ESTA project development in Georgia (Country)

Prof. Dr. Marika Kapanadze

Ilia State University, Tbilisi, Georgia

ESTA
Educating Science Teachers for All

Content

- Country Georgia
  - *Location, History*
- Education system
  - *Structure*
- Teacher preparation
  - *Education, different programs*
- ESTA project implementation in Georgia
  - *Ilia State University*

Ilia State University

www. Iliauni.edu.ge

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SCHOOL OF ARTS AND SCIENCES | SCHOOL OF NATURAL SCIENCES AND MEDICINE | SCHOOL OF BUSINESS, TECHNOLOGY AND EDUCATION | SCHOOL OF LAW

FACTS AND FIGURES

Established in 2006 as a merger of six different institutions, each having a long history and a diverse institutional profile

4 Faculties
About 250 professors and 500 researchers
18 Emeritus Professors
Over 16 000 Students
Around 50 Bachelor's and around 50 Master's programs.
Around 30 research institutes and centers.

Educational and research bases throughout different regions of Georgia.

Georgia
საქართველო

Territory - 69,700 km^2

Population – 3 980 000

Capital - Tbilisi

Georgia

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Population

Georgian 86.8%, Azeri 6.3%, Armenian 4.5%, Russian 0.7%, other 1.7%

Religion

Orthodox Christian - 83.9%, Muslim 9.9%, Armenian-Gregorian 3.9%, Catholic 0.8%, other 0.8%, none 0.7%

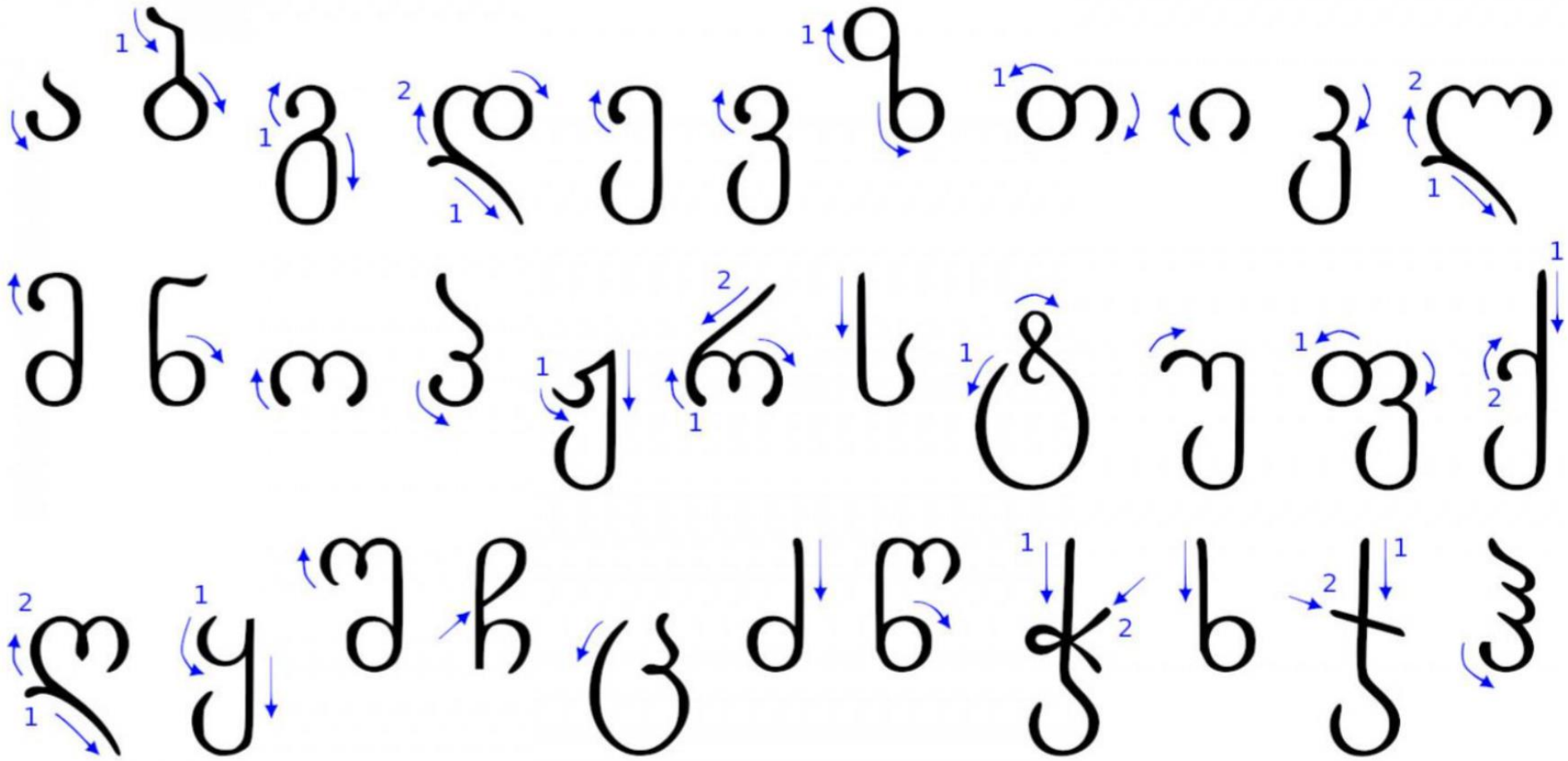
Language

Georgian - a member of South Caucasian (or Kartvelian) branch of the Caucasian language family.

