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A Technology Education Project

Module 1: Message in a bottle – Rise to the challenge!

Tip: Hide the message in a bottle and only reveal it as the story progresses. If any of the students want to open the message and read it, let them. Otherwise, you can read the message aloud for the whole class.

Story:

Day is dawning on a faraway planet. The Kip crew wake up, eager to start a new day. Today, they've decided to meet on the shore of a nearby lake. What interesting things will the day bring?

The first one to approach the lake is Tuka. She runs at great speed and easily jumps over large rocks. If you listen very carefully, you can hear a strange buzzing sound coming from the other direction. That's Maco. Once again, he's developed some kind of new contraption to cool the hot air. Waaba is the third one to drift onto the scene with a cheerful yet distracted smile. As usual, she's clearly dreaming about the future. But where on earth is Soca?

The three friends look around, trying to find the final member of their crew. They're used to this shy guy suddenly appearing from the strangest and most surprising places. Eventually, Maco notices that one of the rocks on the shore seems to be moving. So that's where Soca is! His funny transformation trick has worked again. The whole crew burst out into chuckles. By the way, did you know that Soca is the most talented transformer on the entire planet? Even better than the most skilled chameleon!

Just as they find Soca, Tuka notices something bright floating in the water, a little further out from the shore. "Look! There's something bobbing about strangely in the waves!" Soon, everyone is staring intently at the object that Tuka has pointed out. "A message in a bottle! But how on earth are we going to get it onto the shore?" wonders Soca. Tuka shows off her strength, flexes her bulging arm muscles and says that she'll handle this in the blink of an eye. She reaches and reaches for the bottle... until she flops onto the damp sand, right on her stomach. (Oops! That was a mistake!) Tuka brushes the water off herself and then starts laughing with the others at her funny mishap. She realises that using strength won't help in this situation. They need a completely different kind of superpower. Maco has an idea: why not use Waaba's superpower for this? Yes! The crew's only talented flier immediately takes to the air and soars over the water.

With Waaba's help, it's not long before the bottle has been brought ashore and the friends have opened it. The message inside is written very strangely, but it seems important:

(The teacher has taken out the bottle and one of the students gets to open the bottle and read the message! After the message has been read, the story continues...)

“Hmm... Who on earth is this Smeek the L D I Z A R who’s contacting us once again?” Tuka wonders aloud, before continuing: “It doesn’t matter – our super team is needed again! The Kip crew is ready for this mission!” “Of course we’re going to take part and shoulder our responsibility for this! Let’s help those in need!” Maco adds. “But I don’t think we can manage this without backup,” says Soca, cautiously. “We can only build one machine. Who can help us? I wonder if there’s anyone else around here who would be keen to build a moving machine?”

Discussion tips: 1) Is everyone willing to help the Kip crew with this project? Is everyone prepared to take responsibility and contribute to the team effort with their activity and output? If someone doesn’t feel ready, how can everyone work together to support them? 2) What does ‘recycled material’ mean? What materials can you reuse before they end up as waste? Can you still send a message in a bottle these days? Why is it important to protect the sea and nature? Think about this from the perspective of building a sustainable future.

News links:
1) Message in a bottle
https://en.wikipedia.org/wiki/Message_in_a_bottle
2) Clothes out of plastic bottles
https://blaino.wordpress.com/2011/03/05/earthtec-used-plastic-bottles-to-clothes/
https://earth911.com/eco-tech/bottles-are-recycled-into-clothing/

Game: “The Kip crew’s letter game”

Get into teams of 3 to 4 people. Form as many letters as you can using your own bodies. You can use more than one person to create a letter.

Exercise:

Form the letters L, D, I, Z, A, and R using wooden sticks. Can you work out who sent the message by rearranging the letters? Can you build the letters so they stand upright? Did it work? What could be helpful? (Blu Tack? Frozen peas?) **Tip**: continue the construction project using sticks and peas! What’s the biggest and tallest single structure that you can build?

Suggestion for pre-schooler cooperation: “Smeek tag”

One person is ‘it’. When someone gets caught, they have to form the letter S (using either their hands or their whole body) and then hiss. Rescuing people: someone runs opposite the person who was caught and makes the same kind of letter S.

Suggestion for mentoring cooperation:

Paint (or otherwise mark) the aforementioned wooden sticks so that the pair always has 5 blue sticks and 5 red sticks. How many different decompositions can you do using the red and blue sticks? (Decompositions of the number 5.)You can also use the red and blue sticks to help you invent some short addition and subtraction stories.

Oops! That was a mistake!

Discuss what mistakes are and how it feels to make a mistake. What can you do if your friend makes a mistake? Is there anyone here who’s never ever made a single mistake? Can you find the “Oops! Mistake!” sign in your student workbook? If a student makes a mistake during the module and learns from it, they can colour in the sign. Did anyone get a photo or video of their mistake?

Documentation:

Take pictures of the stick letters or decompositions. Also take photos of the structures that you build with sticks and peas. Save these photos in your own learning portfolio. Think about all the new things you've learnt during this module!

Homework:

1) Search your home for things that you can find at least five of. All five items should look the same. You can either photograph, draw or write about them. Ask a parent or guardian for help!

2) Bring some cardboard tubes from home (for example, from toilet rolls, kitchen towel and aluminium foil, or a potato chip tube without the end).

