

**Construct Scientifically Playing With A Purpose**  
*Stephanie Johnson*  
*Crescent Elementary School*

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## **Overview**

According to Webster's Dictionary, Play is a free activity intrinsically self motivated, more a process and a relationship where attention is voluntarily limited.

Over a long period of time educators have observed the different learning styles of young students related to play. These learning styles are all different for each of them. According to French psychologist, Jean Piaget, there are several developmental stages of play. These developmental stages of play will further enhance the cognitive development of the child. Most educators will agree that practice in

learning enhances the skill or concept. The early development of a student in a pre-kindergarten/preschool classroom is very important due to the foundational growth in cognitive skills. The student is learning to use thinking skills through play and participation. As stated by Friedrich Froebel, an early childhood educator, a student learns best through play and handling material and objects. The educator provides opportunities for this to take place. As this play is taking place the student will have the opportunity to explore and grow.

This unit will address some science skills through facilitating and encouraging playful missions. The word mission was chosen to elicit the student's curiosity, thus giving the activities or mission in this unit some mystery. This is a tactic to motivate interest from the student. The skills of investigating, discovering and inquiring will be reinforced as the missions are completed. The student will be able to use judgment of information through using these skills and enjoying it at the same time. This will maintain the student's active participation and give them the chance to make choices independently. Purposeful engagement with the material will also be provided.

This unit will be introduced over a five-week period. It will include playful activities for the student. There are seven mission cards. On these mission cards will be objects for the student to build. Stationary and moveable objects will be used. They will be introduced individually until all seven are available for the students use. On the mission cards are several characters of both genders. This is to signal to the students that all activities are appropriate for both the boys and the girls. At the end of the introductory phase, the mission cards can be placed in Manipulative or Block areas as a free choice activity. To promote the skills previously stated on a continuous basis. The student will use blocks and manipulative – Duplo Blocks, Legos, Flexiblocks, Gears etc. to complete the missions. The mission cards provide signage and an image for the student. This will be promoting skills from other areas such as communications and literacy, but not limiting what they build from the mission card. The student should be encouraged to make his own version, also giving the student guidance to make the objects independently. They will construct the objects from the mission cards using different designs, such as a car or a building. Included with the seven cards is a free choice mission. The student can make any object they choose.

This unit is for pre-kindergarten / preschool students. Consideration and inclusive principles for all students of abilities, ethnic groups and genders has been included. One of the main goals is to foster science skills in all of the students. This can happen when the student has the opportunity to be repetitive with putting blocks together and taking them apart and exploring them. This type of building is called engineering design in the field of science. The student can pose questions to themselves about their choices in what they have built. You can also use this unit as a supplement to different themes through out the year. Themes for transportation and making buildings for community awareness could be utilized. The stories can be used for literacy, making this unit available for around the year usage. Giving girls and boys the opportunity to use the material daily and encouraging them will promote a pleasant experience with nontraditional science from an early age.

This unit will include parent involvement through an informational letter. The letter will include an explanation of this unit and the skills provided. Also provided will be how to implement activities and suggestions for activities at home. The parent will also be invited to experience completing some of the missions themselves in the classroom. The parent will be able to make up missions on his or her own. The student may use it to work at home.

The standards have been included, both standards number five and six are highly correlated in this unit. Every time a student does a mission they will experience designing and making predictions. They will be using models in the form of the mission cards. They will be able to recognize patterns and evaluate their designs.

Evaluation of this unit will be through observation of the student's participation and involvement with the material. Providing the opportunity for the student to use this material is the major factor. This involvement will cultivate certain skills for the student and provide a foundation for future skills. Allowing the student to go through the process and observation of their enjoyment is an important part of the evaluation process. The majority of the material can be found in the pre-kindergarten/preschool classroom. Most classrooms are set up in such a way that these materials are available. The extra building manipulatives that I spoke of, to provide a variety in the classroom would cost approximately \$200.00. This material can be introduced all at once or at different times. If cost will be an issue some of the material also can be found in the student's home, such as cereal boxes etc. or just made from recyclable plastics.

This unit will be interesting to the student and all who will be involved. Starting students at an early age makes it a holistic effort and getting students involved with science in a nontraditional way will improve their thinking skills and start them on their way to a positive outlook toward the sciences.

## Rationale

Construction blocks and manipulatives afford many opportunities to integrate the cognitive, social and physical skills in students. The two media used blocks and manipulatives have very important properties. They will assist in building the skills in this unit. I created this unit to provide an on going opportunity for prekindergarten /preschool students to get involved in science in a nontraditional way. Suggested by Jean Piaget that students learn better as active participants. He made a list of four observable developmental stages of cognition through play, those four stages of play are.