Alphabet

Georgian alphabet is one of the oldest in the world and it is among the world's 14 alphabets.

Alphabet



History

- According to archaeological excavations in the territory of Georgia there are the first hominids in Europe 1.8 million years ago.

- Georgia became a kingdom about 4 B.C. and Christianity was introduced in A.D. 337.

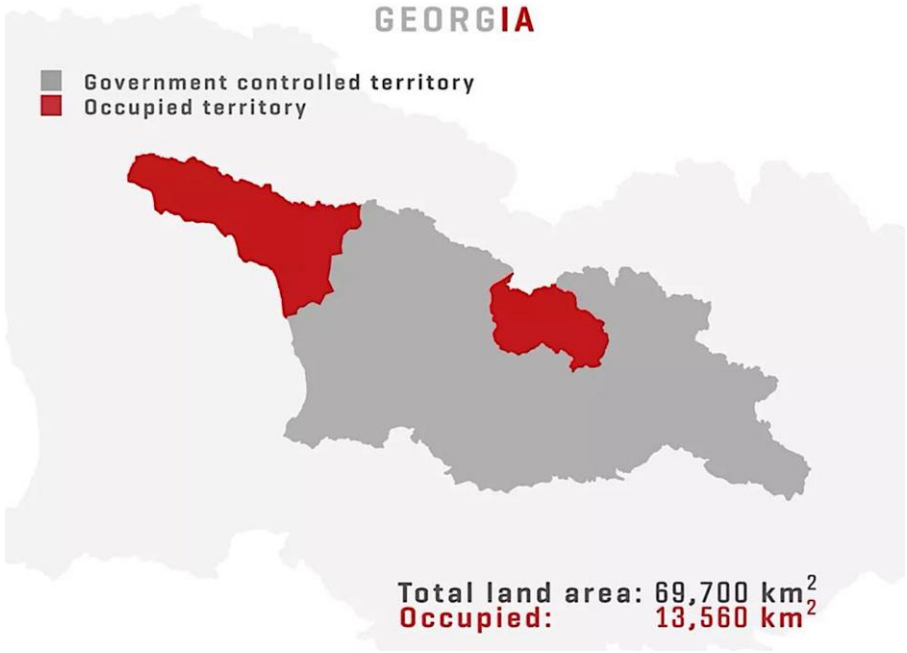
- During the reign of Queen Tamara (1184 - 1213), its territory included the whole of Transcaucasia.

