I will the *Splash Zone* CD; it's a great educational fantastic CD
- I also like the *SZ Sing Along and Play* Book with the CD. It helps us teachers plan activities and supports our topics.
- CD – the music – put it on and the children come to the music (gathering song) – music and movement music to paint by.

I also asked the teachers to tell us what type of activity, if any, they did with each item (Table 7 & 8). They had new ideas they came up on their own and some they had adapted from activities we had shown them at the aquarium. Some teachers did not fill out the whole questionnaire.

**Table 7**

**Manipulatives teachers use with a lesson.**

<i>Penguin Chick</i>		<i>Splash Zone CD</i>		<i>Splash Zone Sing Along and Play CD Book</i>		Plastic Sea Star		Plastic Fish	
Number of Reponses		Number of Reponses		Number of Reponses		Number of Reponses		Number of Reponses	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
17	0	17	0	14	1	15	0	12	4

**Table 8**

**Lessons the teachers did with the manipulatives.**

<i>Penguin Chick</i>		<i>Splash Zone CD</i>		<i>Splash Zone Sing Along and Play CD Book</i>		Plastic Sea Star		Plastic Fish	
Number of Responses to Lesson Ideas		Number of Responses to Lesson Ideas		Number of Responses to Lesson Ideas		Number of Responses to Lesson Ideas		Number of Responses to Lesson Ideas	
reading to children	7	movement in a large group	7	ideas for lesson plans	11	discuss body parts	4	science activities (i.e. sinking and floating)	5
part of penguin theme unit	7	small group/listening	5	recall/prepare for aquarium	3	compare to other ocean animals	4	discuss fish body parts	3
literacy skills	4	penguins	3	critter cards	2	prepare for aquarium	3	math activities	3
prepare for aquarium	3	colors	2	story telling	1	science activities	2	language activities	2
new babies	1	habitats	2	vocabulary building	1	sticking experiments	2	sharing	1
mother's day	1	friendship	2			colors	1	art	1
		conserving	1			group-water play/sharing	1	fish songs	1
		teamwork	1						

Finally, I asked the teachers if the children requested to use the items and if so what sorts of activities did they do with the items. With the exceptions of the *Splash Zone CD* and sometimes the *Splash Zone Sing Along and Play CD book*, the teachers

made all of the manipulatives available to the students. Here are examples of their answers regarding ways that the students used some of the items.

*Penguin Chick*

- Yes, they like to see the pictures and listen to the words
- Yes, when it's in reading area, they picture read
- Yes, children enjoy talking about penguins
- They'll pick up the book and look at it

*Splash Zone CD*

- They aren't really allowed to play with CDS, but they do request the music
- Children love to listen and play with the music of this CD. During work time, they like to sing and dance.
- Sometimes they'll ask you to put on a certain song for them to listen/dance to
- They do listen to this CD and we use it during large group time

*Splash Zone Sing Along and Play CD Book*

- Yes, sit together or choose it to look through
- Yes, they look at pictures of the animals and name them
- Children like to listen to the CD and look at the book at the same time. They like to look at the colorful pictures
- Yes, the children pick up the book and choose an activity. We then incorporate activities into the weekly lesson plan

*Plastic Sea Star*

- Yes, in the water table or the block area, the children will use blocks to build a tank. They also use the suction cups in the back of the sea star, they find smooth surfaces to stick the toy
- They like to trace it, to color it and just to touch it
- When it's out it's in the water table along with other sea animal toys

- Yes, they take it off to count its arms and stick it back up

#### Plastic Fish

- Yes, they like to drop it in the water
- Yes, they move the fish in the water (table)
- When it's in the water table, they hold it, move with it
- Yes, they swim them around the water table or the classroom

So even though teachers' answers differed from the parents' in the category of which manipulative are the children's favorite, teachers incorporate most of the items into their lesson plans. But what is the language that the children are using and are they learning it from the teachers or from the visit to the aquarium?

### Language and Experiences

I wanted to see if I could see the source of families and teachers' influence through language. I looked for times that the words that teachers and families used were ones that could be traced to those taught or used specifically at the aquarium. One teacher said

- The children's favorite items are: *Splash Zone* CD and the Penguin Chick Book. First of all they love to dance and say Splash as they heard the word...let me tell you it is enjoyable seeing students moving around in our large music movement circle at the sound of Splash!

This is one activity that we do with every center in our previsit. (See Appendix F for lesson plan.) The teachers would have learned this activity from us. Parents also mentioned this. The Hernandez family in Watsonville:

**Karina:** ¿Cuál es la canción de los pingüinos? ¿Cómo es?

**Carin:** ¿Splash?

**Karina:** Quisiera que estuviera conectado para que vieras como bailaban...

- Karina:** Which is the song about the penguins? How does it go?  
**Carin:** Splash?  
**Karina:** I wish that it (the CD player) were connected so you could see how they dance.

The song that the mom is referring to is *Step Into the Splash Zone*, the song that we do with the children at their centers. In addition, we also do a penguin song with them called *It's a Penguin Party*. Another teacher refers to this same song.

- My favorite is the CD because it's very good at teaching children about penguins and penguin body parts. It prepares them when going to the aquarium.

During the parent meeting, we give suggestions about activities that parents can do with their children with each manipulative. We recommend that families read the books together, count the animals they see in the books, dance together to the music with their children, and test which surfaces sea stars stick on. Table 3 showed that all of the suggestions were used. Although these suggestions seem logical, it can be said that they are done by the families. The only suggestion not mentioned was performing the activities in the *Sing Along and Play* CD book. As Karina from Watsonville said, it could be that many families could not read the activities and thus could not follow-up on the suggestions. Nonetheless, children seem to be bringing home activities done at the aquarium and at school.

## **Ocean Conservation**

Ocean conservation for many of these families begins with caring and knowing about the ocean without being intimidated by it. Sometimes, their first experience with the ocean comes from visiting the aquarium. In the questionnaires, I asked each family if they thought that their child and/or family knew more about the ocean. Out of the 33

parent questionnaires that we received, seven were in English and they answered they felt they knew more about the aquarium. Some of their answers:

- Yes, because they took us to the whale section for kids and there was whale info posted all over
- Yes, my children as well as my family know more about the ocean because it has been a very wonderful experience participating in the Splash Zone study with Jenny and teacher Maria Parra. They have taught us a lot about the aquarium
- Yes, I think we know more about the ocean. The most interesting thing was about the sea horse that the male is the one who conceives.

