



AK Lesson Plan A- 2nd – 5th Grade

Title: Connect and Create Part I

Subject: Multiple Disciplines

Grade Level: 2nd – 5th Grades

Time Duration: 40- 50 minutes

Objective: Students will be introduced to Überstix through hands-on exploration

Materials: Überstix Components, and if desired Überstix compatible building items such as: straws, Popsicle and craft sticks, paper clips, and egg cartons.

Background Knowledge:

This is the students' first experience with Überstix at school. Their background knowledge is based on previous experiences with other types of building kits and materials.

Procedure:

- 1) Have the class freely explore Überstix with compatible building materials for 10 minutes.
- 2) Instruct each student to create one of the following: dog, giraffe, person, shark, or elephant. When they finish each creation, they should quietly share it with their desk neighbor.
- 3) Walk around the room to monitor and ask the students about what they are creating.
- 4) Next, ask each student to make one fictitious creation and share it with their neighbor. Some examples are an animal, robot, or a transport system. The possibilities are endless as long as they can describe what it is and what its functions are.
- 5) Clean up. If the class will be completing Part II of this lesson, they should keep their creations assembled.





AK Lesson Plan B- 2nd – 5th Grade

Title: Connect and Create Part II- The Use of Acronyms

Subject: English

Grade Level: 2nd – 5th Grades

Time Duration: 30 minutes

Objective: Students will gain a greater understanding of the importance and the reasoning behind the use of acronyms and practice their vocabulary words.

Materials: Fictitious Überstix creation made during the activity “Learning with Überstix- Connect and Create Part I”; Vocabulary books and/or word bank.

Background Knowledge:

*Students have been introduced to acronyms, their purpose and importance, and have discussed frequently used ones.

*Students have been exposed to and are learning numerous vocabulary words.

*Students have explored Überstix and have made specific fictitious creations.

Procedure:

1) Have each student bring their fictitious creations to their desk.

2) Instruct each student to use 3 or more words from their vocabulary book or word bank to create an acronym name for their creation. i.e. V.I.C. - Vociferous Incredible Creature

3) Allow 3+ minutes per student to share their creation and its acronym name with the class. They should explain why they chose the name and possibly describe what its function is, what species of animal it is, or why it is important.





AK Lesson Plan C- 2nd – 5th Grades

Title: Writing with Überstix Imagination

Subject: English

Grade Level: 2nd – 5th Grades

Time Duration: 1 hour

Objective: To learn and apply different character traits by writing a descriptive story

Materials: Students' acronym creation from the activities "Learning with Überstix Connect and Create I and II"; Paper and pencil; Vocabulary books and/or word bank; Highlighter- optional.

Background Knowledge:

*Students have completed the activities, "Learning with Überstix Connect and Create I and II".

*Students understand what character traits are and how they are shown in literature.

Procedure:

1) Have the students find a partner.

2) Instruct the partners to bring their acronym creature to their desks and generate a list of traits for each creature. Encourage students to reflect on traits that are seen in characters from previously read stories and which ones could be applicable to their creature; i.e. the strengths and weaknesses of a character's physical characteristics and personality traits.

3) Using 10 words from their vocabulary book or word bank, have the paired students write a 1-2 page story about a day in the life of their two creatures and their relationship. Possible relationships could be family members, friends, and/or enemies. Make sure the vocabulary words used are underlined or highlighted.

4) When all stories are completed, have the pairs present their stories to the class using their creations as visuals.





AK Lesson Plan D- 2nd Grade

Title: Introducing Science/ What is a Scientist?

Subject: Science

Grade Level: 2nd grade

Time Duration: 40 - 50 minutes

Objective: To realize that all students are scientists

Materials: paper, markers, pencil, Überstix components

Activities and Procedures:

Give the students a piece of paper, pencil and markers. Invite them to discuss what they think a scientist might look like. They can close their eyes and imagine, and think about it for about 5 minutes. Then ask them to draw a picture of what they think a scientist looks like. When they are finished, ask them to write on the paper what they think their scientists do. Ask them to share what they drew and wrote and why.