1. Sensorimotor, which involve simple concepts and reflexes. Usually this stage involves the very young and they are beginning to explore their environment.
2. Is the beginning of abstract concepts and the relationships they have. This stage involves learning symbols.
3. This stage involves concrete and formal problem solving. This is an older group that can organize their problems and solve them.
4. This stage is the ability to develop hypothesis and to deduce new concepts. This stage is the adult group.

The students in this unit fall in the second stage. Through exploring blocks and building with manipulatives the students will be developing social and cognitive skills. The blocks that a student may use can build very simple structures to elaborate ones. The bigger and more elaborate ones will help in using physical skills. The process and the experience of building are important. Tabletop manipulatives can be explored in more than one-way; they can provide a more creative and intellectual experience for the student. All of the missions can be used in blocks or manipulatives. Through constructing the missions the student in the classroom will be given the opportunity to formulate and build upon cognition skills.

The role of the teacher is to facilitate and guide the students. This unit is student centered. I will be encouraging thinking skills and be a resource for the students. How this relates to the seminar is that I will be promoting a process in which gender awareness and science that involves girls and boys will be promoted. Providing the process in a nonstereotypical way is this unit's position. In my classroom my students have free play and free choice. This is where the opportunity for construction can take place. The signage that the seminar uses can be seen through the mission cards in my unit. It provides written communication and less teacher direction thus continuing with the student centeredness. The characters on the cards are gender and ethnic sensitive. They are colorful and bright to elicit the interest of the students.

This unit was written to provide a foundation for girls and boys to be involved in the sciences. Particularly focusing on the girls to stay engaged in the process. This will hopefully foster a positive outlook in the future for them.

## Objectives

The objectives for this unit consist of three parts cognitive, social and physical. We will first discuss the cognitive objectives. The student in the pre-kindergarten /preschool classroom will develop an understanding for the concepts of length, height and weight. This will happen along with exploring stability and leverage while constructing the missions. Manipulating the objects will provide a tactile experience. For some students this is a very good way to learn. After selecting a mission the student will have the opportunity to use predicting and cause and effect, while solving problems related to construction. The student will be able to follow simple directions by using the mission cards. The mission cards are also a type of blueprint. The mission cards are depicting a theme using a visual medium. This is to help make it realistic and simulating what a designing engineer uses. This will give them the opportunity to make choices and develop independence. Some other cognitive skills are being developed such as sorting, ordering and symbols representing an idea. All of these will be reinforced throughout the unit. Each time a student does a mission they will experience these skills. The main objective of this unit is to form foundational skills. Critical thinking will be developed while going through the process of completing the missions. Letting the student use cognitive skills is very important in building science related skills. Direction and positioning terminology will be used as well. The vocabulary will be used as a list of words that may be verbalized while the students are constructing their buildings.

There will be several social skills developed as well. The student will be developing care for classroom material and pride in accomplishing a task. The student can feel good about what they are doing. They also can learn to respect the expressions of other student's work. This will help with character developing efforts and getting along with others. The student may choose to work with one of his peers; this will provide an opportunity to experience group designs. The classroom may do a whole class mission. Completing a mission with another student or group will give practice in teamwork. The social aspect of this unit is important, because the student will have the opportunity to communicate with their peers. They will have the chance to discuss the outcome of their missions. It also is important for the student to have confidence in their work.

The student's physical growth has been considered in this unit. Through the use of large muscle movement in blocks the student can begin to coordinate their body movement. This movement will assist them in learning spatial relationships. Fine motor skills will be used, when the student is using the manipulatives. The student will use their body showing control and accuracy in placing the blocks and this physical movement is part of their growth as well. The student can enjoy successes with assembling.

## Strategies

The teacher should encourage the student. Each mission is introduced one at a time. Allow at least three days between each mission. This will give each student the opportunity to explore each mission prior to introducing the next one. They also can be introduced weekly depending on your class size. When all of the missions are introduced the student has the option to explore it if they choose. You should be the facilitator through open-ended questions such as, "what is that" or "how does it work"? This will encourage creative thinking. You should always consider the student's ideas as the most important basis for their construction. This unit is part of the free play activities for the classroom, thus making it a student-centered activity. You may want to follow the lesson in the class activities section or do one of your own prior to introducing the unit to your class. This will give you an idea of how well the students will accept it. Adaptations can be made at this time. You should answer all questions with a question. The standards for this unit are number five and six from science and technology. The first one addresses designing and building and using models. The second one addresses recognizing patterns and solving problems. To accomplish the standards you should provide any opportunity for constructing the missions. Help the students recognize patterns. The standards are listed in the appendices.