Message for parents:

"The first stage in our journey with the Kip crew is now behind us. First, we solved a riddle that arrived as a message in a bottle. Through games and activities, we practiced cooperative skills, English and maths. We used wooden sticks to build structures, practice decompositions of the number 5, and do small addition and subtraction sums using the numbers 1–10. We also documented what we did and discussed what inclusion, responsibility and sustainable development mean in this context. Our homework is to search our homes for things that we can find at least five of. All five items should look the same. Parents can be assistant detectives! The objects can be photographed, drawn or described in writing. During this module, we should also bring a variety of cardboard tubes to school for a future machine construction project (for example, from toilet rolls, kitchen towel and aluminium foil, or a potato chip tube without the end). We also need some kind of bag in which we can store our supplies while we're waiting to start the construction phase."

CURRICULUM

When doing this module's activities with your students, you should note the following objectives and content for elementary instruction:

- TC7: inclusion, responsibility, building a sustainable future
- ENG: sounds, letters, developing reading and writing skills
- MA: decompositions of the number 5, small addition and subtraction sums using the numbers 1–10
- ENV: developing environmental sensitivity and acting in a sustainable manner

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Module 2: **Emotions – Preparing for a new project.**

Story:

The Kip crewmembers are still sitting on rocks by the lake, studying the message. They're wondering what this mission really means. Soca feels that making a moving machine is a really big and slightly scary task. And the gala sounds terribly exciting. But by working together, the crew believes they can cope with this challenge! Especially now that they've recruited a bunch of eager assistants to help them in their construction project. (Thank you, students!) Smeek has sent them missions before, and Tuka, Maco, Waaba and Soca have discovered that you always learn something new when you work together to solve problems. Not just about yourself, but also about others. And besides, trying out things together is a lot of fun!

So the happy and excited Kip crew head for Maco's house. The best place to build the machine will be somewhere where they can find all kinds of material that can be recycled. By the way, did you know that Maco always saves everything! He can't bear to part with anything.

But oh no, Maco is embarrassed to open his front door. There's a terrible mess inside. All the things left over from his last construction project are still scattered higgledy-piggledy all over the house. As Maco's friends step inside, they try to avoid his junk traps. There are lots of emotions in the air. The mess doesn't bother Waaba! She gracefully floats above everything, already happily dreaming of the sparkling gala event. Maco is more annoyed with Waaba's constant daydreaming than with the actual mess! He wants everyone to focus on the essentials and stay in the moment. Tuka is showing off her skills again. Soca is feeling anxious about both the jumble of things and the jumble of emotions. He tries to hang back on the stairs outside.

"Maco, you're a right mucky pup!" Tuka shouts angrily. (Oops! That was a mistake!) Maco feels sad and hurt, and starts to cry. Before Tuka realises that she has made a mistake, Waaba has already run over to comfort Maco. "Oh dear, it's nothing to worry about! It's true that everything is all higgledy-piggledy in here, but there are nicer ways of saying that you need to tidy up!"
Maco's friends are right. They need to clean up the mess before they can start any kind of new construction project at Maco's house. They won't be able to find the materials they need unless they tidy up the mess and put everything back in its proper place. Waaba shouts: "Hey Soca, where are you? Come inside! We need your superpower. A little tornado would come in handy right now!"

Soca is delighted at the suggestion and springs into the house, sending a mini tornado into the living room. He steers the whirlwind so skilfully that all the things end up in a neat pile in the middle of the floor. Now it's easy to put them back in their proper place.

Tuka's anger has subsided as quickly as it started. She has also realised that she needs to say sorry for her nasty words, and her apology has made Maco feel better. Tuka proudly takes up the reins and leads the team into action. Her strength is now required to organise the heavy objects. Maco is also surprised how quickly dreamy Waaba has managed to make the whole kitchen sparkling clean. Not a dirty dish in sight! Maco has made his bed and organised the shoes in the hallway into a neat row.

Discussion tips:
1) What sort of emotions are there? How can you tell if you've made someone else feel bad? Why is it important to pay attention to other people's feelings? How can you let your emotions out and deal with them? What things make you happy and put you in a good mood?
2) Why is it important to clean up after your last project before you start a new one?

News links:
Feelings and emotions
https://thisworks.fi/fev
https://thisworks.fi/sad

Game: "Waaba's emotion game"

As the music plays, the players walk around the room. When the music stops, the leader shouts out an emotion: sadness, hate, happiness, fear, satisfaction, etc. The players must then freeze and use body language to express that emotion.

Exercise: "Maco's housework bingo"

Print out one bingo board for each team. The bingo board contains a total of nine household chores. First discuss the chores together, and then share them out between the team members. Also remember to return to the household chores and events in the story.

Suggestion for pre-schooler cooperation: "Emotional pantomime"

In pairs or teams. One student takes an emotion card and then acts out that emotion without using any sounds or words. Their partner or other team members must guess what the emotion is. Print out the emotion cards from the material pack!

Suggestion for mentoring cooperation: "An emotional guide for my robot friend"

You can find a ready-prepared emotional grid in the material pack. You should also use the emotional pantomime cards for this exercise. Split the students into pairs. The mentor will first act as the guide, and picks up an emotion card. The first grader chooses which corner of the grid they want to start from. The mentor's task is to guide their partner to the image on the grid that matches the emotion shown on the card. They should give clear instructions, one at a time.(For example, one step forwards. Turn left. Two steps forwards. Turn right. And so on.) **Tip**: You can start the coding exercise by using the same clear instructions to guide your partner from their seat to perform some task, like washing their hands or sharpening a pencil over the bin.