The answers to the Spanish questionnaires were a little more interesting. Out of the 26 families that responded in Spanish, 62% said that they did not know a lot about the ocean, and followed their “no” answer with explanations that seemed to show that they did know more. Here are some examples of their answers:

- Pienso que no sé mucho sobre el mar y menos mi niño pero gracias a estos paseos al acuario los dos hemos aprendido muchas cosas nuevas del mar y sus animales. (*I think that I don't know much about the ocean and my child even less; but thanks to these trips to the aquarium we have learned a lot of new things about the ocean and its animals.*)
- Yo pienso que mi niño y yo sabemos poco del mar. Mi niño sabe que el mar hay pescados, delfines, focas, estrellas del mar, y más. Lo platicamos nosotros pero no sé si esto viene a la pregunta. (*I think that my child and I know little about the ocean. My child knows that the ocean has fish, dolphins, seals, sea stars, and more. We talk about it but I am not sure if this gets to your question.*)
- No sabemos mucho sobre el mar por que fue no más lo que aprendimos en el acuario. (*We don't know much about the aquarium because we only know what we learned at the aquarium.*)

Interestingly, one of these same families when asked the next question, ‘Is there anything else that you could tell us that would help us know what your child or family does with these materials and/or what they have learned about the ocean?’ responded in the following manner:

- La niña ha aprendido a identificar ahora los peces de diferentes tipos, conoció el pulpo, las tortugas, y por eso ahora se interesa un poco más en las cosas del mar y ahora quiere ir cada fin de semana al acuario. (*My child has now learned to identify fishes of different types, she got to see an octopus, the turtles, and for that reason, she is now interested a little more in the things from the ocean and now she wants to go every weekend to the aquarium.*)

Finally, most families that responded on the questionnaire said they discussed more about ocean topics:

- Mi niño ha aprendido sobre el mar con los libros por que el a veces dice que lo que ve en el libro son cosas del mar y pienso que son los libros y lo que le decimos es como aprende a comprender sobre el mar. (*My child has learned about the ocean with the books because sometimes he says the things that he sees in the book are things from the ocean and I think that it is the books and we tell him that he learns to understand the ocean.*)
- Nos ponemos a dibujar el pescadito y la estrella luego los recortamos y mi hija los pega. (*We draw a picture of the little fish and the sea star and then cut them out and my daughter glues them.*)
- Si, no sé si ayude pero mi esposo y mí niña le gusta ver por televisión un programa que hay de animales o otras cosas que hay en el mar y cuando pasan animales parecidos a los artículos que ella tiene, ella los reconoce inmediatamente. (*I don't know if this will help but my husband and my daughter like to watch a television program where there are animals and other things from the ocean and when the animals pass by that are similar to the articles she has, she recognizes them immediately.*)
- I think the pre-visit to the classroom from Jenny and the parent meeting with Jenny and Maria really gives us a lot of activities we as a family can do with the children at home.

The families I interviewed gave me some insight about how they talk about the aquarium.

For both families, it was about making memories. Angela, Alberto Ramirez' grand aunt told me about how Alberto got scared at the aquarium:

**Maria:** No ve, que para entrar al Splash Zone, no ve que hay unas de peluche que se jalan y luego se meten. La primera vez que fuimos al acuario le dio miedo.



**Angela:** Ah pues, lo habíamos quitado de donde estaba el agua entonces él iba enojado (laughs) y dijo yo ya me voy, y se fue adelante, pero un niño la jalo, pero el no la veo cuando la jalo el niño sino cuando íbamos saliendo, y ay, se regreso

**Jenny:** (to Alberto) ¿y te pusiste a llorar?

**Alberto:** Sí

**Jenny:** Si, por que paso, dime

**Alberto:** Por que salían las, las morenas

**Angela:** ¿Cómo se fue la morena? ¿Se metió?

**Alberto:** Si, pero se meten y se salen

**Maria:** *No you see, at the entrance of Splash Zone, you see there are these stuffed animals (eel puppets) that you tug at and then they go inside. The first time that we went to the aquarium, he got scared.*

**Angela:** *Well, you see, we had left the place were there is water and then he was mad/ (She laughs.) And he said that he was leaving, and he went ahead, but at that moment a child pulled (an eel) but he didn't see it when the boy pulled it, and then oh, he turned around.*

**Jenny:** (to Alberto) *And then you started to cry?*

**Alberto:** *Yes.*

**Jenny:** *Yes, why what happened, tell me?*

**Alberto:** *Because they came out, the, the eels*

**Angela:** *How did the eel go? Did it go back in?*

**Alberto:** *Yes, but they go in and out*

I asked the Watsonville family what they liked about the aquarium:

**Karina:** Con la niña no pude ir por que estaba muy embarazada, estaba muy pesado estar caminando. Con mi familia, todo, todo realmente por que conocimos como son los peces adentro del mar, las plantas, cuando les da de comer. Vimos como se meten y les dan de comer a los pescados y los tiburones no les hace nada, las tortugas, hemos estados sentados viendo los shows que dan. Es muy interesante

**Jenny:** Cuanto tiempo se quedaron ustedes allí

**Karina:** ¿Mucho tiempo, verdad?

**Braulio:** Como hasta las tres

**Karina:** 4-5 horas...Pero no esta lejos. Llegamos en un ratito. Comemos ante de entrar, por que es muy cara la comida allá adentro. Paramos en una parte antes de entrar, y cuando entramos se les antoja un agua cualquier cosa se las agarramos pero nada así que sea comida. Y como nos gusta estar bastante, tenemos que entrar comidos.