Ikalto Academy -11 -12th Centuries

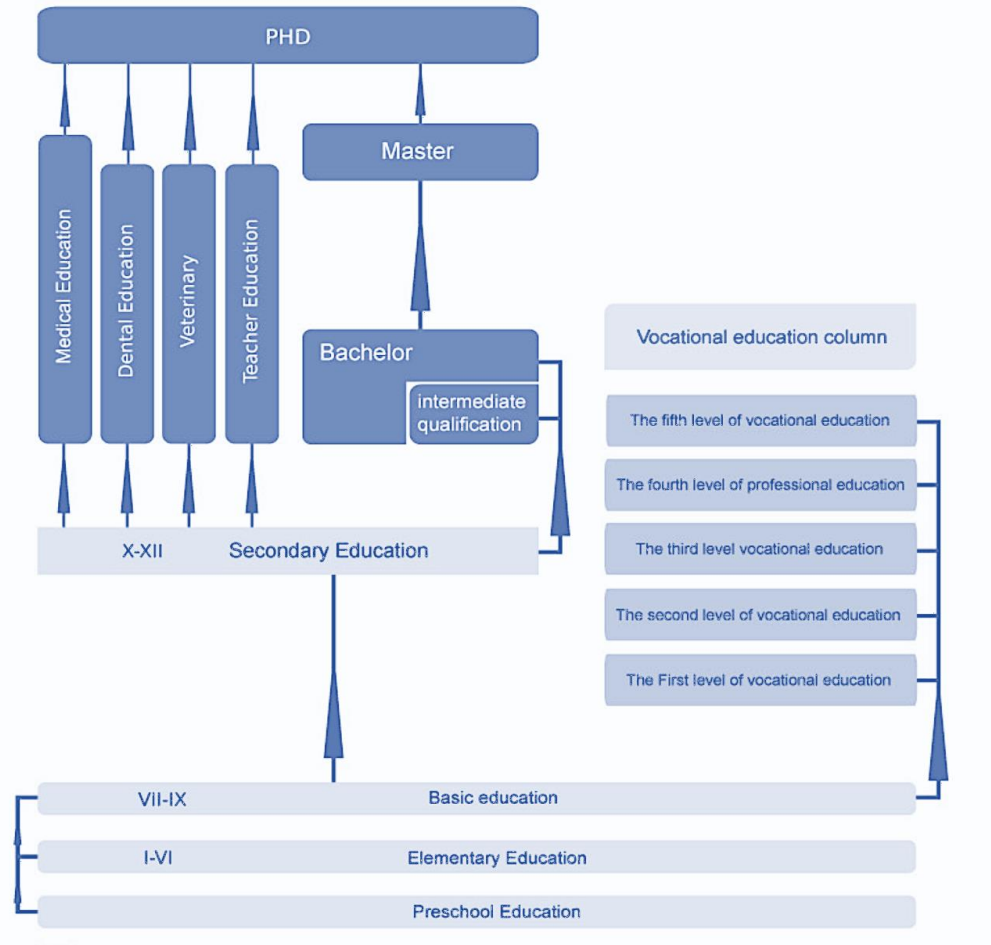
Gelati Academy -12th Century

History

Post Soviet Country.
1991 – Independence
2003 – Rose Revolution
Occupation - 20% of Georgia's territory is under Russian military occupation.



Education System



2005 – first student' oriented curriculum
2011, 2018 – updated versions

Enrollment - 3 main national exams according to the Ministry of Education guidelines and instruction.

https://mes.gov.ge/content.php?id=131&lang=eng

Teacher Preparation

Teacher Profession – not popular

- Master Degree (300 Credit points)
- Teacher preparation program (60 Credit points)

Teachers Standard - Statuses

A) a practicing teacher;

B) senior teacher;

C) leading teacher;

D) Mentor.

Teacher Preparation

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Non-Georgian teachers' professional development program

- for promotion of non-Georgian school / sector teachers' professional development and improvement of teaching / learning in order to enhance the quality of the state language teaching.

Teach for Georgia

- for promotion of teaching and learning process by attracting qualified human resources and to ensure equal opportunities for getting general education in all public schools (The mountainous regions, as well as other parts of Georgia report the lack of teachers).

Support for Education
Teacher preparation programs

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Projects funded by EU Commission in Science Education:

- 2010 – 2012 – TEMPUS project SALiS (http://salislab.org/)
- 2012 – 2014 – FP7 project PROFILES (http://www.profiles-project.eu/)
- 2013 – 2016 – FP7 project Chain Reaction (https://chain-reaction.iliauni.edu.ge/)
- 2016 – 2019 – ERASMUS project ARTIST* (http://erasmus-artist.eu)
- 2019 – 2023 – ERASMUS project ESTA* (https://esta-project.eu/)

Cooperation with Philippines

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September, 2014 – ALOP (Active Learning in Optics and Photonics) workshop at Ilia State University
UNESCO, ICTP Triest

Prof. David Sokoloff – University of Oregon, USA
Dr. Alex Mazzolini - Swinburne University of Technology, Australia
Ivan Culaba - Ateneo de Manila University, Phillippines

Cooperation with Philippines

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Erasmus project ARTIST (2016-2019) - http://www.erasmus-artist.eu/

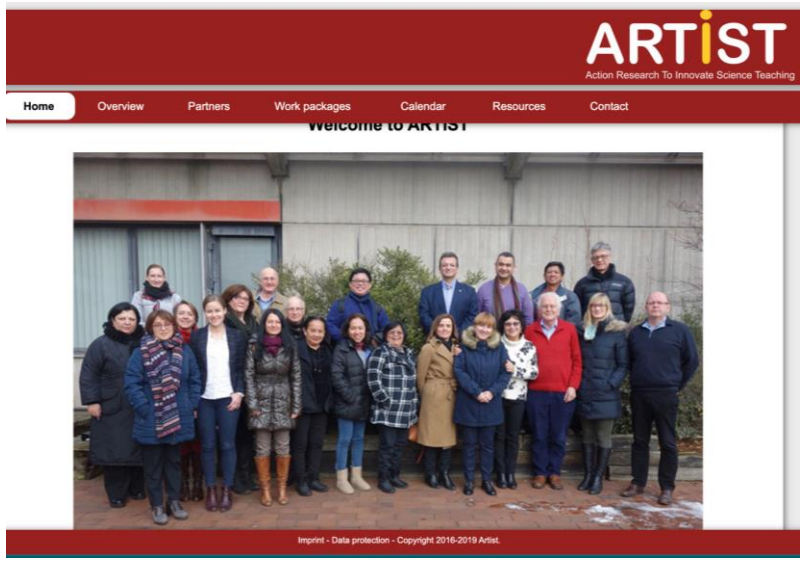
The focus of ARTIST - to innovate science education

through classroom-based and teacher-driven Action Research.

