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SCIENTIFIC LITERACY
AT THE SCHOOL



TallinnaAsunduse Lasteaed

Absorption experiment

The theme of „What is absorption and capillaries?“

Purpose of the research

Purpose of the research project was to teach to the children about absorption and capillaries.

Description of the activity

Supplies: water, tablecloth, notepaper, napkin, plaything

In total it took 24 hours including: preparation, acquiring the supplies, research, executing the experiment, children painting pictures regarding the experiment, conclusion.

The experiment took place in Tallinn's "Asunduse" kindergarten of pre-schoolers, where the age ranged from 5-7 years. The conductors of the test were the teachers Eneli & Kristel. In total there were 12 children, 4 of them being boys and 8 girls.

All discussions were based on using Socratic method. Socratic method means Teachers asked children a progression of seemingly innocent questions that ultimately led the respondent to a logical conclusion that was incompatible with that children's originally stated belief.

Used information:

<https://www.hunker.com/13421223/how-do-paper-towels-absorb>

1. Elaboration and preparation of the research activities

First teachers studied the topic. Teachers made notes, consulted with each other, planned activities, looked for the necessary means and made the order to go through the planned activities.



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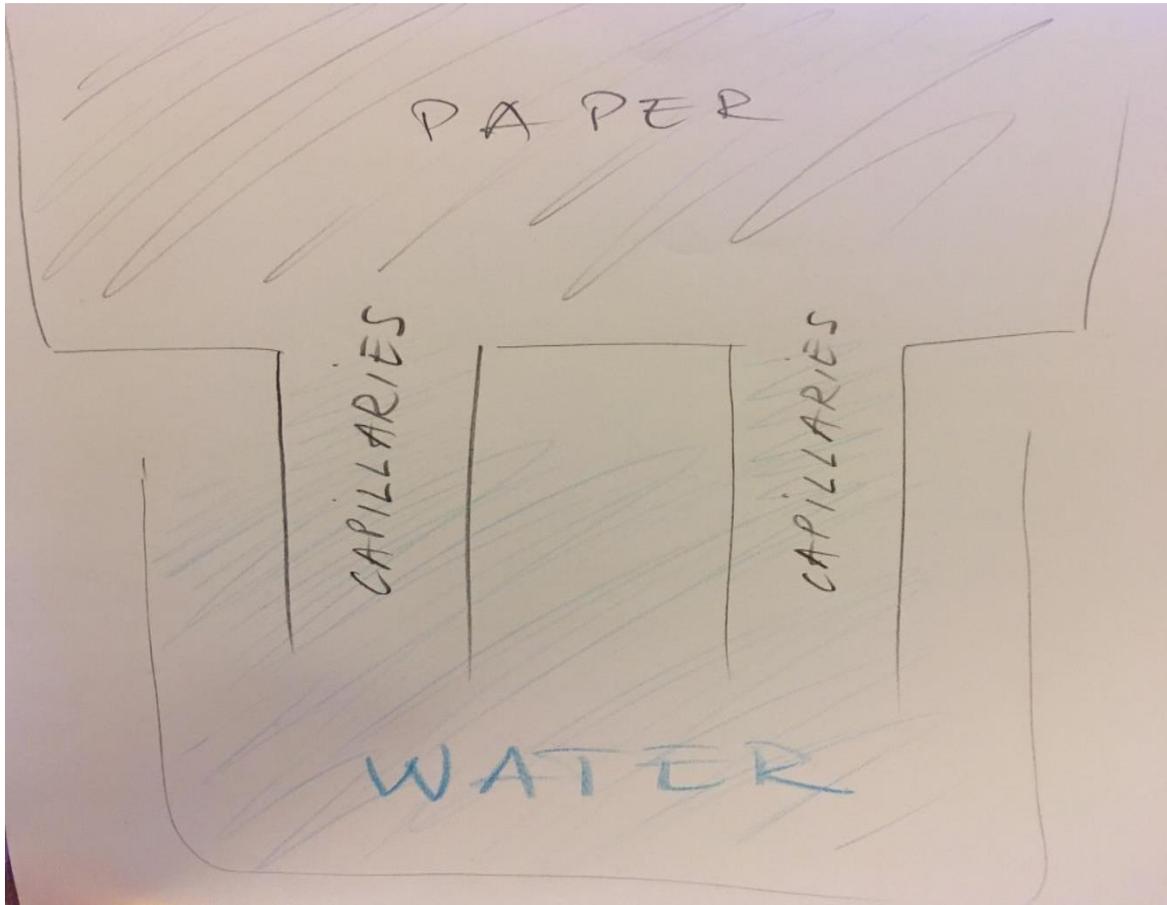
One day before the experiment, the teachers asked the children what is absorption and capillaries. Teachers asked children to draw a picture of that.