**Karina:** *With my daughter, I was not able to go because I was very pregnant and I was too heavy to walk. With my family, everything,*

*everything really because we get to know what the fishes are like inside of the ocean, the plants, when they are given to eat. We saw that they go inside to give the fishes to eat and the sharks don't do anything, the turtles, we have been seated to watch the shows. It is very interesting.*

**Jenny:** *How long did you spend there.*

**Karina:** *A lot of time, right? (To her son Braulio.)*

**Braulio:** *Like until 3*

**Karina:** *About 4-5 hours...and it is not far. We get there in a little bit. We eat before we go in because the food is too expensive in there. We stop somewhere before we go in, and when we go inside they may want water that we get for them, but nothing like food. And we really like to go be there but we have to eat before we go in.*

In all, the families seem to come away with a greater understanding and appreciation of the ocean. They were all grateful for their visit and many were amazed at what they had seen and learned. The question that begs to be asked is do they see the ocean as part of their environment? How far have we moved them towards caring about the oceans?

## Chapter 5

### Discussion and Action Plan

#### Summary

The goal of the Monterey Bay Aquarium is to conserve the world's oceans. We believe that a conservation attitude begins at an early age. For this reason, and to increase the presence of ethnic and social minorities in the aquarium's visiting audiences, a program was created called the *Splash Zone Discovery Program*. Partnering with the Head Start programs of Santa Cruz and Monterey counties, families were given various opportunities to learn about the ocean, including taking home a *Splash Zone Family Kit* which included various toys and books (manipulatives). The desire was to transmit into

homes science content and conservation messages being taught at the aquarium and in school centers. This project is a preliminary summative evaluation of the effectiveness of the *Splash Zone Family Kit* to achieve these goals.

Families were given these materials to take home and then asked to report back about the types of activities they did with them. Two families were interviewed in their homes and 33 parents reported back via a questionnaire. The manipulatives from the kit were also made available to the children at their school center and during their visit to the Monterey Bay Aquarium. Teachers were also asked to provide feedback about the usage of these materials via a questionnaire; 17 responded.

Families used most of the manipulatives, but they clearly enjoyed the *Penguin Chick*, *Splash Zone CD* and the plastic sea star the most. These items seem to generate the most conversations around ocean topics. Both in the questionnaires and in the interviews, families told me that the *Splash Zone CD* and the plastic sea star were items that their children enjoyed. These items were ones that the families could use and enjoy together.

It was also evident that adults believed children enjoyed the manipulative that they themselves most enjoyed. When teachers were polled, they responded that the *Splash Zone CD* was their favorite item and they believed that was the children's favorite. It was the CD that they used most for different forms of learning, including large group and small group projects. In the future, I would recommend asking the children directly which item is their favorite and why. I would do this a couple of times throughout the year since children's development and preferences change greatly in the preschool years.

Finally, it was clear that families were talking about the ocean and its animals. Whether or not the parents perceived that they were talking more about these topics than previously depended on the language in which they were asked. Parents who responded to the English questionnaire felt they had learned more after participating in the *Splash Zone Discovery* program. Parents who responded to the Spanish questionnaire felt that they did not know a lot about the ocean, but what they had learned came from their visit to the aquarium. As one parent put it:

- No sabemos mucho sobre el mar porque fue no más lo que aprendimos en el acuario. (*We don't know much about the ocean because we only know what we learned at the aquarium.*)

The difference in response could be due to the way the question was worded. The

English version stated:

Do you think that you child and/or family know more about the ocean?  
Why or why not?

The Spanish version is below:

¿Usted piensa que su niño o familia saben más sobre el mar? ¿Por qué o por qué no? (*Do you think that your child or family knows more about the ocean? Why or why not?*)

My colleague pointed out that it could have been unclear for the Spanish speakers and that in both languages the question should have probably ended “after your visits to the aquarium?” This would have been clearer for the parents and could have possibly cleared up the incongruities apparent in the Spanish replies that stated that the families did not know, but then listed all of the things they had learned. Nonetheless, the conversations parents had with their children were the most important connections that children had to creating new science content knowledge and a conservation mind-set. One parent commented, “...y pienso que son los libros y lo que decimos es como aprende a

comprender sobre el mar.” (...*I think that it is the books and what we tell him that he learns to understand the ocean.*) This statement exemplifies the need for educational manipulatives to help facilitate conversations between parents and their children. And for families that have little experience or connection with ocean, it is critical to provide them materials that aid the initial step into ocean conservation – caring and communicating that care through conversations.

### **Action Plan**

(E)ducators may want to consider ways of facilitating parents’ entrance into the play frame (pretend scenarios) so that parents and children can get the most of the a visit to the children’s museum and to encourage the parental tendency to teach children through more structured interactions.

- Shine & Acosta, 2000, p. 51

This project began as a preliminary summative evaluation of the *Splash Zone Family Kit*. As I began my research, I realized that beyond this goal, it was also important to help create quality programs that help children. In order to create these programs, parents and teachers must be players in the curriculum. So as I began to look at the results, I realized that the parent component of the *Splash Zone Discovery* program needed improvement. It is apparent to me that having the parents engaged and interested in what their children are learning is critical to creating transformational curriculum. The changing of conservation attitudes and behavior is the goal of this type of curriculum. Providing both parents and teachers the opportunity for adult learning situations has proven successful for the *Splash Zone Discovery Program*. We could improve the current information given during the parent meeting. By targeting three possible conservation behaviors, introducing them in the parent meeting at the school centers, and

then reinforcing these behaviors when the families come to visit the aquarium, we may give the parents something tangible for them to do. I would like to create a simple conservation behavior questionnaire given the parents before the aquarium parent meeting to see what they are already doing. This way, we can tailor the parent meeting for each center. As Falk and Dierking recommend, “ Instead of asking ‘What did somebody learn by visiting this exhibit, or taking this class, or listening to this lecture,’ the appropriate question is, ‘how did this experience contribute to what someone knows, feels, or understands?’” (as cited in Lundmark, 2000).

Of course, creating a connection the ocean via the aquarium is the first step. During the parent meeting, highlighting that the animals at the aquarium are ambassadors of the ocean could help adults and children see beyond the walls of the aquarium with a more global perspective. Since many of the parents are immigrants, speaking of the animals as immigrants may create that more personal connection. Whatever the tool to create the personal connection, attaching a conservation behavior to it, without calling it a conservation behavior, will further cement the connection, because as Hungerford and Volk (1990) stated, we only conserve what we care about.