You want to be enthusiastic about the missions. When you are going through the lessons the added activities will make it interesting for the student. Provision for a great deal of building material should be made possible. The variety will make it easier for the student to be more innovative. Also be sure to let the students know the rules for building with blocks and manipulatives at the beginning of the unit and be consistent. The maximum height of the blocks should be to the student's shoulders. They should share and not throw any of the material. You should also keep the rules to a minimum. The student should be able to do the building independently. This is another way that the student can build a positive attitude toward discovering his or her own abilities. Also try to elicit information from the students concerning the conversation the mission characters may be having on the mission cards by posing simple questions.

## Classroom Activities

Before beginning the activities, send a letter home to the student's parents concerning the unit and a list of helpful material they may use at home. You can refer to the appendices to get an idea of what to send. Once you have done this you will want to introduce the unit to the students. First begin with setting the rules for using the material. There should not be any building above your shoulders and no throwing of material. You should also state that we share materials. The rules should be clear and not too many. After these things are done you may begin your introduction. You want to be very enthusiastic. Tell the students that we are going to be doing missions with our blocks and manipulatives. As you are introducing the unit start a vocabulary list. Your first words will be designers, build, missions and signs. Tell them what a mission is. A mission is something you build and that they will be designers because they will be building their missions. The mission characters on the cards like to build. Let the students come up with a name for the mission characters. Explain that one of the characters has her back to us because she always is looking at what to build. Then start with reading the book I Read Signs. Then discuss briefly what signs are and elicit the students to discuss the book. Tell them that the missions will be like a sign to get them to build. These signs are called mission cards. Then have the students make signs of their own using construction paper and markers. Let them make their favorite one.

#### Mission#1

##### Design a building.

Begin with the recording of The Three Little Pigs by Greg and Steve. After the song ask the students what happens in the song. Discuss who did the building. How did they build it? What happened with it? After their discussion show the students an example of a blueprint. Talk about what a designer engineer does. Don't forget to continue your vocabulary list. Play the Three Little Pigs again and sing along and teach the words if students don't know it. Introduce the mission card. Let the characters discuss what they would build. Let students who would like to build go to blocks or the manipulatives. This is a good time to reinforce the rules. If all of your class would want to do it let them rotate in groups of four for each area. After they are done you may go around and discuss with them or pose questions. Let the students talk about what they are doing. The skills the student will learn are creativity, height, direction and blueprints used in science.

## Mission#2

Design a vehicle.

The finger play The Wheels on the Bus will begin this mission. Do the finger play using all of the body movement. Discuss different types of vehicles. Introduce a graph to the students. Make this a pictograph using whatever vehicle the students say. For example if a car is said draw a car and put the students name under it that likes cars. The same is done for a bus or truck. This will generate the student to think about the vehicle they may want to build. Introduce the mission card. Have the characters have a conversation about vehicles. Don't forget to add on to your vocabulary list. Some of the words could be vehicle and graph. This mission should have some of the moving manipulatives with wheels and you may add props. In the blocks some of the large ones have wheels as well. The skills are interpreting information, movement and problem solving.

## Mission#3

Design a career person.

Let the student make a collage. Bring in pre-cut magazine pictures of both genders. This is an opportunity to introduce science careers. Try to have all of the engineers, related to science such as a material science, designer and a biologist. You will want to add other careers as well. Show the pictures and discuss each career with the students. Answer the questions they may have. Let the students glue the pictures to some construction paper. Introduce the mission card. Let the characters discuss the mission. Make the material available for building. This mission can use people props. After they are finished they may want to discuss it. Let them make that choice. Add the words career and engineers to your vocabulary. The students may come up with more. To follow up on this mission read the story What I Like. The student will develop the skill of identifying different science careers. The students will use eye and hand coordination through making a collage. Identifying new words in the vocabulary. Sorting and classification of blocks and careers will take place.

## Mission#4

Design a What Cha Ma Call It.

Read the book *Where The Wild Things Are*. Ask questions concerning the story to get the students to discuss unusual things. Introduce mission card and let the characters discuss something unusual. Continue to add on to the vocabulary. Let the student make something wild and unusual. The skills developed are literacy and comprehension through the reading of a story. The student will learn to recognize the difference between make-believe and reality.