The next step is to open a discussion about what they like to create, and how they experiment and investigate. Have you created something in the past? What have you experimented with? Have you ever built your own toy? Have you ever worked with tools, cooked in the kitchen, or gone camping? What tools did you use? Let the discussion continue for about 10 minutes.

Now, give each student a variety of Überstix components. Have the students close their eyes, imagine and visualize what they could make with the parts. Let them think about what they want to create for 3 to 5 minutes. Then allow the students to start working. Time allotment is at the teacher's discretion. Make sure the students know when they only have 5 minutes left.

The last step is sharing. Let the students share what they made with the Überstix, what they named their creation and what is the purpose of their creation or why they made what they did.

Conclusions: Explain to the students that everyone is a scientist, and that means that they are scientists as well. A scientist does not have a particular look or particular behavior. Encourage the students to be eager to create, explore and discover new things in areas they have an interest.





AK Lesson Plan D- 3rd- 5th Grade

Title: Symmetry and Überstix

Subject: Math

Grade Level: 3rd – 5th grade

Time Duration: 30 minutes

Objective: Students will apply what they know about symmetry and create symmetrical shapes.

Materials: Überstix components, an example of a closed symmetrical shape.

Background Knowledge:

- The students have been learning about symmetry and have mastered the concept.
- Students understand that a closed shape is connected, as in a circle.

Procedure:

1. Review symmetry with the class.
2. Show them an example of a symmetrical shape and discuss what makes it symmetrical.
3. Tell the class that they each must use at least 20 Überstix to create a symmetrical shape and then have them begin.
4. When everyone is finished, have each of them share their shape and explain how it is symmetrical.
5. As an extension, students could talk about what it looks like, similar to how doctors use ink blots to test patients' state of mind or when looking for shapes in the clouds.





AK Lesson Plan E – 2nd Grade - PAGE 1

Title: Introduction to Simple Machines

Subject: Science

Grade Level: 2nd Grade

Time Duration: 40 – 50 minutes.

Objective: Students will understand what a simple machine is and will be able to construct a simple machine.

Materials: Überstix components, Überstix Simple Machines Lab Sheet, copies of the minipult instruction sheet, extra manipulatives for performing work with the constructed simple machine, e.g. Cheerios, Skittles, marshmallows, cotton balls, erasers, etc...

Household gadgets, i.e. corkscrew, pizza cutter or knife, nutcracker, hand mixer, hand can opener, door wedge, graduated stepping stool.

Introduction:

The teacher demonstrates a few of the 6 different types of simple machines (lever, wedge, inclined plane, pulley, wheel & axle, and screw) by showing different household gadgets and soliciting from students how these tools help people work. Überstix Simple Machines Lab Sheet should be used for definitions and explanations of the 6 different types of simple machines.

Teacher introduces the catapult and provides a brief introduction highlighting the following: Catapults use projectile motion to move objects across distances. A couple of factors can affect the distance an object can be launched, such as the mass of the object, and the amount of force used to move the object.

Force- a push or pull. A force can make something start moving, stop moving, or make it change direction.

Work- work is done when we use a force (a push or pull) to move something over a distance.

Energy- the ability to do work. If I have no energy, I can't use force to make something move!

Simple Machines make our lives easier by allowing us to use less energy and force to do work. As demonstrated with the household gadgets, there are six simple machines for performing work. The lever is one of these simple machines.

Activity: The students can work individually or the teacher can assign partners. The students will use the Überstix visual instructions to build a model of the MiniPult. Once the models are constructed, have the students test their MiniPults for distance with different objects: a cotton ball, cheerios, feather, eraser, block, etc... and discuss why certain objects are launched further than others.





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Discuss how a catapult might be used and how it can help to get work done. What determines how far your missile moves? Does it matter how heavy your missile is?

Extension Activity: Assemble the MiniPult and test it for distance.