In addition, it is important for us to continue giving parents tools to help them teach their children. The manipulatives most enjoyed were those that the family could use together and were in the language that the parents spoke. What we want to encourage are more comments like this mother’s:

- Mi niño ha aprendido sobre el mar con los libros porque él a veces dice que lo que ve en el libro son cosas del mar y pienso que son los libros y lo que le decimos es como aprende a comprender sobre el mar. (*My child has learned about the ocean with the books because sometimes he says the things that he sees in the book are things from the ocean and I think that it is the books and we tell him that he learns to understand the ocean.*)

I know that the original intent behind the *Splash Zone Sing and Play* CD book was to give families ideas of activities they can do in their homes. 90 % of the families in Head Start are Spanish speaking. Although many of them used the book to point animals out in the pictures, they never referred to using the book for its activities. One English-speaking parent did say that she used the book this way. If we want parents to do these activities with their children, it would be important for them to be able to read the instructions. Only then will we see if the activities are appropriate for their intended audience.

I also believe in providing more opportunities for families to have experiences in nature. The Watsonville family spoke about the memories they had created when they explored nature together. They had a pet turtle and fishes. They commented on watching television programs together and discussing the animals they knew from their aquarium visits. This family is ready to receive further conservation messages and incorporate conservation behaviors into their lifestyle. They already have personal connections to nature, so they are interested in learning how to take care of it. By helping families explore nature together, we will help them also be ready to receive and incorporate conservation messages and behaviors into their lifestyle. As an institution, we would not have to be responsible for these outings. There are other organizations, such as the Monterey Bay Sanctuary office, that are doing family outings to local habitats. By partnering with these institutions and connecting our audience with these opportunities, we will be helping families make stronger, personal connections to nature, and in turn the ocean, enhancing their abilities to receive the conservation messages we are teaching.

Finally, the aquarium provides training for the Head Start teachers once a year. During these workshops, teachers are given adult learning opportunities and ideas for hands-on activities. During this workshop, I would like to have the teachers invite a parent to come and do a one-hour activity. This parent could be the one that parents vote as the president of their particular school center or someone that the teacher believes could be a partner in the classroom. The goal would be to create a partnership among all of the adults teaching the children in the conservation triad. All the adults will be able to share ideas for bringing more of the ocean into the classroom via some type of lesson or activity, with the parent representative being an additional advocate for the aquarium experience. The more adults we have creating the transformational curriculum, the stronger the outcome. Ramsey (1998), in her book Teaching and Learning in a Diverse World: Multicultural Education for Young Children, suggests that it is the responsibility of the adults involved in the children's lives to create curriculum that allows for all voices to be heard. By adding the parent component to the workshop, the Monterey Bay Aquarium will be reinforcing the partnership that must exist among all adults caring for children.

### **Conclusion**

There is still a great deal to learn from this audience and this preliminary study only scratched the surface of what this audience can teach us. As the world's economy changes and we become a nation of people with great diversity, it is important to ensure that all voices are heard in the final solution. If we are to turn the tide on the impacts humans are having on the world's oceans, then it is critical to look at all audiences and where they are coming from. It is only when they are heard and understood, that we can



create the much needed change. The *Splash Zone Discovery* program is an important step for families, but we must empower all families to feel that the change they make will better their family's lives.

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Appendix A

## Teacher Questionnaire

Thank you for participating in this study. The information you provide will help the Monterey Bay Aquarium find better ways to serve the children and families of your center. We are interested in knowing how you used each of the materials listed below. Please make your answer as long or as short as you like. You may add another piece of paper if you need. If you have any concerns or questions, you may contact Jenny de la Hoz at (831) 648-4842.

The following materials were given to your families the night of the Monterey Bay Aquarium's parent meeting and were also given to you for your class. Please answer the following four questions for each of the items.

### *Splash Zone CD*

1. Where do you keep this item in the classroom? Why?

2. Have you ever used this item for a lesson? If yes, please explain.

3. Do the children choose to play with this? If so, please explain how or what they do.

4. What vocabulary have you noticed your children using when they use this item?

**Splash Zone Sing Along and Play Book**

1. Where do you keep this item in the classroom? Why?

2. Have you ever used this item for a lesson? If yes, please explain.

3. Do the children choose to play with this? If so, please explain how or what they do.

4. What vocabulary have you noticed your children using when they use this item?

***Plastic Sea Star***

1. Where do you keep this item in the classroom? Why?

2. Have you ever used this item for a lesson? If yes, please explain.

3. Do the children choose to play with this? If so, please explain how or what they do.

4. What vocabulary have you noticed your children using when they use this item?

***Plastic Fish***

1. Where do you keep this item in the classroom? Why?

2. Have you ever used this item for a lesson? If yes, please explain.

3. Do the children choose to play with this? If so, please explain how or what they do.

4. What vocabulary have you noticed your children using when they use this item?

***Penguin Chick Book***

1. Where do you keep this item in the classroom? Why?

2. Have you ever used this item for a lesson? If yes, please explain.

3. Do the children choose to play with this? If so, please explain how or what they do.

4. What vocabulary have you noticed your children using when they use this item?

Which of the items mentioned are the children's favorites? What do they like to do with them?

Which of the items mentioned is your favorite? Why? How do you like to use it?

Is there anything else that you would like to tell us that would help us know what the children do with these items and what they have learned about the ocean?



## Appendix B

### Splash Zone Programs Head Start-Parent Visit

**Theme: Students and families will begin to develop a conservation ethic through interaction with the Splash Zone educators and exhibits.**

#### Goals/Objectives:

- Students and parents will expand knowledge of the natural world and the aquarium through observation, activities and discussion.
- Parents will meet the Splash Zone Instructor and hear about their role as chaperones at the aquarium.
- Parents will learn a little about the animals at the aquarium and what their children will be doing.

#### Preparation:

- a) Call the teacher a few days before to remind them about the visit. Also, make sure the Splash Zone van is reserved.
- b) Get the family kits to bring to the center, ask the teacher how many are needed in English and Spanish. (Splash Zone book with CD, SZ coloring book, Penguin book (English or Spanish), yellow fish)
- c) Bring the Splash Zone stuffed animal bags, the two floor puzzles, the shark box and the kelp board. (The dolly is also helpful!)

