STEAM ACTIVITY FOR FAMILIES
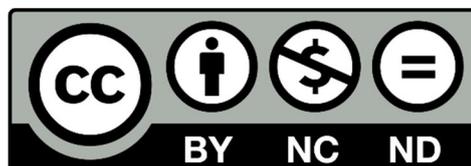
MADE THOMAS MORE

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WIWETER – SESSION WITH PARENTS
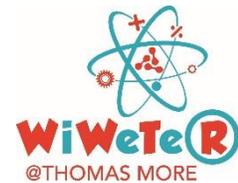
SECRET AGENT

PROJECT PURPOSE

During this session children and their parents are present. Each child will work with his parent. In this case it is important that parents don't take the lead. It is a co-creation and the children have to do most of the work.

Self-efficacy in STEAM refers to the belief in one's capabilities to accomplish a particular STEAM-related task at designated levels. The higher people's perceived their own efficacy, the wider the career options they seriously consider pursuing and the greater the interest they have in them (Bandura, 1993).

Research shows that families have a lot of influence on students' aspirations, and more influence on girls than boys, but they often don't know where STEAM can lead to.

By working together, parents and children, the collective efficacy of the family will improve and the efficacy of the students in particular (Pajares, 2006).

The purpose of this session is that parents confirm the knowledge of their child and that the self-efficacy in STEAM will grow.

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Developed: 2017

Length of time: 2 hours

Demonstration- and research materials:

- Plasticized secret codes and keys
- Red cabbage juice
- Lugol or isobetadine
- Pollinators for plants
- Several fluids to test (acid, lemon juice, coca cola, soda solution….)
- pH papers
- lemon juice
- potato juice
- test tubes and test tube holders
- pipettes
- cups
- strong white paper
- cotton swabs
- thin brushes
- writing paper
- pens

Tools:

- flatiron
- hair dryer

Before the start of the session, the parents and the children will be separated to explain the purpose of the evening. It is certainly important to explain what the instructors expect from the parents during this session. They have to listen to the kids and try to work together to find the answers. When possible they have to confirm the children in their abilities.

Phase 1: I didn't know!

The student shows a sentence in code at the board.

> What does this sentence say? Is there anyone who can decipher this sentence? What happened?

The student gives some explanations about secret messages and how they were used in history. He poses a few questions where children and parents have to think about.

> It is possible to pass along messages on a secret way. You need different codes and keys to decipher the messages. Even Julius Caesar used a secret code to communicate with his officers. Therefor he used concentric circles with a split pen and a rotation angle (student shows an example).

(Rot 3)
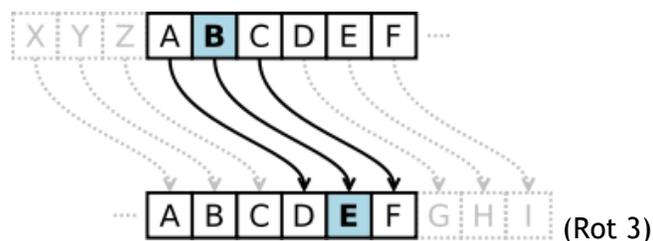
> Who knows a secret code? Can you give an example?
> How can you write something invisible? How can the receiver make this visible again?
> Are there any conditions for a secret code?
> Where do we still need coding today? Which information do you think should be coded today? Have you already heard about scandals about information that is not coded enough?
> Today we are going to investigate what is a good manner to write in code.

Phase 2: We investigate!

Every group (parent and child) gets a few secret messages and codes. They have to try to decipher them as fast as possible.

1. Disks Caesar code

    Sentence in code: YZUZ RJZINYVB GZZM DF XJYZMZI WDE RDRZOZM
    Code: 5R

    Sentence deciphered: Deze Woensdag leer ik coderen bij WiWeTeR (This Wednesday I learn coding at WiWeTeR).
    Explanation: You have to turn the disk in the middle 5 steps to the right. Then You see that a V matches A, W matches B …

2. Signs

Sentence in code:
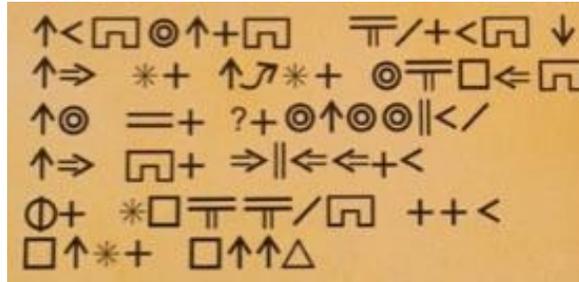
Code:

Sentence deciphered: Ontmoet agent 9 op de oude markt om je vermomming op te pikken. Ze draagt een rode roos. (Meet agent 9 at the old market to get your maskerade. She is wearing a red rose.)

Explanation: The sign in the red rectangle matches the A. The arrow gives the way where you can find B – Z and 0 – 9.

3. Maskerade

Sentence in code:
- o .thcadnaa ed gidonno tein kerT

  .reinam elamron nee po ej gaardeG
- o .nesnem eredna nessut ne gnivegmo ej in nellavpo neod tein ej eid

  nerelk gaarD

Code: 6R

Sentence deciphered:
- o Gedraag je op een normale manier. Trek niet onnodig de aandacht. (Behave in a normal way. Do not draw any unnecessarily attention.)
- o Draag kleren die je niet doen opvallen in je omgeving en tussen andere mensen. (Wear clothes which do not stand out in your surrounding and with other people.

Explanation: Everything is written backwords.