Pick one missile (object) and repeat with the same object 5 times.

Find the average distance.

Plot all the averages for each person in the class.

Which distance was the most frequent? What was the average for the class?





AK Lesson Plan E- 3rd - 5th Grade - PAGE 1

Title: Simple Machines Explored

Subject: Math

Grade Level: 3rd through 5th grade

Time Duration: 3 to 4 blocks of 1 hour each

Objective: Students will be able to identify different types of simple machines and describe how they reduce the effort required in order to perform work.

Materials and Resources: Überstix components, Überstix Simple Machines Lab Sheet, 6 index cards with the name of a simple machine on each, Household gadgets, i.e. corkscrew, pizza cutter or knife, nutcracker, hand mixer, hand can opener, door wedge, graduated stepping stool

The Way Things Work by David McCauley
<http://www.fi.edu/qa97/spotlight3/spotlight3.html>
<http://www.teacher.scholastic.com/dirtrep/simple/index.htm>

National Education Technology Standards:
Basic operations and concepts
Technology productivity tools
Technology research tools

Introduction:
The teacher demonstrates a few of the 6 different types of simple machines (lever, wedge, inclined plane, pulley, wheel & axle, and screw) by showing different household gadgets and soliciting from students how these tools help people work.

Research:
All students read "Simple Machines" from the Franklin Institute's website,
<http://www.fi.edu/qa97/spotlight3/spotlight3.html>.

Students are divided into six groups, one for each of the six simple machines. Each group draws a card for the simple machine they will be responsible for researching.
Students have access to David McCauley's book, The Way Things Work, and the "Investigate the Facts" section of Dirtmeister's Science Reporters: Simple Machines on Scholastic Book's website,
<http://www.teacher.scholastic.com/dirtrep/simple/index.htm>.

Students use exploration to read about the mechanics of the simple machine, view pictures of examples, and watch demonstrations.





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Design: Students use Überstix components to create an example of the simple machine they are responsible for. If they wish, they can also create a separate design for a tool, either a model of an existing tool or one they invent that incorporates the simple machine.

Presentations:

Students collaborate to share their findings with the whole group. They should use their Überstix creations, visual aids, examples and demonstrations.

Assessment:

Students are given a Simple Machines Observation Sheet (as below).

Simple Machines Observation Sheet

Your Name: _____

1. What object did you create? (At home: What object did you find?)
2. What type of simple machine is it? If your object is made up of more than one simple machine, list all of them.
3. How can you tell what type of simple machine your object is?
4. How does this simple machine make a job easier?
5. There is always a “trade off” of effort with simple machines. Explain what you’re “trading off” to get the job done more easily with this simple machine.

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The class completes one observation sheet together for one of the simple machines in the classroom that the teacher has used for demonstration. Then each student completes one observation sheet for their Überstix creation that is a simple machine or that incorporates the use of a simple machine. Students then take the double-sided observation sheet home to locate and analyze another simple machine in their household.

| Evaluation | Needs improvement | Satisfactory | Exemplary |
|----------------------------------|--|---|--|
| Simple machine(s) identification | 1 or less simple machines are identified correctly | 2 simple machines are identified correctly | More than 2 simple machines are identified correctly, or at least 1 tool contains more than 1 simple machine |
| analysis of simple machine(s) | Does not describe the simple machine's role in reducing effort | Explanation of the simple machine's role in reducing effort | Explanation off the simple machine in terms of effort and forces |





AK Lesson Plan F- 2nd – 5th Grade

Title: Finding Simple Machines in Nature

Subject: Science

Grade Level: 2nd- 5th Grades

Time Duration: 40 - 50 minutes

Objective: To be able to apply knowledge of simple machines and find examples in constructed models of animals

Materials: Überstix components, Animal Kingdom instructions, paper and pencil.

Activities and Procedures:

Have the students work individually or in groups. There are enough models for 10 different groups. Each group should select one of the 5 animals to construct: Bat, Bird, Crab, Dragon, or Frog.