On the experiment day teachers went to the classroom of the group earlier to put out all the needed means and to awaken an interest in starting activities with children.

Because of the surface tension experiment the other day the children thought it's similar experiment.

Description of the methodology used

Beginning in the 1970s, Novak and his research team at Cornell developed the technique of concept mapping as a means of representing the emerging science knowledge of students. It has subsequently been used as a tool to increase meaningful learning in the sciences and other subjects as well as to represent the expert knowledge of individuals and teams in education, government and business. Ausubel's believed that learning of new knowledge relies on what is already known. That is, construction of knowledge begins with our observation and recognition of events and objects through concepts we already have. We learn by constructing a network of concepts and adding to them. Ausubel also stresses the importance of reception rather than discovery learning and meaningful rather than rote learning.



The Nature of Scientific Inquiry (NOSI)

Observation. Discussion on the topic „What absorb water? What are capillaries?”

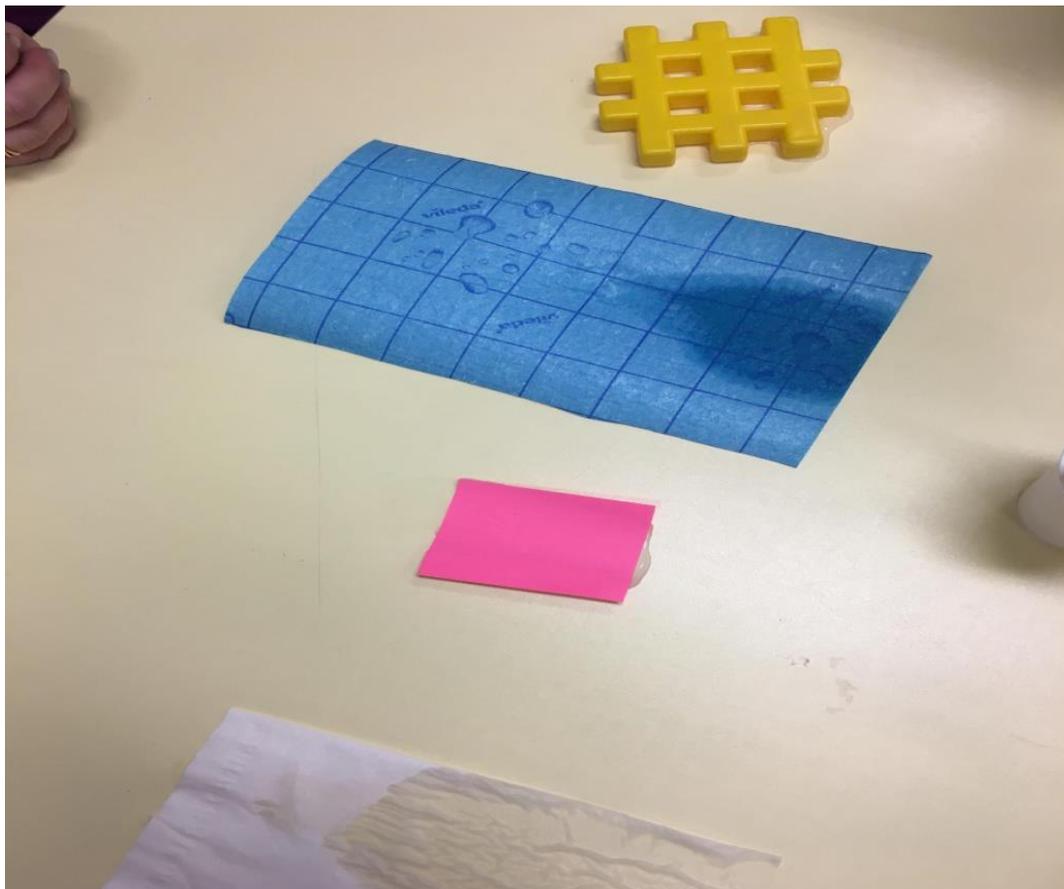
For the introduction, we talked about absorption. Since the last experiment about surface tension the children thought it's similar or the same thing.