#### Visit-Educational (20 minutes or so)

- a) Introduce yourself. Thank them for coming.
- b) Start with the two floor puzzles as a warm-up. They will split into two groups and race to finish the puzzles. Afterwards, tell them a little about the penguin and the Square-spot fish (or clownfish and leafy sea dragon).
- c) Show them what you did with the students at the previsit. (The cleaner shrimp and eel, the daddy seahorse, fish have fins, etc.)
- d) Talk about three features from the aquarium. Sharks: they are safe, the cartilage does not prevent Cancer, they have a replacement row of teeth, etc. Penguins: birds that are too heavy to fly, feel feathers, molting, etc. Kelp: bring some kelp products that they can try.  
*Informational*
- e) Have them put together their resource bags and sit back down (or at the end of the meeting).
- f) Go through the items in the bags and how they can use them.

- g) Talk about the logistics of the day of their visit. Remember to tell them: No siblings, take only action photos, help their children through the exhibits, ask the teacher about breakfast, lunch, bus times, and paperwork.
- h) Leave time for questions.



Appendix C

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Parent Questionnaire

Thank you for participating in this study. The information you provide will help the Monterey Bay Aquarium find better ways to serve the children and families of Head Start. If you have any concerns or questions, you may contact Jenny de la Hoz at (831) 648-4842.

1. Which item does your child like to use? Check as many boxes as apply.

*Splash Zone CD*

Plastic Sea Star

*Penguin Chick Book*

*Splash Zone Sing Along and Play Book*

Plastic Fish

2. Which item is your child's favorite? Why? How do they like to use it?

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3. Which item is your favorite? Why? How do you like to use it?

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4. Which item does your child or family use the least? Why?

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5. What is your family's most memorable experience at the Monterey Bay Aquarium? Why?

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6. Do you think that you child and/or family know more about the ocean? Why or why not?

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7. Is there anything else that you could to tell us that would help us know what your child or family does with these materials and/or what they have learned about the ocean?

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### Cuestionario Para Padres

Gracias por participar en este estudio. La información que usted nos da ayudará al acuario de la bahía de Monterey a encontrar maneras mejores para servir a los niños y a las familias del programa de Head Start. Si usted tiene cualesquiera preocupaciones o preguntas, usted puede llamar a Jenny de la Hoz al (831) 648-4842. Gracias por su ayuda.

- ¿Cual artículo utiliza su niño? Marque todas cajas apropiadas.

CD de *Splash Zone*

Estrella Plástica Del Mar

Libro Del Pingüino Polluelo

Libro de *Splash Zone Sing  
Along and Play Book*

Pescado Plástico

- ¿Cuál artículo es el preferido de su hijo? ¿Por qué? ¿Cómo lo utiliza el o ella?

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- ¿Cuál artículo es su favorito? ¿Por qué? ¿Cómo lo utiliza usted?

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- Cual artículo utilizan de menos su niño o familia? ¿Por qué?

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- ¿Cuál es la experiencia mas acordada por su familia en el acuario de la bahía de Monterey? ¿Por qué?

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- ¿Usted piensa que su niño o familia saben más sobre el mar? ¿Por qué o por qué no?

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- ¿Hay cualquier otra cosa que usted nos podrá decir que nos ayudaría a saber lo que hace su niño o familia con estos materiales o lo que han aprendido sobre el mar?

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MONTEREY BAY AQUARIUM\*

886 CANNERY ROW, MONTEREY, CA 93940-1085  
TELEPHONE (831)648-4800 FAX (831)648-4810  
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**CONSENT FORM FOR NON-MEDICAL RESEARCH**

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**CONSENT TO PARTICIPATE IN RESEARCH:  
The Use of Manipulatives and Educational Materials to Teach  
Young Children about Science**

We are asking you to participate in a research study. We want to make sure that you know all about the project, its possible risk and benefits, safety, privacy and confidentiality issues, and your right to withdraw at any time without penalty. Please read this consent form carefully and ask the researcher any questions before you decide whether to give us your informed and willing consent. Thank you.

Jenny de la Hoz, graduate student at California State University Monterey Bay Masters of Arts in Education Program and educator at the Monterey Bay Aquarium, will conduct this study. The result of this project will be a master's project and evaluation project for the Monterey Bay Aquarium. It will be used to inform changes to the *Splash Zone Family Kit* provided for Head Start Families who participate in the *Splash Zone Discovery Program* at the Monterey Bay Aquarium. You were selected as a possible participant in this study because you have participated in the Monterey Bay Aquarium's parent meeting held at your child's Head Start center and attended at least one visit with your child to the aquarium.

• **PURPOSE OF THE STUDY**

We want to find out the following information:

1. Which materials or manipulatives from the *Splash Zone Family Kit* are used by Head Start families?
2. How do families use the *Splash Zone Family Kit* materials or manipulatives in their homes? What do the children do with them? What has become meaningful to them? How are the parents involved?

3. What is the language used by children and adults when playing with them? Does it reflect any of the language used during programming? Does the language show affective connections to the ocean or to nature? What do the parents say about the language development?
4. What is the ease is speaking about ocean related subjects? What experiences can the parent's relate about their visit to the aquarium?
5. What stories can be told about the usage of these materials in their home? At school? While they visited the aquarium?

- **PROCEDURES**

If you volunteer to participate in this study, we will ask you to do the following things:

- I will contact you via phone to set-up a time to visit your family at your home that is convenient for you.
- The day of the visit, I will videotape an interview with you and your family. I will ask you some personal information such as the name and ages of you and your family.
- I will ask you to show me the materials that were given to you at the Monterey Bay Aquarium's parent meeting and show me where you keep them.
- I will ask your children to show me what they enjoy playing with and to tell me stories about the materials.
- I will ask you to tell me about your visit to the aquarium and what stories your child has shared with you about the ocean.

The interview will last no longer than **one hour** unless you request that it exceed this time limit. The interview can also be shorter if you need. There will only be one visit unless there is an unforeseeable need for another visit such as technical malfunction, any type of emergency, or need to get more information for the study. You may withdraw from the interview at any time. You may ask to see the video at any time. If you would like a copy of the video, you can request a copy the day of the interview.