Students should construct the animals, thinking of the different simple machines they are constructing as they assemble their models. Have the students list the different simple machines they encounter as they construct their models, and contemplate how each one helps the animal move, eat, survive, etc...

Afterwards, each group can show off their model and demonstrate the different simple machines found and discuss how they are useful to the animal.





AK Lesson Plan G- 2nd – 5th Grade

Title: Invention

Subject: Science

Grade Level: 2nd- 5th Grades

Time Duration: 40 - 50 minutes

Objective: Invention

Materials: paper, pencil, markers, Überstix components

Activities and Procedures:

Divide the Überstix components equally among the students; as they are building, they can trade pieces as needed. Have students work individually or in pairs. Begin with an open discussion; talk about people who have invented different machines, tools, computers and electronics that help people in their every day lives. The task for each group is to make something that would be helpful in one area or another, for example, in the kitchen, basement or backyard. Encourage the students to be inventors.

Students start working in groups while a teacher is walking around the classroom and observing the cooperative work. Once the inventions are built, ask each student to draw a picture of the group's Überstix creation, take a picture of each creation, or display the creations. Then have the students name their creation (it can be a made up name) and write a few sentences underneath the image or built model describing the invention's function and purpose.

The closure:

Invite children to show and tell. Each group selects one student to tell about their creation, while others listen. When everyone is finished, collect the drawings/pictures/models and display them in the hallway with each creation's name and purpose.





AK Lesson Plan H- 2nd Grade

Title: Build and Measure

Subject: Math

Grade Level: 2nd grade

Time Duration: 40 minutes

Objective: The student will be able to design a structurally sound tower and use appropriate tools to measure its height

Materials: Überstix (same number of components for each group), rulers, yardsticks and tape measures.

Activities and Procedures:

1. Assign students to work in cooperative learning groups of two.
2. Each group will be given the exact same number of Überstix components to work with.
3. Each group has the task of constructing a free-standing tower using the Überstix components that have been distributed.
4. Each group will build a tower that stands 12 inches or taller* without it toppling over. Make sure enough components are allotted to each group to build a 12" tower.
5. Set timer and allow students to work together to complete task.
6. At set time, call stop and let the measuring begin.
7. Have rulers, yard sticks, meter sticks, and tape measures available for measuring the height of each tower. Remind students that it has to be standing to be in the competition.
8. Measurement may be in inches or centimeters.

Additional Lesson Plan Option: Have the student groups compete to build a tower of a specific height.





AK Lesson Plan H- 3rd- 5th Grade

Title: Möbius Strip

Subject: Math

Grade Level: 3rd – 5th grades

Time Duration: 40 minutes

Objective:

Materials: Überstix, Überstix Möbius Strip instructions, paper, tape, pencil, scissors

Activities and Procedures:

Take a strip of paper and some sticky tape. Turn the paper into a loop, but before you stick it down, flip one end of the paper over. This should give you a piece of paper with a half-twist in it. This is a Möbius strip.

Next build a Möbius Strip with Überstix following the instructions included in the teachers packet. Have each student build a section and then combine the sections to create one large Möbius Strip.

Mathematical Idea

A Möbius Strip is a twisted loop. A twisted loop is very different from a normal loop.

Strange Properties

The Möbius strip has only got one side. If you draw a line down the middle of the paper strip you created, until you get back to your starting point, you will find that you draw on both sides of the paper. The twist in the paper makes you change sides as you draw around.

The Möbius strip used to be common in belt drives (like a car fan belt). With an ordinary belt only the inside of the belt was in contact with the wheels, so it would wear out before the outside did. Since a Möbius strip has only one side, the wear and tear on the belt was spread out more evenly and they would last longer. However, modern belts are made from several layers of different materials, with a definite inside and outside, and do not have a twist. Similarly, the Möbius strip has only one edge. Make a mark on one point of the edge. Now start at the mark and trace along the edge with your finger. You will find that you get to the opposite point on the edge before you get back to the starting point.