Children's thoughts: „Why is that so?” „It has membrane on it.” „Absorbs.” „But really there is no pipes.” „You can see them with a magnifying glass.”



2. Experimentation

During the experiment there were 4 surfaces used to test which surface absorbs water and which does not. The different surfaces were : a sticky note, tissue paper, table cloth and a toy, specifically a plastic block (Off-brand of LEGO). To test which surface absorbs water and which one does not, we created artificial water reservoirs, specifically four of them. During the experimentation of absorption we found out that the sticky note got wet but did not absorb as a whole. The tissue and the tablecloth fully absorbed as much as they could. The plastic block had no effect when exposed to the water, so to say, it did not absorb any water.





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„Why so?” „It has a pellice on it.” „The papers are so small that the water goes through them.” „Cool. Water turned pink” „We once did it with Merit” „We know that the colours go together” „The colour got stuck to the table” „Colour gets mixed” „Blue goes to the usual, yellow goes usual etc.” „Turn green” „Yellow-red -> Purple” „It goes quickly red” „How do we lift them?” „Absorbs.” „Actually it has no pipes” „You can see them with a magnifying glass.” „Absorbtion is when it climbed up the paper” „Does the same happen to the green and yellow sticky notes as it did with pink?”



3. Summarization of the results as laws

Paper towels are made up of cellulose fibers which also make up cotton, wood, and most other plants. These cellulose fibers are actually huge molecules that consist of many small molecules linked together. Capillarity, or capillary action, occurs when intermolecular bonding between water molecules and molecules of another material is greater than the intermolecular bonding among water molecules themselves. This is called adhesion, and when it happens water will tend to spread over the surfaces of the other material, even climbing against gravity to do so. Cohesion among the water molecules will drag along those water molecules not in direct contact with the material, and surface tension will hold the water together as it adheres to the surface. Adhesion may be strong enough to raise the water against gravity. If a material is porous enough, the water can continue to climb for quite a distance. But on a smooth non-porous surface, the water will stop climbing when the weight of the cohered water is greater than the adhesion can support.

4. Hypothesis

Water goes in the paper. Let's see what happens with different material

5. Testing the hypothesis

To see the different closely we used colours to see how paper absorb water.



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6. Explanation provided by the hypothesis

We had 4 different surfaces which we used for one of the tests. Our second test included cups filled with coloured water and tissues.

Final assessment of the activity

All together there were 8 children in the kindergarten all 3 days (on 1. day children drew a picture before they knew anything, on the 2. day children took part of the experiment and on the day 3. children drew a picture with new knowledge of the topic).

One of the eight children thought that there should be some kind of a machine that gives electricity to the lamp. Three of them thought that it was related to surface tension, regarding the last experiment. One of them thought that absorption is in water and capillaries are in the air.

And three of them just drew what they saw happen in the experiment with the cups and colours.