Oops! That was a mistake!

What mistake did Tuka make? How can you clear up this kind of mistake? Did you make any mistakes during this module's tasks? What did you learn from your mistake? If a student has made a mistake and learnt from it, they can colour in the "Oops! Mistake!" sign. Did anyone get a photo or video of their mistake?

Documentation

Take before and after pictures of the household chores! Store them in your own learning portfolio. Did you learn anything new during this module?

Homework:

1) Housework bingo. Photograph, draw or write about the household chores that you did. Tip: Take before and after pictures. Ask your parents to check the results of your work. When you've completed a chore, you can cross it off on the bingo board.

2) Bring some round lids or caps from home (such as jar lids, milk carton caps, round lids from plastic tubs).

Message for parents:

During the second module, we practiced emotional skills and got some household chores to do for homework. We shared out the tasks from our housework bingo among the members of our small team. You can help us by checking the results of our work! Now that we've completed the tasks and exercises for this module, we can bring more recycled materials from home for our machine. This time, we need all kinds of round lids and caps (such as jar lids, milk carton caps, round lids from plastic tubs).

CURRICULUM:

When doing this module's activities with your students, you should note the following objectives and content for elementary instruction:

- TC3 self-care and managing everyday life, emotional skills
- MA: making observations from a mathematical perspective, writing step-by-step instructions and following instructions

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Module 3: The jar lid – Together we're more!

Tip: Everyone can form a circle with their hands together and shout the Kip salute from the story!

Story:

Phew, that was quite a job! But now the mess has been cleaned up and all the housework has been done! Maco's home is now ready for some new construction. Maco is already eagerly awaiting his friends and meets them at the front door. He greets everyone politely, and then Tuka leads them all in an enthusiastic team salute to boost their team spirit: "Form a circle, paws together and shout Kip!" This booming salute is Tuka, Maco, Waaba and Soca's fun and cheerful way of greeting each other, whenever the mood strikes them. (Tip: Kip salute in a circle.)

The crew begin by searching for different kinds of materials for their moving machine of the future. "Hey guys, look what I found!," Waaba says, flying around the kitchen with a swaying tower of objects in her arms. But oh dear, Waaba's flight ends abruptly when she brakes too suddenly and all the items fly around the room. (Oops! That was a mistake!) This time, Tuka's superpowers are required. Thanks to her ultra-quick reflexes, only one object disappears behind the cabinet. Tuka manages to catch all the rest.

The Kip crewmembers gather around the cabinet for a group discussion. What did they lose behind the cabinet? Soca thinks aloud:
"Hmm, it actually rolled quite a long way from the other side of the room." Maco peers under the cabinet to get a better look. Tuka tries to move the cabinet, but not even her strength is enough for this. And no wonder, because the cabinet is screwed to the kitchen wall! "Which one of us is the smallest? Soca! You try and crawl behind the cabinet!" Tuka suggests. Soca sucks in his stomach and struggles to squeeze himself between the cabinet and the wall, but the gap is too small.
(Which one of the crew could help?) "Hey, I know," shouts Maco. Once again, he's come up with a solution. "Waaba can use her superpower and move the object with the power of her mind." Waaba concentrates all of her power on the problem and it's not long before a small, round jar lid rolls out from behind the cabinet.

Discussion tips:
1) Why do people greet each other? What different kinds of greetings do you know? What other good manners should you follow when you're dealing with other people?
2) Can people have the same superpower as Waaba? Could someone really move an object with only the power of their mind?

News links:
1) A device that reads you mind
https://www.wired.com/story/machine-reads-your-mind-talks/
https://www.fastcompany.com/90388440/mind-reading-technology-is-closer-than-you-think

2) How to say hello
https://www.babbel.com/en/magazine/how-to-say-hello-in-10-different-languages

Game

Each team invents their own special way of greeting each other. The teams can then present their greetings to the other teams! Can you come up with one more shared greeting for the entire class? **Tip:** Video the greetings and save them!

Exercise

1) In your teams, compare the round lids and caps that you all brought from home. Which is the largest and the smallest? Which ones are the same size? Sort the lids and caps into suitable stacks. How many different stacks are there? How many lids and caps are there in each stack? 2) Take turns rolling the different-sized lids and caps along the floor. (NOTE! Roll them, don't throw them or slide them!) Measure the longest and shortest distance that they rolled. Will a ruler be long enough or do you need a metre rule or even a tape measure? **Tip:** 1) Use masking tape to draw a line on the floor some distance away. Take turns and see who can roll their chosen lid onto the line. The winner is the one who gets their lid closest to the line! 2) Try to roll other objects you can find in the classroom (that aren't round!) Before you try, think what might happen. After the exercise, have a group discussion (either in your teams or with the whole class) about why objects of one shape roll better than objects of another shape.

Suggestion for pre-schooler cooperation: "The Kip crew greeting game":

Everyone walks around the room. When the teacher gives the signal, the students should greet the closest person and say their own name. **Tip**: You can adapt this game. Work with the students to come up with different ways of moving and greeting each other.

Suggestion for mentoring cooperation:

Use masking tape to stick a cardboard heart on every student's back. The students should move around the room and write nice things on each other's cardboard hearts (with the mentor's help). **Tip:** Mentors can also have their own hearts!