Coordinator - University of Bremen, Germany

Philippines – Ateneo de Manila University

De la Salle University, Manila



ARTIST in Manila

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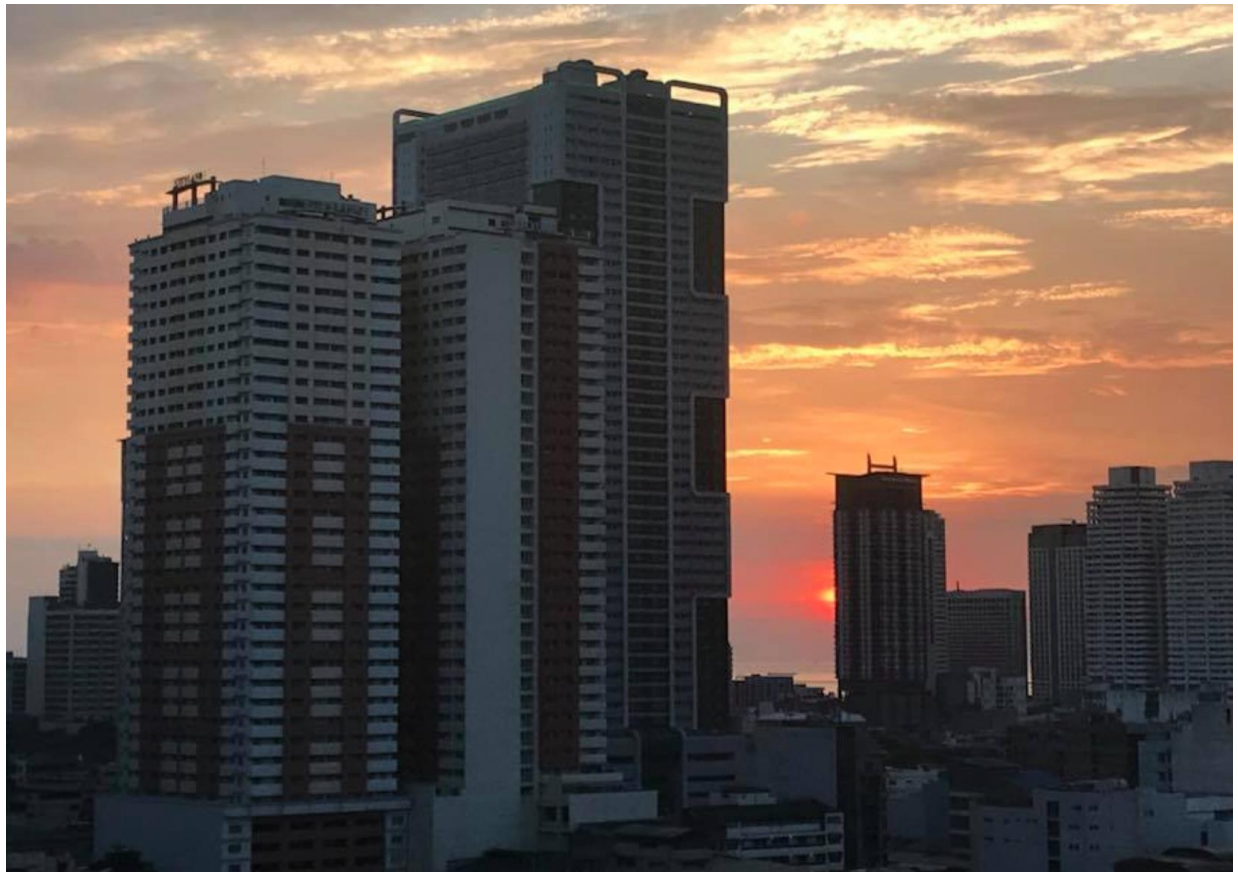
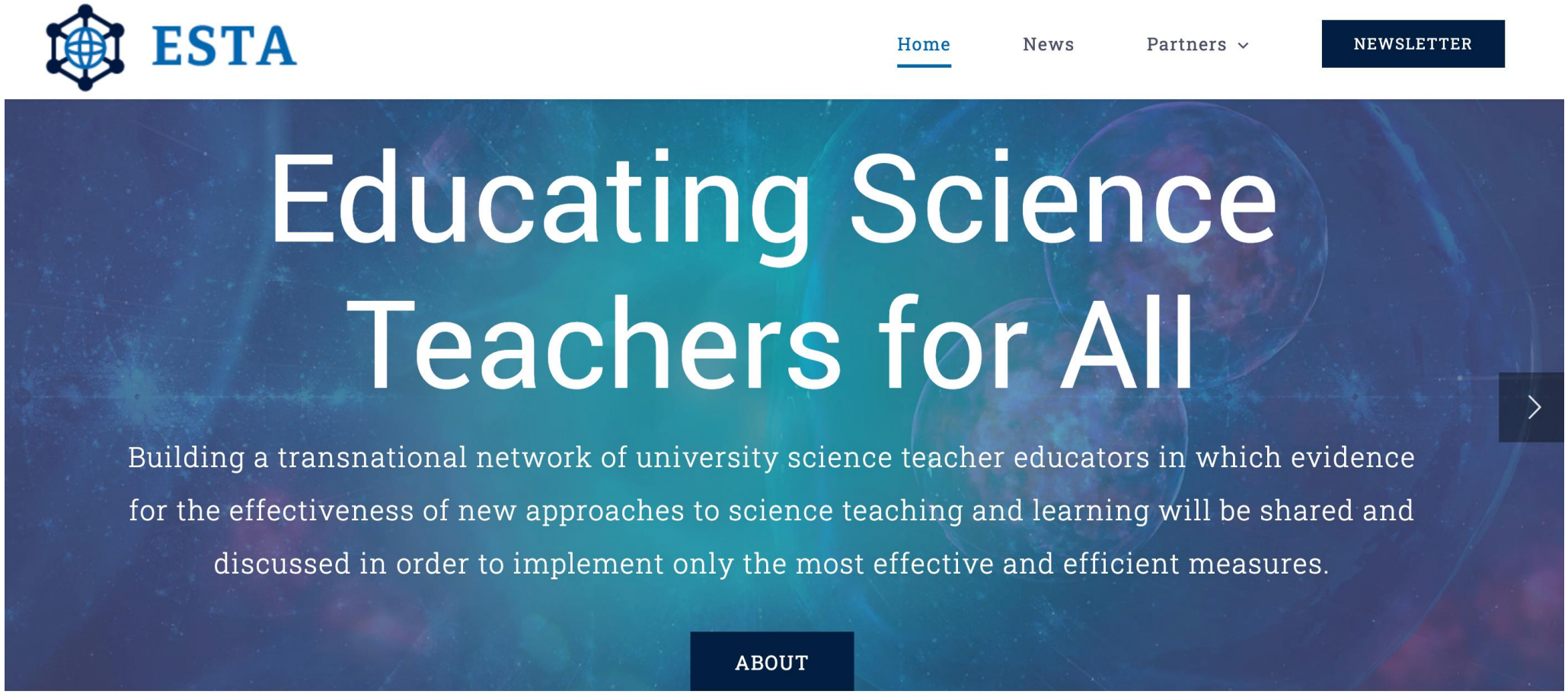