4. Egyptian signs

Sentence in code:

A professor did research about the Old Egypt. He discovered a tomb where an Egyptian king was buried. He saw a message, written on some rocks. Try to help him discover the sentence. He already deciphered a few words.
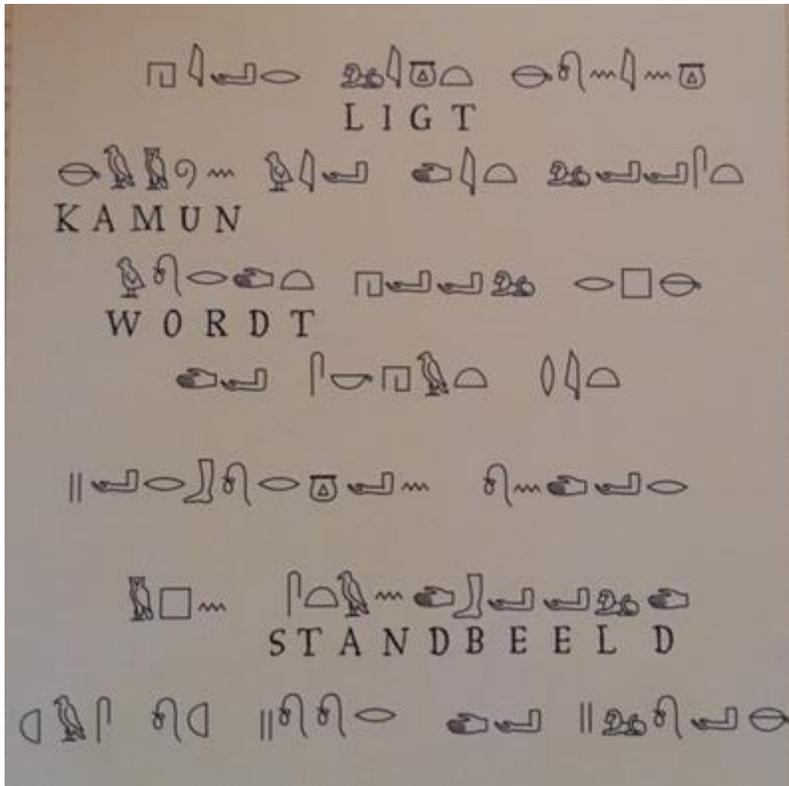
Sentence deciphered: Hier ligt Koning Kamun. Wie dit leest wordt heel rijk. De schat zit verborgen onder mijn standbeeld. Pas op voor de vloek. (Here lies King Kamun. Th one who will read this, will become very rich. The treasure is hidden under my statue. Watch out for the curse.)

Phase 3: Try it out!

- First try to write your name in code.
- A child tries to make a secret message for his parent, who has to decipher the message.
- Each group has to make a secret message for another group, who has to decipher this one. They can choose which code they use.

Phase 4: I didn't know!

The student shows a paper. He has written a message in invisible ink and asks the pupils what he has written. How can you find out what I have written? He gives the tip that he has used milk to write his message.

The pupils give some possibilities. Maybe they will come with an answer. Otherwise the student will gave the answer. He explains that the milk will get visible when holding it close to a light source.

Secret messages also can be written in other sorts of invisible ink. There are a few possibilities: milk, lemon juice, potato juice …

Phase 5: We investigate!

It is important to use different kind of fluids to write invisible messages.
A few groups start with the same fluids. Afterwards there will be a push-through system, so that every group will have done all the experiments.
The groups will get a schedule. In the first column they test the pH-value of the solutions. In the next columns they have to make cross if it is a good combination to write messages in invisible ink and to discover them.

	pH-value	Lugol	Water	Milk	Flatiron	Red cabbage juice
Lemon juice						
Potato juice						
Soda solution						
Red cabbage juice						

1) Lemon juice and iron

   Parent and child write a text on a paper. They use lemon juice for this. To read the message they use a flatiron.
   By ironing, the juice will burn a little bit. The message will become visible.

2) Potato juice and lugol

   Parent and child write a text on a paper. They use potato juice, this is starch. Afterwards they use a fluid, called lugol, to make the message visible again. The lugol reacts with the starch.

3) Lemon juice or soda solution and red cabbage juice

   Writing a text with lemon juice or a soda solution. Afterwards they use red cabbage juice to go over the text. The message will become visible.
   The acid of the lemon juice will react with the base of the red cabbage.

Parents and children will discover that several fluids are very acid and others are not. They will use a pH paper to arrange the fluids from acid to basic.
The student will explain the processes behind this interactions.

Phase 6: Try it out!

In pairs the children write a message for their parents. They have to use an invisible ink and a secret code. The parents have to decipher the message.
Ways to decipher:

       o Puzzle with a code
       o Warming the text with a flatiron.
       o Warming with a hair dryer.
       o Paint with Betadine
       o Paint with red cabbage juice

Phase 7: Reflection

Together with the student, the parents and the children talk about what they did during this session.

It is also important to talk about what the parents expected from their children and vice versa.

> Did you expect that your child could do this things?
>
> Do you understand why your child likes to do these things?
>
> What was it like to do these activities with your parent?
>
> …

During the reflection the focus has to be on the self-efficacy (related to STEAM) of the family but especially on the self-efficacy of the child.

Differentiation:

If the students notice that there is a group that is very good in deciphering the codes, they can give them a few extra codes to decipher. Also rebus and Morse code can be given to differentiate by tempo and level.

Images

1. Disks Caesar code

CODE E

Encrypt:
- turn inner disk to set code
- for each letter: find it in outer
  ring and replace it with letter
  in inner ring

Decrypt:
- turn inner disk to set right code
- for each letter: find it in inner
  ring and replace it with
  letter in outer ring

KidsMakeStuff.com

2. Signs

3. Egyptian signs

L I G T

K A M U N

W O R D T

S T A N D B E E L D

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