Oops! That was a mistake!

What mistake did Waaba make? What could she do differently next time to avoid making the same mistake again? Has the teacher made a mistake in this module? What did the teacher learn from their mistake?

Documentation:

Photograph the stacks of lids and caps, and also take photos while you're rolling them and other objects. Don't forget your mistakes! Everyone can also photograph their own cardboard heart and store it in their own learning portfolio. Think: what new things have you learnt during this module?

Homework:

Homework: 1) What kinds of good manners do you follow at home? Discuss this with your parents, and then write about or draw them. You could also invent a new family greeting! 2) Bring some egg boxes or other cardboard from home (such as boxes or milk cartons).

Message for parents:

During the third module, we've practiced treating other people with respect and other good manners. We worked together to invent a variety of different greetings. They were fun! We can also invent a similar family greeting at home. Our homework is to have a discussion with our parents about the good manners that we follow in our family. We can either write about them or draw them. Now that we've completed the tasks and exercises for this module, we can bring in more recycled materials for our machine. This time we need egg boxes or other cardboard boxes and cartons.

CURRICULUM:

When doing this module's activities with your students, you should note the following objectives and content for elementary instruction:

- TC2: treating others with respect, interpersonal skills, good manners, self-expression
- MA: practicing sequential skills, finding differences and regularities, making comparisons, taking measurements
- ENV: research and experimentation, problem-solving

This is based on the Finnish National Curriculum

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Module 4: **Shapes – Stacking the materials.**

Story:

As usual, Tuka is running towards Maco's house at high speed. She has her sights set on the distant horizon, and almost squashes a tiny, cute snail. But luckily, Tuka notices the terrified creature at the last moment and is able to stretch her foot over the snail. Tuka stops to admire the creature, which stares up at her with big eyes and blinks its long lashes. The lamplight is so dim that it's extremely dangerous for the snail to be moving around in dusky dawn. Tuka decides to save the snail's life and lifts the tiny, slimy creature into the palm of her hand. She carefully carries it over to the other side of the road, and places it safely on the ground next to a mailbox. And it was lucky that she did so, because just then someone comes shooting out from behind a large building on a hover board! "I don't think a little snail knows much about pedestrian crossings and traffic signs!" This is the conclusion that Tuka reaches as she continues on her journey.

The doorbell rings. Unusually, Tuka is the last one to arrive at Maco's house. The others are already there, sitting in a circle on the living room floor and waiting for her. Maco has been digging through his cupboards and has collected a huge amount of building materials in some large cardboard boxes. "What are we going to do with these? Where shall we start?" Waaba asks happily. Maco has an idea. His superpower always appears when there's a need for creativity and complex thinking. Maco suggests that they should sort the materials into different stacks according to their geometric shapes. It will then be much easier to form a good picture of the different parts of the machine and start the actual construction.

Waaba is keen to collect all the round and curved shapes, and is already rolling them into a pile. Maco is more systematic, and chooses to stack all of the square shapes. He shares his knowledge by giving the others some more detailed information. His stack will only have shapes whose sides are exactly the same length and whose corners are exactly the same size. Tuka chooses rectangles, because moving them seems to require the most strength – at least, at first glance. Once again, Soca hasn't had time to choose anything, as he hasn't been able to get a word out of his mouth. He's left with triangles. "I wonder if there are any triangular surfaces at all in the pile of materials?" he thinks to himself.

When all of the material in the boxes has been sorted into neat stacks, Tuka starts showing off about the height of her stack. She's sure that she's collected the most objects. Maco disagrees with Tuka about the number of items. Waaba suggests that, to solve the problem, everyone should count the number of items in their stack. Maco agrees, and fetches a pen and some squared paper. Everyone should colour in the same number of squares as there are objects in their stack.

To everyone's surprise, in the middle of the calculation process Maco announces that he's made a blunder. He has accidentally collected one of Tuka's rectangles. (Oops! That was a mistake!) The crew spend a few moments discussing the difference between a square and a rectangle. Maco laughs and hands over the rectangle to Tuka. Tuka is even more excited, and adds another coloured square to her column.

Discussion tips:
1) What does creativity mean? Which superpowers or skills does each character have? And what skills do the students have? Why is it important for a team to have members with different skills? What if everyone had exactly the same 'superpowers'?
2) What does pedestrian crossing mean? What kind of road sign marks a pedestrian crossing?

Game: "Soca's shape game"

Lay some shapes on the floor (squares, triangles, circles and rectangles of size A3 or A4). You can find some templates in the material pack. When the teacher turns on the music, the children move freely around the room. When the music stops, the teacher gives a command: for example, stroke a circle with your fingertip, touch a triangle with your elbow, tap a square with your left hand. More than one child can use the same shape at the same time! **Tip**: The teacher can demonstrate, but the students can also lead the game.

Exercise: "Sewing diagram"

You can find the sewing diagrams in the material pack. Print out the diagrams and glue them onto some cardboard. Use a sharp needle to pierce the holes, and a sewing needle and cotton thread for sewing. The student can choose whether to do an easier or more difficult picture. At the beginning, you should practice tying a knot and threading the needle. **Tip:** Think about how you could use a needle and thread in the actual construction project.