ESTA - Education Science Teacher for All



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Objectives of the Project

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- ESTA aims to improve the level of competencies in HEI in partner countries by professionalization and development of university science teacher educators regarding diversity in science classes (focus on language and culture).

- The teacher educators will share their knowledge and skills with in-service and pre-service science teachers, and thereby contribute to a more inclusive and higher quality science teaching.

ESTA partners from Georgia

- Ilia State University, Tbilisi
- Iakob Gogebashvili State University, Telavi

ESTA at Ilia State University

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- ESTA course for pre-service science teachers
- ESTA course for in-service science teachers

Workshop (in-service) – May-June 2022

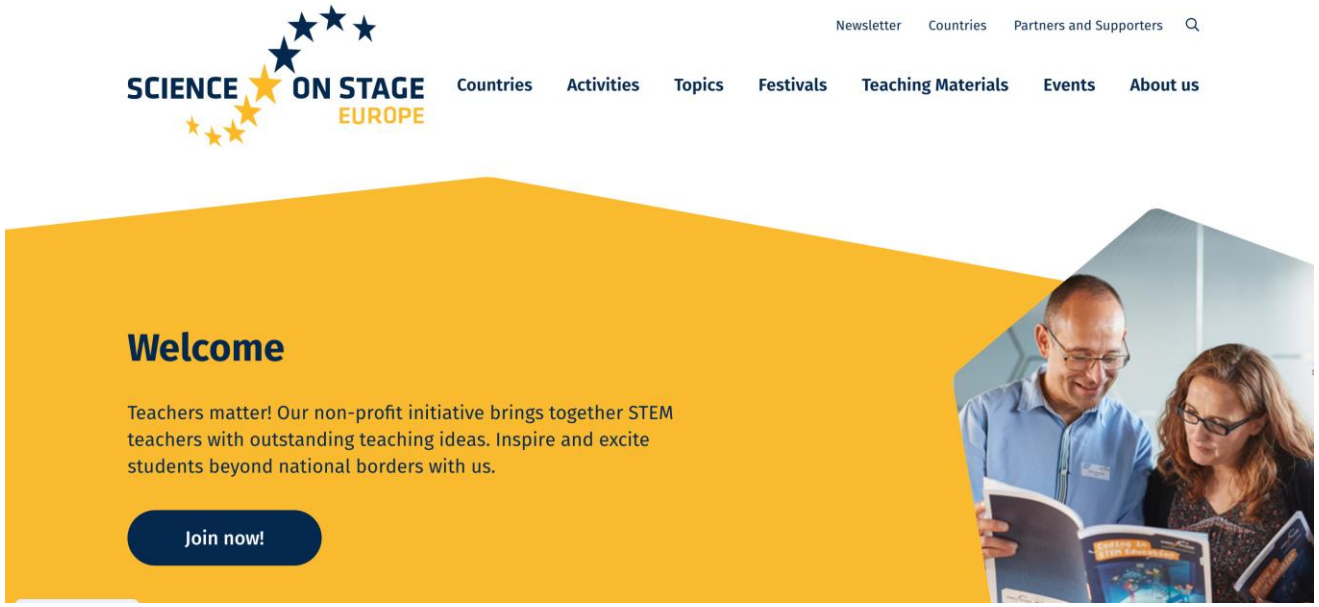
- Online sessions
- F2F meetings and workshops