- **POTENTIAL RISKS AND DISCOMFORTS**

There are no risks involved with the study. All data obtained will remain confidential to ensure that you are not subjected to social risks such as the questioning of your legal status in this country. The videotapes will remain under lock and key at the Monterey Bay Aquarium's Education Department and will only be used to learn what families have learned at the aquarium. Staff from the Monterey Bay Aquarium, such as myself, will view the videotapes, which will not be disseminated for public viewing. You can withdraw at any time if you feel endangered or you no longer want to participate in the study.



• **POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY**

This study will help us learn what Head Start families just as yourself have learned from your experience with the *Splash Zone Family Kit* educational materials. It will let us know in which ways we can improve the program to help other Head Start families.

• **NATURE OF RECORD KEEPING**

All personal information received from this research will only be read by myself, Jenny de la Hoz, and the Education Department supervisors: Cynthia Vernon, Rita Bell, Kathryn Schmeiser, and Kim Swan. Others will view the videotape, but they will not have access to any of the personal information you have provided.

• **PAYMENT FOR PARTICIPATION**

By accepting to be in this study, you understand that your only payment will be in the form of passes to the Monterey Bay Aquarium for your immediate family. The Monterey Bay Aquarium cannot provide transportation to the aquarium, but will give you the number of passes you request for your immediate family. Please make arrangements with me the day of your interview to get these to you.

• **CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

The videotape will remain at the Monterey Bay Aquarium’s Education Department and will be viewed as mentioned above. You can request a copy of your videotaped interview at any time by contacting myself, Jenny de la Hoz at the information listed below. The videotape will be stored and not deleted.

• **PARTICIPATION AND WITHDRAWAL**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

• **IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about the research, please feel free to contact the following individuals:

Margaret Laughlin	Jenny de la Hoz	Rita Bell	Kathryn Schmeiser
(831) 582-4380	(831) 648-4842	(831) 648-4845	(831) 648-4834

CSUMB	Monterey Bay Aquarium	Monterey Bay Aquarium	Monterey Bay Aquarium
100 Campus Drive	886 Cannery Row	886 Cannery Row	886 Cannery Row
Seaside, CA 93955	Monterey, CA 93940	Monterey, CA 93940	Monterey, CA 93940

• **RIGHTS OF RESEARCH SUBJECTS**

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact the Chair of the Committee for the Protection of Human Subjects, Linda Rogers at California State University, Monterey Bay, 100 Campus Center, Bldg 15, Seaside, CA 93966; 831-582-5012.

**SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE**

I understand the procedures described above and that I am over 18 (eighteen) years old. My questions have been answered to my satisfaction, and I freely agree to participate in this study. I also give permission for my child(ren), listed below, to participate in this study. I understand that I will receive a copy of this form for my records and future reference.

\_\_\_\_\_

Parent/Guardian

\_\_\_\_\_

Signature of Parent/Guardian

\_\_\_\_\_

Date

\_\_\_\_\_

Name of Subject #1

\_\_\_\_\_

Name of Subject #2

\_\_\_\_\_

Name of Subject #3

\_\_\_\_\_

Name of Subject #4

\_\_\_\_\_

Name of Subject #5

\_\_\_\_\_

Name of Subject #6

**SIGNATURE OF INVESTIGATOR**

In my judgment the subject is voluntarily and knowingly giving informed consent and possesses the legal capacity to give informed consent to participate in this research study.

\_\_\_\_\_

Signature of Investigator

\_\_\_\_\_

Date



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**FORMA de ACUERDO PARA LA INVESTIGACIÓN NO MEDICA**

Página: Página 1 de 4

**ACUERDO PARA PARTICIPAR EN LA INVESTIGACIÓN:**  
El uso de juguetes y de materiales educativos para la enseñanza de la  
ciencia a niños jóvenes

Estamos pidiendo que usted participe en un estudio de investigación. Deseamos asegurar que usted sepa todo sobre el proyecto, los riesgos y las ventajas posibles, asuntos de seguridad, y de su derecho de retirarse en cualquier momento sin problema. Lea por favor esta forma de acuerdo cuidadosamente y haga a la investigadora cualquier pregunta antes de que usted firme este acuerdo. Gracias.

Jenny de la Hoz, estudiante de maestría de artes en el programa de la universidad de California de la bahía de Monterey o California State University Monterey Bay (CSUMB) y educador de la educación en el acuario de la bahía de Monterey, conducirá este estudio. El resultado de este proyecto será la conclusión de el proyecto de maestría y para evaluación del acuario de la bahía de Monterey. Será utilizado para posibles cambios al *Splash Zone Family Kit* o el paquete de materiales que usted recibió de parte del acuario de la bahía de Monterey durante una junta de padres. Ustedes han sido seleccionados porque ha participado en la reunión de padres dada por el acuario en el centro preescolar de su hijo y han asistido por lo menos a una visita con su niño al acuario.

• **PROPÓSITO DEL ESTUDIO**

Deseamos acertar la siguiente información:

- ¿Cuáles de los materiales o juguetes del *Splash Zone Family Kit* son utilizados por las familias de Head Start?
- ¿Cómo utilizan las familias los materiales o juguetes del *Splash Zone Family Kit* en sus hogares? ¿Qué hacen los niños con los materiales? ¿Cuáles materiales se han hecho importantes para ellos? ¿Cómo están los padres implicados?

- ¿Cuál es el lenguaje usado por los niños y los adultos al jugar con ellos? ¿Es parecido al lenguaje usado durante la programación en el acuario? ¿Muestra el lenguaje conexiones afectivas al mar o a la naturaleza? ¿Qué dicen los padres sobre el desarrollo del lenguaje de su hijo?
- ¿Cuál es la facilidad entre padres e hijos de hablar sobre temas relacionados al mar? ¿Qué experiencias pueden los padres relacionar sobre su visita al acuario?
- ¿Qué historias se pueden contar sobre el uso de estos materiales en su hogar? ¿En la escuela? ¿Mientras que visitaron el acuario?