Suggestion for pre-schooler cooperation: "Tuka and Maco's comparison game"

The teacher uses masking tape to draw two lines on the floor and gives instructions to the students: for example, students with short hair should go to one line and students with long hair to the other line. Which are there more of? Those students should, for example, jump, squat, stand up or wave.) Compare various things and characteristics, for example, long/short hair, skirts/trousers, socks/slippers, jeans/tracksuits. (NOTE! No personal or personality-related characteristics!) Tip: You can also compare objects in pairs. Whose pen is the longest? Give a thumbs up. Whose backpack is the heaviest? Do a squat.

Suggestion for mentoring cooperation: "Geometric shape hunting"

The students take a tour of the school with the mentor and look for different geometric shapes (square, triangle, circle and rectangle). You can find a printable template in the material pack. Name the things and objects that you find. Can you draw the number of objects as a bar chart on squared paper? What shapes did you find most of?

Oops! That was a mistake!

What mistake did Maco make? What was the consequence? Can you laugh at your own mistake? Can you laugh at someone else's mistake?

Documentation

Take pictures of the different shapes that you find at school and save them in your own portfolio! Also take a picture of yourself that shows your own “superpower” or strength! (Either a selfie or with help from a friend.) Remember to save your superpower photo in your portfolio as well! Think about what new things you’ve learnt during this module.

Homework

1) Look around carefully on your way to or from school. What things and objects can you find that were built by people? Photograph, draw or write about them. Can you find any familiar geometric shapes in these pictures? Add these photos to your portfolio! **Tip**: Take a really good look around you! Can you find any litter dropped by people? Pick up the litter and sort the waste with your teacher. You’re doing a great service to the environment!
2) Bring more materials from home: string, thread, fishing line, rubber bands, etc.

Message for parents:

During the fourth module, the Kip crew took us on a trip to make observations about the surrounding area and mathematical plane geometry. In this module’s group exercise, we practiced some finger dexterity that required great precision. Ask your child whether they chose the easier or the more difficult sewing diagram. In your child’s opinion, did they make the right decision or should they have chosen the other option? Threading a needle requires persistence and practice – we also learnt those! Our homework for this module is to examine things and objects built by people on our way to or from school. We can photograph them, draw them or write about them. We were also asked to be observant and do a great service to nature if we saw any litter on the way. After successfully completing our skills exercises, it’s now time to bring in some more material for our machines: This time we should bring a variety of things like string, thread, fishing line and rubber bands from home.

CURRICULUM:

When doing this module’s activities with your students, you should note the following objectives and content for elementary instruction:

- **TC1: making observations, using information to solve problems and draw conclusions**
- **MA: plane geometry, drawing a bar chart, making comparisons**
- **HC: experimenting with different materials, working safely and responsibly**
- **ENV: observing the built environment and building a sustainable future**

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Module 5: An exciting basement - Design your machine.

Story:

A new day dawns. Tuka, Maco and Waaba have gathered in the usual place, but they're feeling even more excited than normal. Today, Maco has promised to show them an exciting place that they've never seen before. "Follow the leader!" shouts Maco, as he leads them down a narrow spiral staircase into the dark, damp basement. Luckily, he lights a miracle lamp that sounds a warning whenever there's a spider or water dripping from the ceiling. "This is so exciting!" Waaba yells, as cheerful as usual. "Why are we even coming down here?" Soca asks doubtfully. In his opinion, this is exactly the kind of place where unexpected things can happen. However, encouraged by the others, he dares to continue the journey into the unknown.

"Wait a moment! It must be somewhere around here!" shouts Maco, and continues to plunge deeper into the basement. Tuka has been given the task of carrying a piece of timber, which goes snick-snack as she walks. "I should have guessed!" Soca is quite sure that the timber will break at any moment. He wants to get out of the basement as quickly as possible, but he can't imagine returning up the dark stairs alone. Just then, to Soca's relief, Maco returns carrying a dusty chest in his arms. The whole Kip crew heads back upstairs.

Maco rummages excitedly through his treasure chest and throws out all manner of objects. The first thing that flies out of the box is a soft, green feather. A small, round, blue button shoots out next... and hits Waaba right in the forehead: "Ouch!" (Oops! That was a mistake!) They all burst out laughing. Luckily it didn't hit her in the eye! Maco says sorry and promises to calm down. He continues looking for treasure, but more carefully and without throwing things around. Finally, the crew find a whole load of things in front of them in addition to the button and colourful feathers. There are also sticks, small rocks, dry leaves, flowers and hay. There is also a great assortment of strings and threads, fishing line and stretchy rubber bands!

As Tuka stares at all the material, her fingers are already itching to get started. She suggests that the crew should get to work right away. But Maco reminds Tuka of an important task that they have to do before they can start building the machine. "A well-planned job is half done!" That's the first step. Maco goes to his design cupboard and fetches a piece of paper and a pencil for each member of the crew. Everyone can draw their own design for the kind of machine they want to build. Waaba has one more important question before she can start drawing: "So what does 'a moving machine' mean?" That's a good question to think about together!

Waaba is working on her own design using light, circular motions. The others are finding it difficult to picture an image in their minds, but Waaba has a clear idea of what she's going to build. Her design shows a fun and happy machine that moves on spinning wheels.

Soca has drawn a simple sketch of a machine for growing flowers. The moving part in his machine is a lid that opens when you pull a string. Soca can already picture all the flowers that his machine will grow, and he can't wait to practice his language skills with them. By the way, did you know that Soca is the only member of the Kip crew who can speak the language of flowers and animals?