12 Science teachers - Tbilisi (capital) Schools

Materials for the Workshop

- Theoretical background (CLIL method)
- Practical experiments

Science on Stage Europe - https://www.science-on-stage.eu/



Lilu’s House

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SCIENCE ON STAGE EUROPE

Countries Activities Topics Festivals Teaching Materials Events About us

Lilu’s House: Language Skills through Experiments

Overview

PRIMARY SCHOOL

SCIENCE

LANGUAGE SKILLS

ENGLISH, GERMAN, DUTCH, LATVIAN, RUSSIAN

Lilu's House

Foreword

Dear teachers,

Through the use of creative teaching and learning methodologies you encourage children's imagination, curiosity and desire to explore and learn about the world around them. This allows children the time and opportunity to engage with many different everyday scientific concepts. Science on Stage Germany also aims to inspire and excite children about science from a very young age. The Science on Stage team is collaborating with a wide range of teachers, from early childhood, through to elementary and right up to second level education, to facilitate the exchange of ideas and share expertise. One aim is to produce high quality evidence based teaching and learning resources that are transferrable across all curricula. For the development of this publication primary school teachers from all over Europe have used inspiring examples to introduce you to new teaching perspectives and show how children's interest in science can be increased and intensified using strategies that promote literacy skills in the classroom.

The publication 'Lilu's House: Language Skills through Experiments' provides teachers with suggestions and tools for their own lessons and combines and connects the promotion of language skills with the use of scientific experiments. The story includes texts and assignments with varying levels of complexity to ensure inclusion and to cater for a mixed ability classroom and children with differing levels of literacy skills and literacy needs. The main focus of the teaching resource is on promoting language skills through oral language, reading and writing during science lessons. These activities also facilitate the exploration of scientific concepts in the story about Lilu's house. In this way, the children develop scientific process skills and subject matter knowledge. Therefore, primary school teachers delivering these lessons in their classroom do not need a strong scientific background in order to do so successfully.

The teaching units were developed and tested by ten committed primary school teachers from seven European countries. This has resulted in a wide range of creative and innovative pedagogical approaches in every chapter. The connecting element

throughout is the fantasy creature Lilu and his friend, a girl called Alina. The home, which is a direct link to something children know from their own world of experience, serves as the starting point for their adventures. The two friends go on a discovery tour of Lilu's house and find all kinds of 'inexplicable' things there, e.g. misted-up mirrors in the bathroom, bouncing beans in the living room, and the secrets of yeast in the kitchen.

The bathroom, kitchen and living room encourage not only exploratory learning, but also the practice of linguistic elements: words for objects or actions, sentence patterns, reading comprehension, or listening. The library contains information about the teaching methods and activities used within the units. In addition, links are provided which lead the reader to further in-depth material, texts in easy language and worksheets that can be downloaded from the Science on Stage homepage free of charge.

We hope you find the activities and ideas in this teaching resource useful and helpful when looking at integrating language skills development into your science lessons. If you have any questions, please feel free to email the Science on Stage Germany office (info@science-on-stage.de).