Cut down the middle of the paper strip. Instead of getting two separate strips, the Möbius strip becomes one long strip. (To start the cut off, fold the strip and make a small cut, then unfold the strip and use the hole as a starting point.) This long strip has four half- twists in it. If you cut it down the middle, you get two strips wound around each other.

Similarly, the Überstix Möbius Strip has very dynamic principles that the students will have fun discovering as they manipulate it.





AK Lesson Plan I- 2nd- 5th grade

Title: Engineering and Design

Subject: Math

Grade Level: 2nd through 5th grade

Time Duration: 40- 50 minutes

Objective: The student will be able to design a structurally sound tower with maximum height as the objective.

Materials: Überstix (same type and number of components for each person/group), and measuring devices.

Activities and Procedures:

1. Depending on the number of students, have them work individually or in pairs.
2. Each student/group will be given the exact same Überstix components and the same number of components to work with.
3. Each student/group has the task of constructing a free-standing tower using the Überstix components they have been given.
4. The challenge is to build the tallest structurally sound tower possible with a limited number of pieces.
5. Set timer and allow students to complete task.
6. At set time, call stop and let the measuring begin.
7. Have rulers, yard sticks, meter sticks, and tape measures available for measuring the height of each tower. Remind students that it has to be standing and structurally sound to be in the competition.

Additional Lesson Plan Options:

Add a set number of components from another build system, such as Lego or K'nex to each student's allotment of Überstix, and have them use the combined systems to build the tallest structurally sound tower.

Add 4 straws and 2 egg cartons to the materials the students can build with.





AK Lesson Plan I- 2nd- 5th grade

Title: Engineering and Design

Subject: Math

Grade Level: 2nd through 5th grade

Time Duration: 40- 50 minutes

Objective: The student will be able to design a structurally sound tower with maximum height as the objective.

Materials: Überstix (same type and number of components for each person/group), and measuring devices.

Activities and Procedures:

1. Depending on the number of students, have them work individually or in pairs.
2. Each student/group will be given the exact same Überstix components and the same number of components to work with.
3. Each student/group has the task of constructing a free-standing tower using the Überstix components they have been given.
4. The challenge is to build the tallest structurally sound tower possible with a limited number of pieces.
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Additional Lesson Plan Options:

Add a set number of components from another build system, such as Lego or K'nex to each student's allotment of Überstix, and have them use the combined systems to build the tallest structurally sound tower.

Add 4 straws and 2 egg cartons to the materials the students can build with.





AK Lesson Plan J- 2nd- 5th grade

Title: Communication

Subject: Language Arts

Grade Level: 1st Grade

Time Duration: 30 - 50 minutes.

Objective: Students will experience giving and taking instruction and the results of communication.

Materials: Pak#1 Überstix components

Activities and Procedures:

Step 1) Building from Visual Instructions- Select one of the 6 Pak#1 models to build. Have each student build the chosen model from the visual picture.

Step 2) Building with verbal feed back. Have the children work in pairs with each student having 1 Pak#1 kit. Arrange the children so that they can hear each other but not see the other's pieces or building area (Suggestions are to sit back to back, or have a book or folder between each pair.)

The first person picks a piece, explains which it is and where it is being placed.

Second person follows the verbal instructions of the first person (without peeking). Then, the second person chooses a piece and builds it on the project, describing the piece and its position.

First person listens to the instructions and builds the same thing. (No looking.) In doing this project be sure the children ask questions to be sure they have the pieces in the exact same place and direction.

Keep alternating until all the pieces are used. Then the children look at each other's object and see how many pieces are in the same place.

Step 3) Building with no verbal feedback.

Do the same as above but this time only the person whose turn it is to pick, place, and describe gets to talk. No questions. No feed back.

-After all the pieces are placed look at each other's objects and see how many pieces are in the same places.

Step 4) Discussion.

Discuss which way works the best :1) just seeing flat instructions, 2) hearing and asking questions, 3) or just hearing.