Maco's design is very precise and full of tiny details. His problem-solving robot moves and talks when you press a square button. Tuka draws so quickly that she has finished her entire design before the others have even started. Tuka has designed a catapult that shoots things as fast as a rocket using a doubled rubber band.

Looking at their amazing designs, Waaba realises they're going to need some soft and flexible materials to wrap around the different parts. She promises to bring some with her next time!

Discussion tips: Why is planning an important part of the job? In what ways can you plan your own work? What does 'a moving machine' mean? When you work in a team, does the team always need a leader? Is the leader always the same person or character? What other roles can there be in the team, in addition to the leader?

Newslink:
www.thisworks.fi/spiders

Game: "Follow Maco"

The team members form a line and the student at the front of the line makes some different movements: such as walking on their tiptoes, crawling, walking sideways, stomping their feet, clapping their hands. The other members of the team follow the leader, copying their movements. **Tip:** Try playing the game with the whole class at once. Can you follow the leader as easily in a long line as you did in a short line?

Exercise:

Design your very own moving machines of the future. Use white paper and pencils. **Tip:** You can also use information and communication technology to create your designs, or build a three-dimensional model out of plasticine.

Suggestion for pre-schooler cooperation:

Go outside in small teams and collect five natural materials of different types and weights (such as leaves, small stones, sticks, moss, feathers, hay, berries, flowers). Place a bucket or basket about a metre away from the team members. They should then try to throw each type of material into the bucket, one at a time. **Tip:** Before throwing an object, the team should come up with a hypothesis. After the exercise, think about why some materials flew into the bucket more easily than others.

Suggestion for mentoring cooperation: "Waaba's drawing school"

The mentor and student form a pair. One is the artist, the other is the instructor. The teacher draws or projects a simple picture on the board. The artist has their back to the board. The instructor gives simple commands to the artist. Based on these instructions, the student will try to draw the same shape as the teacher. You aren't allowed to say the name of the shape! The whole class can admire the finished drawings together.

Oops! That was a mistake!

What mistake was made in this module's story? Are mistakes made by accident or on purpose? Or can they be both? How can you say sorry if you made a mistake by accident? Did you make any mistakes by accident in this module? How did you handle them?

Documentation

Take a photo of your own design and save it in your portfolio. Also take a photo of the den you built at home!

Homework

1) Make your own den at home and take photos. Ask your parents for help! Tell the other students at school about your den. Did your den have a roof? How many walls did it have? And what kind of doorway? Could you fit inside it? **Tip:** You can also write about your den: a few words or sentences, or even a short story. Who do you think might live in the den?
2) Bring some flexible materials from home (such as foil, empty coffee packages, fabric).

Message for parents

This module, Tuka, Maco, Waaba and Soca led us down into an exciting basement at Maco's house. Among the spiders and the water dripping from the ceiling, they found a treasure chest that was full of suitable construction materials. This module, we practiced cooperative skills and following instructions. We also got to draw designs for our very own moving machines! Our homework for this module is to build a den at home. We could use things such as chairs and blankets, or maybe even wood and nails if we have some help. We'd like you to help us build our dens. Now that we've completed the tasks and exercises for this module, we should bring in some flexible materials for our machine (such as foil, empty coffee packages and fabric).

CURRICULUM:

When doing this module's activities with your students, you should note the following objectives and content for elementary instruction:

- **TC5: practical ICT skills and own output**
- **ENV: research and experimentation, problem-solving**
- **MA: writing step-by-step instructions and following instructions**
- **HC: planning, learning how to use ICT as part of creative and documentation processes**

This is based on the Finnish National Curriculum

This Works!

A Technology Education Project

Module 7: Breaktime workout – The machine is ready.

Story:

Refreshed by a good night's sleep, the Kip crewmembers are ready to begin the final day of construction. Maco is going to be the work supervisor today. He gives his friends clear and detailed instructions on what they should do next. He sounds so funny, almost as if he's controlling robots: "Tuka, take a toilet roll tube from behind the box. Turn around. Take two steps forwards. Turn right. Place the toilet roll tube on top of the egg box. Soca, take two steps backwards. Turn right. Take four steps forwards. Pick up the milk carton caps. Turn around. Take three steps forwards. Turn left. Place the caps inside the circles that are in the box." (Haven't we heard these kinds of instructions in class before? Yes, if you did the module 2 mentoring exercise!)

Time passes quickly, and detailed work can sometimes make you feel a bit tired. No worries – Tuka always has some breaktime workouts up her sleeve to restore everyone's energy levels. "Hands up, hands down, squat and rise! Bottom out, knees together, bounce around in a circle! Wave your hands, move your legs, shake your antenna! Do a side stretch, now the other side, and back to your place!" Phew! After waving their arms and legs around like that for a bit, their dexterity has returned!

It's now time for the Kip crew to put the finishing touches to their machine. Waaba paints the machine in cheerful colours with long, curving brushstrokes. "Who would like to fetch more green paint?" Waaba asks. "Me!" Soca yells excitedly, and charges towards the storage cupboard. But oh no! As he gets up, he accidentally kicks the blue paint pot over. Paint splashes all over the place, and Maco's orange belly gets splattered in funny blue spots. (Oops! That was a mistake!) Everyone laughs at how funny Maco looks. "Oh well, at least the machine didn't catch this spotty disease," Maco says grinning, and hurries off to wash himself. As Maco rubs his hands with soap, a cup in the sink starts to fill with a cluster of different-sized soap bubbles. Maco gets an irresistible idea! He grabs one of the watercolour brushes that is waiting to be washed and carefully starts to paint individual bubbles. Wow, that colourful cluster of soap bubbles looks amazing! Excited, he calls the others over to admire his beautiful artwork!