Mission#5

Design a flying object.

Begin this lesson with posing a question, if you had to take a trip you would fly in what? Make some suggestions such as helicopter, blimp, hot air balloon or plane. If you have pictures you should show them. Pass out some paper airplanes that you already made for each student. Take students to gym area or outdoors to fly their airplanes. You may choose to make a paper airplane in front of the students. I would only do it if the student would ask. Introduce the mission card and let the characters discuss what they would fly in. As a nutrition activity make Flying High Pudding. This is simply a box of pudding with a name to go with the theme. Pudding is very easy and cost efficient. Let the students eat and enjoy. Now they may build. The student will learn the skills of physical coordination and balance through flying paper planes at the beginning of the lesson. The nutrition activity provides measurement and listening skills. They will learn length and size of blocks to make an airplane.

Mission#6

Design a bridge.

Role-play the story *The Three Billy Goats Gruff*. Let all the students get a chance to be one of the characters. You may have to do this four or five times but each student will bring his own personality to it.

If a student does not want to act its their choice. Using the mission cards let the characters talk about bridges. This is an opportunity to build the vocabulary with words such as flat, curve, balance and straight. The students may come up with other words. Let the student draw a picture of a bridge. This can be called a blue print. Then take a field trip on a bus to ride over and under several bridges. When you return let the students enjoy building bridges. The skills of balance and equilibrium through making a bridge will be explored. They will also use creative skills when dramatizing the story.

#### Mission#7

Design a free choice object.

Read the story *We're Different, We're the Same*. After this story is read let the students discuss how they are the same and different. This is a good time to discuss gender. Let the students play Simon Says and take note that every one can jump the same, spin around and maybe blink one eye the same. This will elicit inclusiveness with both genders. All of the building material should be available. Let the characters on the mission card discuss what they might want to build. Problem solving can take place more in this mission due to the fact that anything might be made. The student will have to figure it out and make adjustments. The student s skills are participation and exploring ones own needs and wants.

After all of the missions have been introduced let all of the cards be available for the students during free play. This will give them the opportunity throughout the year to use them. The material for building should also be available. Now remember let the students curiosity prevail and it should be valued. They should explore safely with the material. Make sure there is a variety of material and utilize the enrichment material. You should be able to integrate across the curriculum with other subjects. Promote

scientific thinking and include your parents. Adaptations for students with special needs can be made.

## Bibliography/Resources

1. Day, B. (1987). Early Childhood Education. 3<sup>rd</sup>. Edition. New York. Macmillan Publishing Company.

This book has names and types of blocks to purchase and different activities to use with your students.

2. Holt-Bess, G. (1989). Science with Young Children. District of Columbia. National Association for the Education of Young Children.

This book discusses science concepts and their bases in its introduction. Can give you an idea of some problem solving activities.

3. Nyberg, J. (1996). Charts for Children. Illinois. Good Year Books. This

book can give you suggestions on story maps, charts and graphs. This is written for pre- kindergarten students.

4. Sims, P. (1997). Awakening Brilliance- How to Inspire Children to Become

Successful Learners. Georgia. Bayhamptom Publications. Good reading material to enlighten the educator on how to assist their students to become successful students. This book also discusses different learning styles and how to teach them.

5. Sparks, D. L. and the A.B.C. Task Force (1998). Anti-Bias Curriculum Tools for Empowering Young Children- Learning to Resist Stereotyping and Discriminatory Behavior. District of Columbia. National Association for the Education of Young Children.

This book has a chapter on gender and how to avoid stereotypical behavior when dealing with young students.

6. Webster's Millennium- 2002-CD ROM Encyclopedia. (2002). Washington. Webster Publishing.

In this encyclopedia you can find detailed definitions on the subject of play and information on early childhood educators and psychologist.

7. Weikert, P. D., Banet, B., Hohmann, M. (1979). Young Children in Action- A Manuel for Preschool Educators. Michigan. The Highscope Press.

This book discusses active involvement in learning and provides activities for the teacher or the parent

**Classroom  
Material**

1. Learning Materials Workshop Blocks and Booklet. Enrichment for the class -room may be ordered online. Get that information in appendix B.

2. Grid Blocks –Indoor or outdoor interlocking blocks.

3. Architectural Blocks- Tabletop (manipulative) blocks for building different types of structures.

4. Unit Blocks – These are wooden blocks for the floor. They include shapes that are elliptical curves, triangles, cylinders, arches and intersections. There are 170 pieces.