Your Science on Stage team

Lilu's House


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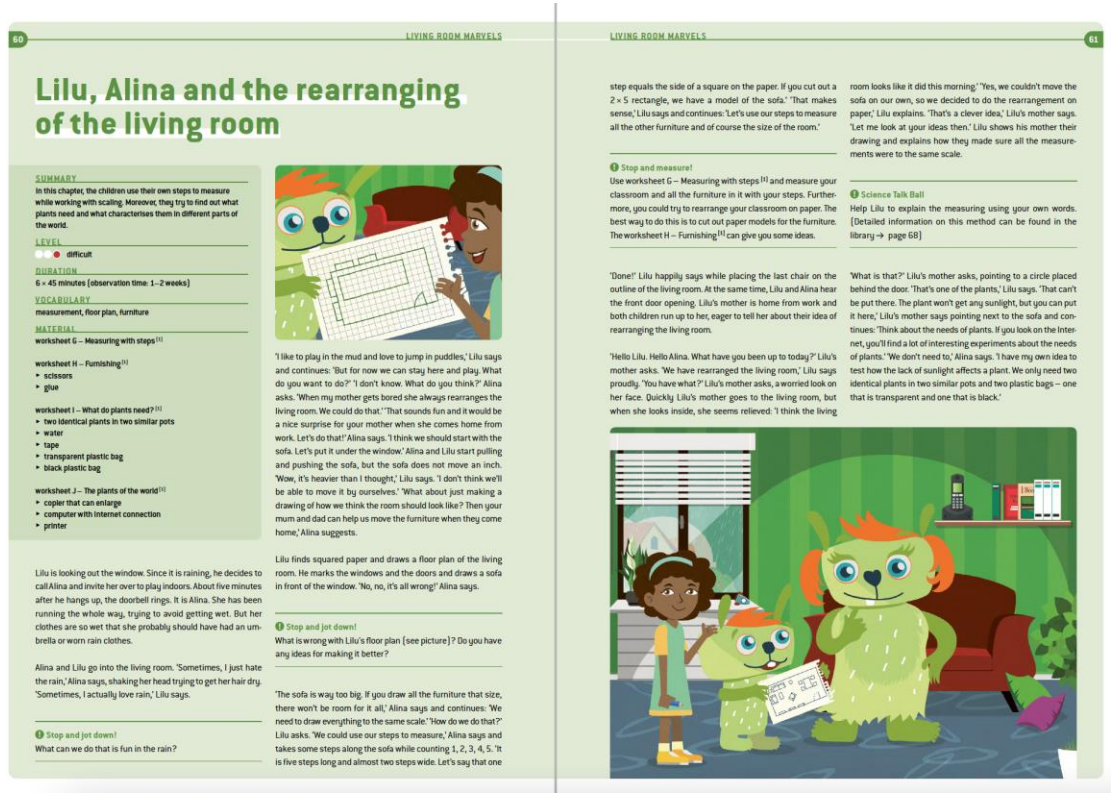
Authors: Petra Breuer-Küppers and Majken Grünfeld
Living Room Marvels
LIVING ROOM MARVELS
55
Conceptual Introduction
The chapter 'Living Room Marvels' is roughly divided into three parts, which can be done all together or separately.
In the first story, 'Lilu, Alina and the beans', Lilu and Alina discover how beans can jump out of a glass by themselves and other characteristics of legumes [→ page 56]. There is also the possibility to cook bean soup with children. This can serve as a transition to the kitchen unit [→ page 36].
In 'Lilu, Alina and the sofa' [→ page 58] a leg of Lilu's favourite sofa breaks. The children can discuss what could make the sofa so comfortable and what would happen if someone sits on the broken sofa. In addition, the children can think about solutions to get Lilu a great sofa again. When Lilu and Alina decide to bring the sofa to a carpenter, they first need to move it out of the living room and through the house. This story is about pushing and pulling the sofa over different surfaces. The children explore the phenomenon of friction and how different conditions – i.e. the type of floor, if the sofa has legs or not, etc. – influence how difficult it is to push or pull the sofa [→ page 59].
In the last part of the chapter, Lilu and Alina want to rearrange the living room but some of the furniture is too heavy for them to move. They decide to make a drawing of what the room should look like. Following the story, children learn how to draw a floor plan of the living room to scale [→ page 60]. As plants are often also part of the living room furniture, children discover experiments on requirements for plant growth [→ page 62].
▸ You can find the plain texts and dialogues as well as the room outline in a printer-friendly version online. [1]