At last, when the final piece of foil and the last bead has been glued into place, the machine is finally ready! Wow, it looks great! And yes, it really does move! The Kip crew rejoices, as their construction project has been completed right on schedule. All that's left is to pack the machine up carefully. They do this calmly and thoughtfully. When the machine has been protected and packaged, they write on the lid in clear handwriting: "Smeek the Lizard. Machine Gala."

Waaba remembers that there is still one really important thing left to do. Ah yes! The Kip crew searches for the prettiest piece of paper that Maco has in his house. Together, they sketch the journey that they have made together. They draw the message in a bottle at the beginning of the path and the Gala at the end. They write the crew's name at the top. In the middle section, they give details about all the things they've learnt on their shared voyage. Each member of the crew signs their name along the bottom edge of the paper: Tuka, Maco, Waaba and Soca.

And finally – for the last time during this journey – the Kip crew shout their cheerful salute: “Form a circle, paws together and shout Kip!”

Discussion tips: Why is it important to do some exercise during breaktimes? What other things could you do to maintain your concentration and stay alert? What does ‘Gala’ mean? In this case, could it be more like a machine trade fair? Who should be invited to the gala? Parents, the principal, mentors, and maybe some other important people? When is the Gala? What is the programme for the Gala?

Newslink: What do colors mean? https://www.thisworks.fi/color

Game: “The Kip crew’s communication game”

In this game, we’re going to model different programming languages with symbols. You can find ready-made symbol chains in the material pack. First, work together to decide what each symbol means and then follow the instructions (for example, a square means jump with both legs, a triangle means do a squat, a circle means clapping).

Exercise:

Before you continue building your machine, you can try Maco’s soap bubble painting! Give the team a glass or small cup full of water and a little liquid soap. Use a straw to carefully blow some bubbles in the water. Then very carefully colour individual bubbles using small paintbrushes. You can use watercolours or gouache. Do you need a little or a lot of water on your brush? And what about paint? Try it and see! Can you paint bubbles that are next to each other in different colours, or will the colours mix? What will happen to your artwork in the end? Watch it and see what happens.

Suggestion for pre-schooler cooperation: “Tuka’s breaktime workout”

In your teams, make up your own breaktime workout. You can use the symbols from the communication game or invent your own symbols and meanings. Write the instructions for each symbol on a piece of paper. Present your breaktime workout to the other teams.

Suggestion for mentor cooperation

Put the finishing touches to the moving machine.

Oops! That was a mistake!

What mistakes have been made during your shared journey? What have you learnt from them? Why are mistakes important? Are you afraid of making a mistake?

Documentation:

Take a photo of your soap bubble artwork and save it in your portfolio. Also take photos while you’re building your machine, and of the finished machine. Save these pictures after the other photos of your machine. **Tip:** Do pictures help you remember everything that has happened on the journey? Did the finished machine look the same as in your design? Which of the learning moments that happened during our journey was the most important for you? What was your team’s shared star moment? What was the moment when each person learned the most? Where there any moments that weren’t very nice? Did everyone manage to document their own strengths?

Homework:

Take the Gala invitation home! You can find a ready-made suggestion in the material pack, but it would be great if every student could make their very own invitation! NOTE! Don't forget to send an invitation to the principal as well. There's a ready-made invitation in the material pack.

Message for parents

Our shared journey with the Kip crew is coming to an end. During this last module, we developed our multi-literacy skills and got an introduction to coding by modelling a programming language with the aid of a symbol system. We invented some fun morning workouts for robots and demonstrated them to each other. Our exercise for this module was to colour some small soap bubbles. We made some beautiful artwork! In our teams, we finished our moving machines and added the final photos to our portfolios. We discussed what kind of learning moments we'd encountered along the way, what had been the most important moment for each student, and what had taught us the most. We also planned the upcoming Gala together – and you're also invited. There was no homework for our project this module, but we hope that we'll continue to share fun learning moments with our parents at home anyway. Thanks for your contribution to the This Works! learning programme! We're looking forward to showing you what we've accomplished. See you soon!"

CURRICULUM:

When doing this module's activities with your students, you should note the following objectives and content for elementary instruction:

- **TC4: conveying information using a variety of symbol systems**
- **MA: geometry, writing step-by-step instructions and following instructions**
- **ENV: researching phenomena, research problems**

This is based on the Finnish National Curriculum

THIS WORKS!

A Technology Education Project

Module 6: Jobs of the future – From my idea to our idea.

Story:

Waaba has kept her word! She flies to Maco's house with a large basket full of pieces of fabric in a variety of colours. Soca loves the animal print, while Tuka likes the sporty sneaker fabric. A symmetrical checkered pattern has caught Maco's eye. "Please don't tear them! Hold on a minute before you go rushing in like that!" Waaba shouts as she puts the basket down. "Let's go back to square one and remember what we should be doing!"