5. Lego's- Basic Tube Set- Used as a tabletop (manipulative) you can create towers and curves.

6. Interstar Building Sets- this is a tabletop (manipulative) the set locks together wheels, axles, links and twister.

7. Flexiblocks- this is another tabletop (manipulative) this is for building structures that bend swivel and rotate.

8. Giant Edu Blocks- These are plastic colorful floor blocks. They are huge legos.

9. Qak Tag paper and Clip art for your mission cards.

10. Constuction paper for missions#1 and mission #6.

11. Large Paper for graph in mission #2 and for the vocabulary list.

12. Regular white paper for paper airplanes in mission #5.

13. Jello pudding-vanilla and a quart of fat free milk for mission #5.

14. Magazine cutouts of career people for mission #3.

15. The Three Little Pigs By Greg And Steve- Playing Favorites recording to be used in mission

#1.

16. Crayons and Markers for drawings in missions #1 and #6.

17. Storybooks for the missions are-What I Like by Catherine and Laurence Anholt used in mission#3. -I Read Signs by Tana Hoban used as part of the introduction to the unit for reading signs. - We're Different, We're the Same by Sesame Street Featuring Jim Henson's Sesame Street Muppets used in mission #7. - Where The Wild Things Are story and pictures by Maurice Sendak used in mission #4. A listing is in appendix D.

All of the material can be purchased through Lakeshore. You can also find the books at your local library. The majority of the blocks and manipulatives are already in the preschool/ pre-kindergarten classroom.

The enrichment material Learning Materials Workshop is part of our curriculum. It is in every pre-kindergarten classroom in our school district. You will find this material to be very informative with a guide and it addresses block play more extensively with activities.

## Appendices

### **Appendix A-** Content Standards- Science and Technology

1.All

students will design build and use models in order to explain, evaluate or predict results of investigation. Standard #5

2.All students will have and use skills of observation collect information recognize patterns, think carefully, predict, set up and perform experiments and solve problems. Standard #6

### **Appendix B-** Web Sites

1. The National Headstart Association- [www.nhsa.org](http://www.nhsa.org)

This unit is written for a Headstart classroom and you can get more information about this organization on this site.

2. The National Association for the Education of Young Children- [www.naeyc.org](http://www.naeyc.org)

This is an organization you can join and get information for teaching.

3. Early Childhood- [www.earlychildhood.com](http://www.earlychildhood.com)

This site has information on some of the latest information on education for parents and educators.

4. The Family Communications Organization- [www.fci.org](http://www.fci.org)

The seminar for this unit is based on the information in this site. Go to corporate information and click on Girls Math and Science Partnership

5. Creative Curriculum- Teaching Strategies- [www.teachingstrategies.com](http://www.teachingstrategies.com)

Information on teaching resources and books for classrooms. It has a great amount of resources concerning development and learning.

6. The Learning Materials Workshop- [www.learningmaterialswork.com](http://www.learningmaterialswork.com)

This is a site for resources for home and in the classroom. I will be using this material as enrichment in my unit. It has a booklet and blocks that are colorful. The booklet explains in detail how to use the blocks. Based on research. Can Order materials from this site.

### **Appendix C-Parent Letter**

Dear Parent,

Our class will be exploring with blocks and manipulatives. Through a unit I wrote called Construct-Scientifically Playing With A Purpose. We will be building and constructing objects from cards called missions. These cards have characters that talk about building. I am trying to promote Science skills in the classroom. This will in the future hopefully spark an interest in your child to explore one of the science careers. I would like for you to assist me with providing activities for your child at home. Here are some suggestions for at home activities. Sit with your child and come up with ideas of things to build. Write them down (just so your child can see the print). Start collecting material tissue boxes, cereal boxes, plastic containers or you can purchase Legos and wooden blocks for building. Build different things or one great thing and keep it. The process of building is important for your child, so to repeat it several times is great. Please feel free to join us at any time during our free play and come and build.

Thank you

**Appendix D-** Storybooks for Mission Cards

1. Anholt, C. and L. (1998). What I Like. Massachusetts. Candlestick Press.  
The book encourages students to discuss likes and dislikes.
2. Kates, B. We're Different, We're The Same. (1992). New York. Random House.  
Lets the reader recognize gender differences and how much they really are the same.
3. Hoban, T. (1983). I Read Signs. New York. Scholastic Incorporated.  
This is a picture book that introduces signs to the pre-kindergarten student.
4. Sendak, M. (1991). Where The Wild Things Are. United States. HarperCollins Publishers.  
A Book that has make believes in it for the reader.