- **PROCEDIMIENTOS**

Si usted se ofrece voluntariamente a participar en este encuesta, pediremos que usted haga las siguientes cosas:

- Yo me pondré en contacto con usted vía el teléfono para confirmar un tiempo de visita a su hogar con su familia que sea conveniente para ustedes.
- El día de la visita, yo voy a grabar una entrevista con usted y su familia. Le pediré cierta información personal tal como el nombre y las edades de usted y de su familia.
- Yo le pediré que usted me demuestre los materiales que les fueron dados en la reunión de padres dada por el acuario de la bahía de Monterey y demostrarme donde ustedes los guardan
- Yo le pediré que sus niños me demuestren como juegan con los materiales y que me cuenten historias sobre los materiales.
- Yo le pediré que usted me cuente sobre su visita al acuario y qué historias su niño ha compartido con usted sobre el mar.

La entrevista durará no más de una hora a menos que usted solicite que pase este límite de tiempo. La entrevista puede también ser más corta si usted necesita. Habrá solamente una visita a menos que haya una necesidad imprevista de otra visita tal como malfuncionamiento técnico, cualquier tipo de emergencia, o necesidad de conseguir más información para la encuesta. Usted puede retirarse de la entrevista en cualquier momento. Usted puede pedir ver el vídeo en cualquier momento. Si usted quisiera una copia del vídeo, usted puede solicitar una copia el día de la entrevista.

- **RIESGOS Y MALESTARES POTENCIALES**

No hay riesgos implicados con el encuesta. Todos los datos obtenidos seguirán siendo confidenciales asegurándose de que no corra a los riesgos tales como la cuestión de su estadía legal en este país. Las videocintas permanecerán bajo llave y candado en el departamento de la educación del Acuario de la bahía de Monterey y serán utilizadas solamente para averiguar lo que han aprendido las familias en el acuario. Solamente el personal del acuario de la bahía de Monterey, tal como yo, podrán ver las videocintas, y no serán diseminadas al público en general. Usted puede retirarse en cualquier momento si usted se siente que esta en peligro o usted no desea participar mas en el encuesta.

- **BENEFICIOS POTENCIALES PARA USTED Y/O A LA SOCIEDAD**

Este encuesta nos ayudará a averiguar qué han aprendido las familias de Head Start, como la suya, con los materiales educativos *Splash Zone Family Kit*. Nos dejará saber de qué maneras podemos mejorar el programa para ayudar a otras familias de Head Start.

- **NATURALEZA DE GUARDAR DE DATOS**

Toda la información personal recibida en esta investigación será leída solamente por mí, Jenny de la Hoz, y los supervisores del departamento de la educación: Cynthia Vernon, Rita Bell, Kathryn Schmeiser, y Kim Swan. Otros maestros podrán ver los videos, pero no tendrán acceso a cualquiera de la información personal que usted ha proporcionado.

- **PAGO PARA LA PARTICIPACIÓN**

Aceptando a participar en esta encuesta, usted entiende que su único pago será en la forma de pasos al acuario de la bahía de Monterey para su familia inmediata. El acuario de la bahía de Monterey no puede proporcionar el transporte al acuario, sino le dará el número de pasos que usted solicita para su familia inmediata. Por favor haga los arreglos con la investigadora el día de su entrevista.

- **LA INFORMACIÓN CONFIDENCIAL**

Cualquier información que se obtiene en conexión con este encuesta y que se pueda usar para identificar a usted seguirá siendo confidencial y será divulgada solamente con su permiso o según los requisitos de la ley. La videocinta permanecerá en el departamento de educación de acuario de la bahía de Monterey y será vista solo por las personas mencionadas arriba. Usted puede solicitar una copia de su entrevista en cualquier momento entrándose en contacto con Jenny de la Hoz en la información enumerada abajo. La videocinta será almacenada y no borrada.

- **PARTICIPACIÓN Y RETIRO**

Usted puede elegir participar o no en esta encuesta. Si usted se ofrece voluntariamente a estar en esta estudio, usted puede retirarse en cualquier momento sin consecuencias de ninguna clase. Usted puede también negarse a contestar cualquier pregunta que usted no desee contestar y todavía permanecer en la encuesta. La investigadora puede también retirarles de esta investigación si se presentan las circunstancias.

- **IDENTIFICACIÓN DE INVESTIGADORA ES**

Si usted tiene algunas preguntas o preocupaciones por la investigación, póngase por favor en contacto con los individuos siguientes:

Patricia Whang (831) 582-5026	Jenny de la Hoz (831) 648-4842	Rita Bell (831) 648-4845	Kathryn Schmeiser (831) 648-4834
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CSUMB	Monterey Bay Aquarium	Monterey Bay Aquarium	Monterey Bay Aquarium
100 Campus Drive	886 Cannery Row	886 Cannery Row	886 Cannery Row
Seaside, CA 93955	Monterey, CA 93940	Monterey, CA 93940	Monterey, CA 93940

• **SUS DERECHOS**

Usted puede retirar su acuerdo en cualquier momento y dejar de participar sin pena. Usted no está renunciando ningunos derechos o reclamos legales, o remedios debido a su participación en esta investigación. Si usted tiene preguntas con respecto a sus derechos, entre en contacto con la silla del comité para la protección de temas humanos, Linda Rogers en la universidad de estado de California de la bahía de Monterey o California State University Monterey Bay 100 Campus Drive, Building 15, Seaside, CA 93966; 831-582-5012.

**SU FIRMA O DEL UN REPRESENTANTE LEGAL**

Entiendo los procedimientos descritos arriba y tengo mas de 18 (dieciocho) años de edad. Mis preguntas han sido contestadas a mi satisfacción, y acuerdo libremente participar en esta encuesta. También doy el permiso para mi hijo(s), enumerado abajo, para participar en esta encuesta. Entiendo que recibiré una copia de esta forma para mis archivos y referencia futura.

\_\_\_\_\_

Padre / tutor

\_\_\_\_\_

Firma de Padre / tutor

\_\_\_\_\_

Fecha

\_\_\_\_\_

Nombre de persona #1

\_\_\_\_\_

Nombre de persona #2

\_\_\_\_\_

Nombre de persona #3

\_\_\_\_\_

Nombre de persona #4

\_\_\_\_\_

Nombre de persona #5

\_\_\_\_\_

Nombre de persona #6

**FIRMA DE INVESTIGADORA**

En mi opinión la persona(s) detallado arriba da(n) voluntariamente y con conocimiento acuerdo informado y posee la capacidad legal al acuerdo informado para participar en esta encuesta.