They all sit down and dig out the message in a bottle. (Reread the letter at this point.) Ah yes, we have to build the machine as a team! That means we need a shared design that takes into account every team member's ideas and wishes. This idea is a bit tricky for Tuka at first, because she's convinced that her design is sure to win at the Gala. She determinedly tries to stick to her own idea, but eventually understands that by combining everyone's ideas, they can create something even better. Tuka sulks for a moment, but soon forgets her bad mood and joins the others in coming up with a shared design.

It's not long before the crew are proudly admiring their achievement! They were very successful in creating a shared design together. Waaba's calm nature created a good mood and encouraged everyone to work together. Maco handled the detailed drawings, because he felt that he was the best person for that job. Together, Tuka and Soca decided that the machine would move in two different ways. Everyone got to add something to the design, but they always came up with the ideas together. Soca quickly scribbles their team name on the design: The Kip Cew. Cew? "Somehow this sounds a bit different than usual...." He spells it out again. (Oops! That was a mistake!) Ah, one of the letters is missing from the word 'crew'. Does someone want to help Soca add the missing letter in the right place?

As they stare at their design, the Kip crew start thinking about who would use their moving machine of the future. "What kinds of new jobs will we need in the future?" Waaba wonders. Soca suggests that the machine could be a robot translator that translates the language of flowers. Waaba excitedly tells the others that she'd love to be an emotion librarian. "Maybe our moving machine transports a good mood from one person to another?" she continues. Tuka starts showing off with her own idea. She wants to establish her own super company, and her job will be to test flying sneakers. The moving machine will have an important role to play in this, because it will generate the flying energy that will be essential for the sneakers of the future. As usual, Maco's suggestion is both creative and strategic. He wants to be the head design engineer at a problem-solving agency. He thinks that the machine would help its owner to solve the most difficult – and even impossible – problems. Maco continues: "When you open the hatch and insert a problem into it – even the most difficult problem in the whole galaxy – the rear hatch will soon open and out will pop a hint that will tell you how to solve the problem in an extremely easy way."

Everyone is left to mull over what the machine might be used for, because now it's finally time for the crew to roll up their sleeves and start building the machine!

Discussion tips:
What jobs will we need in the future? Why is it important to be flexible with your own ideas when you're working in a team? When is it important to stick firmly to your own ideas? (For example, to avoid a dangerous situation.)

Newslink
Jobs of the future www.thisworks.fi/jobs

Game: "Funny future jobs"

Form groups of three. Fold a piece of A4 into three sections. The first student should draw the top part of a character (from the neck up) in the topmost section. The second student should draw the character's midsection. The third student should draw the lower part of the character's body. While one student is drawing, the others mustn't watch! Finally, unfold the paper and together decide who the character is and what their job is.
Tip: you can write a few words about the funny characters, or even short stories!

Exercise:

In your teams, create a shared design for your moving machine of the future. Also think about what materials you will need to use and which part of the machine will move. Or maybe the entire machine will move? **Tip:** 1) Use a large piece of paper (such as A3). 2) You can also create your team's shared design using information and communication technology (such as simple drawing or design software) or make a three-dimensional model (for example, using plasticine).

Suggestion for pre-schooler cooperation: "Guess which job I'm thinking about?"

The teacher cuts out the job cards from a ready-made list. The teacher takes one job card at a time for the students to guess. The students try to guess what the job is by asking questions.
Tip: Only YES/NO answers!

Suggestion for mentor cooperation:

Start building your machine with the mentors. First show your design to the mentor, so that you can collect suitable materials and think about how you're going to build the machine.

Oops! That was a mistake!

What mistake did Soca make? Has anyone ever made a spelling mistake? Does it bother you when you make spelling mistakes? Why is it still important to learn to spell words correctly?

Documentation

Take a photo of your shared design and save it in your portfolio. Does it look the same as your own design? Think about which things are the same and which things are different. Also photograph the first stage of your construction process and save it in your portfolio. **Tip:** Look at the photos together and think about three things: 1) What were you able to build this time? 2) How well do you think the building went? 3) What are you going to do next?

Homework:

1) Think about what services you could offer to your family members. (Such as shoulder rubs, pedicure, brushing hair, braiding hair.) Provide at least one of these services. Photograph, draw or write about it.
2) Bring all kinds of "odds and ends" from home that would otherwise end up being recycled. Remember to ask permission from your parents first!

Message to parents:

In this module, the crew finally led us in some actual building work. Before that, we prepared for our joint construction project by practicing some working life skills and some things related to entrepreneurship. We drew a shared design for our moving machine. Through some games and exercises, we learnt about many professions and invented some funny future jobs. Our homework is to come up with several services that we could offer at home. These could be shoulder rubs, pedicures, brushing hair, braiding hair, or maybe even serving an evening snack. Perhaps in return we could receive some kind of equivalent service from one of our parents or siblings? Now that we've completed this module's tasks, we can bring in the final materials for our machines. This is a good time to look around at home and see if there are any unnecessary 'odds and ends' lying forgotten at the back of a cupboard – something that would be good as a decoration or would help us to put the finishing touches to our machine. We'd be happy to take them off your hands!

CURRICULUM:

When doing this module's activities with your students, you should note the following objectives and content for elementary instruction:

- **TC5:** practical skills and own output
- **TC6:** understanding your role as part of a larger whole, valuing cooperation, learning about professions, entrepreneurship
- **HC:** planning and documenting joint work

This is based on the Finnish National Curriculum