\_\_\_\_\_

Firma del investigadora

\_\_\_\_\_

Fecha

## Appendix E

### Family Interview Questions

The interviewer will bring the manipulatives and educational materials in the *Splash Zone Family Kit*, which consists of the following:

- The *Splash Zone* CD, a collection of lively music and songs by well-known children's entertainer Linda Arnold
- A book, *Sing Along and Play in the Splash Zone*, builds on the music and songs in the *Splash Zone* CD
- *Splash Zone Coloring and Sticker Books*
- plastic sea star
- a yellow plastic fish that floats
- *Penguin Chick* book in English or Spanish.

The following questions are ideas that are going to be used during the interview as prompts. The interview will be conducted in a casual conversation style.

#### Interview in English

(To the child)

- Which of these do you have? Which is your favorite? Why?
- Can you show me where you have these in your house? Why do you have them here?
- What do you like to do with these things? Can you show me?
- What did you like the most at the aquarium? Do you remember using any of these things at the aquarium? Which? What did you do with it there?
- (Using each of the items in the *Splash Zone Family Kit*) What can you tell me about this? Can you tell me a story about this?

(To the parents)

- Which of these items have you seen your child use? What do they do with them?
- Which of these items are you most glad that your family got? Why?
- What is one of your most memorable moments at the aquarium? What is something new that you learned from your child or from going to the aquarium with your child?
- Have you always like the ocean? If not, do you feel more comfortable with the ocean now? Why?

#### Interview in Spanish

(Al niño)

- ¿Que de éstos tienes? ¿Cuál es su favorito? ¿Por qué?
- ¿Puede mostrarme a donde tienes éstos en tu casa? ¿Por qué los tienes aquí?
- ¿Qué te gusta hacer con estas cosas? ¿Puedes mostrarme?

- ¿Qué te gustó más del acuario? ¿Cuáles de estas cosas usaste en el acuario? ¿Qué hiciste con él allí?
- (Con cada uno de los artículos en el *Splash Zone Family Kit*) ¿qué me puedes decir sobre esto? ¿Puede contarme una historia sobre esto?

(a los padres)

- ¿Qué de estos artículos has visto que su niño usa? ¿Qué hace su hijo con él?
- ¿Cuáles de estos artículos le alegró más recibir para su familia? ¿Por qué?
- ¿Cuál es uno de sus momentos más memorables en el acuario? ¿Cuál es algo nuevo que usted aprendió de su niño o de ir al acuario con su niño?
- ¿A usted siempre le ha gustado el mar? ¿Si no, usted se siente más cómodo ahora con el océano? ¿Por qué?



**Appendix F**

**Splash Zone Programs  
Head Start Previsit**

**Theme: Students and families will begin to develop a conservation ethic through interaction with the Splash Zone educators and exhibits.**

**Main Concepts (Head Start Frameworks)**

<b>Science</b>	<ul style="list-style-type: none"> <li>Begins to use senses and a variety of tools and simple measuring devices to gather information, investigate materials and observe processes and relationships.</li> </ul>
	<ul style="list-style-type: none"> <li>Develops increased ability to observe and discuss common properties, differences and comparisons among objects and materials.</li> </ul>
	<ul style="list-style-type: none"> <li>Expands knowledge of and abilities to observe, describe and discuss the natural world, materials, living things and natural processes.</li> </ul>
	<ul style="list-style-type: none"> <li>Expands knowledge of and respect for their body and the environment.</li> </ul>
	<ul style="list-style-type: none"> <li>Demonstrates increasing capacity to follow rules and routines and use materials purposefully, safely and respectfully.</li> </ul>
	<ul style="list-style-type: none"> <li>Increases abilities to sustain interactions with peers by helping, sharing and discussion.</li> </ul>
	<ul style="list-style-type: none"> <li>Demonstrates increasing comfort in talking with and accepting guidance and directions from a range of familiar adults.</li> </ul>
<b>Mathematics</b>	<ul style="list-style-type: none"> <li>Begins to recognize, describe, compare and name common shapes, their parts and attributes.</li> </ul>
	<ul style="list-style-type: none"> <li>Develops increased abilities to combine, separate and name “how many” concrete objects.</li> </ul>

**Goals/Objectives:**

- a) Splash Zone Instructors will begin to assess students' prior knowledge.
- b) Splash Zone Instructors will become familiar with the classroom management strategies, answer teacher and student questions and build relationship.
- c) Students will be introduced to some of the creatures of the aquarium through puppets and discussion.
- d) Students will learn a thematic song with some literacy elements.

**Preparation:**

- a) Call a few days before the visit to remind the teacher. Also, make sure that the Splash Zone van is reserved.
- b) Bring the Splash Zone bags with the stuffed animals and puppets.
- c) Bring the Splash Zone CD and a player.
- d) Bring any paperwork or activities that the teacher might request.
- e) Bring a box of ocean related books.
- f) Tub with plastic ocean animals (\*optional)
- g) Penguin Party song board

**Visit (25 minutes, at least)**

- a) Introduce yourself. Ask students if any have been to an aquarium or to the ocean.
- b) Use the puppets to talk about some of the aquarium inhabitants. Be sure to talk about: Sharks don't eat people, fish have fins, daddy seahorses have the babies, cleaner shrimp clean the teeth of the eels, penguin feathers are light, not heavy, count the crabs legs, review colors in the animals, etc.
- c) Talk about how to touch the animals at the aquarium. Pass around the stuffed animals to model the idea.
- d) Teach them the song "It's a Penguin Party" with the movements. Do it together. (Use the song board to model some literacy with the song.)

**Conclusion (5 minutes or so)**

Allow students time to look through ocean related books, hear Splash Zone songs, ask questions, etc. \*Use a tub of toy ocean animals covered with water and pull small groups while they are looking at books. Tell students that animals must be touched gently and need to remain under water.