60
LIVING ROOM MARVELS
Lilu, Alina and the rearranging of the living room
SUMMARY
In this chapter, the children use their own steps to measure while working with scaling. Moreover, they try to find out what plants need and what characterises them in different parts of the world.
LEVEL
difficult
DURATION
6 × 45 minutes (observation time: 1–2 weeks)
VOCABULARY
measurement, floor plan, furniture
MATERIAL
worksheet G – Measuring with steps [1]
worksheet H – Furnishing [1]
▸ scissors
▸ glue
worksheet I – What do plants need? [1]
▸ two identical plants in two similar pots
▸ water
▸ tape
▸ transparent plastic bag
▸ black plastic bag
worksheet J – The plants of the world [1]
▸ copier that can enlarge
▸ computer with internet connection
▸ printer
Lilu is looking out the window. Since it is raining, he decides to call Alina and invite her over to play indoors. About five minutes after he hangs up, the doorbell rings. It is Alina. She has been running the whole way, trying to avoid getting wet. But her clothes are so wet that she probably should have had an umbrella or worn rain clothes.
Alina and Lilu go into the living room. 'Sometimes, I just hate the rain,' Alina says, shaking her head trying to get her hair dry. 'Sometimes, I actually love rain,' Lilu says.
Stop and jot down!
What can we do that is fun in the rain?
'I like to play in the mud and love to jump in puddles,' Lilu says and continues: 'But for now we can stay here and play. What do you want to do?' 'I don't know. What do you think?' Alina asks. 'When my mother gets bored she always rearranges the living room. We could do that.' 'That sounds fun and it would be a nice surprise for your mother when she comes home from work. Let's do that!' Alina says. 'I think we should start with the sofa. Let's put it under the window.' Alina and Lilu start pulling and pushing the sofa, but the sofa does not move an inch. 'Wow, it's heavier than I thought,' Lilu says. 'I don't think we'll be able to move it by ourselves.' 'What about just making a drawing of how we think the room should look like? Then your mum and dad can help us move the furniture when they come home,' Alina suggests.
Lilu finds squared paper and draws a floor plan of the living room. He marks the windows and the doors and draws a sofa in front of the window. 'No, no, it's all wrong!' Alina says.
Stop and jot down!
What is wrong with Lilu's floor plan (see picture)? Do you have any ideas for making it better?
'The sofa is way too big. If you draw all the furniture that size, there won't be room for it all,' Alina says and continues: 'We need to draw everything to the same scale.' 'How do we do that?' Lilu asks. 'We could use our steps to measure,' Alina says and takes some steps along the sofa while counting 1, 2, 3, 4, 5. 'It is five steps long and almost two steps wide. Let's say that one
LIVING ROOM MARVELS
61
step equals the side of a square on the paper. If you cut out a 2 × 5 rectangle, we have a model of the sofa.' 'That makes sense,' Lilu says and continues: 'Let's use our steps to measure all the other furniture and of course the size of the room.'
Stop and measure!
Use worksheet G – Measuring with steps [1] and measure your classroom and all the furniture in it with your steps. Furthermore, you could try to rearrange your classroom on paper. The best way to do this is to cut out paper models for the furniture. The worksheet H – Furnishing [1] can give you some ideas.
'Done!' Lilu happily says while placing the last chair on the outline of the living room. At the same time, Lilu and Alina hear the front door opening. Lilu's mother is home from work and both children run up to her, eager to tell her about their idea of rearranging the living room.
'Hello Lilu. Hello Alina. What have you been up to today?' Lilu's mother asks. 'We have rearranged the living room,' Lilu says proudly. 'You have what?' Lilu's mother asks, a worried look on her face. Quickly Lilu's mother goes to the living room, but when she looks inside, she seems relieved: 'I think the living room looks like it did this morning.' 'Yes, we couldn't move the sofa on our own, so we decided to do the rearrangement on paper,' Lilu explains. 'That's a clever idea,' Lilu's mother says. 'Let me look at your ideas then.' Lilu shows his mother their drawing and explains how they made sure all the measurements were to the same scale.
Science Talk Ball
Help Lilu to explain the measuring using your own words. [Detailed information on this method can be found in the library → page 68]
'What is that?' Lilu's mother asks, pointing to a circle placed behind the door. 'That's one of the plants,' Lilu says. 'That can't be put there. The plant won't get any sunlight, but you can put it here,' Lilu's mother says pointing next to the sofa and continues: 'Think about the needs of plants. If you look on the Internet, you'll find a lot of interesting experiments about the needs of plants.' 'We don't need to,' Alina says. 'I have my own idea to test how the lack of sunlight affects a plant. We only need two identical plants in two similar pots and two plastic bags – one that is transparent and one that is black.'

Lilu's House

- What is Friction?

Living Room Marvels

WORKSHEET F

Friction

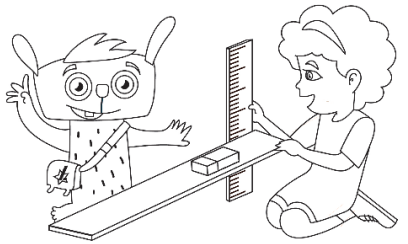
Purpose: To compare friction on different surfaces.

Vocabulary: names of the different materials being used

Material:

- wooden board (10 cm x 50 cm)
- ruler
- block (e.g. eraser)
- pen
- strips of different materials (e.g. tissue paper, tracing paper, leather, sand paper, plastic)

Procedure:



- Place the block on one end of the board.
- Guess how high the end of the board with the block can be raised before the block moves - write down your guess in the table below.
- Raise the end of the board and measure the height. Write down your measurement.
- Choose a strip of material and place it on the board with the block on top of it.
- Guess how high the board can be raised before the block moves - write down your guess in the table.
- Raise the board and measure the height. Write down your measurement.
- Pick a new material and repeat the procedure.

Taken from the publication Lilu's House Language Skills through Experiments
A project by Science on Stage Germany e.V.

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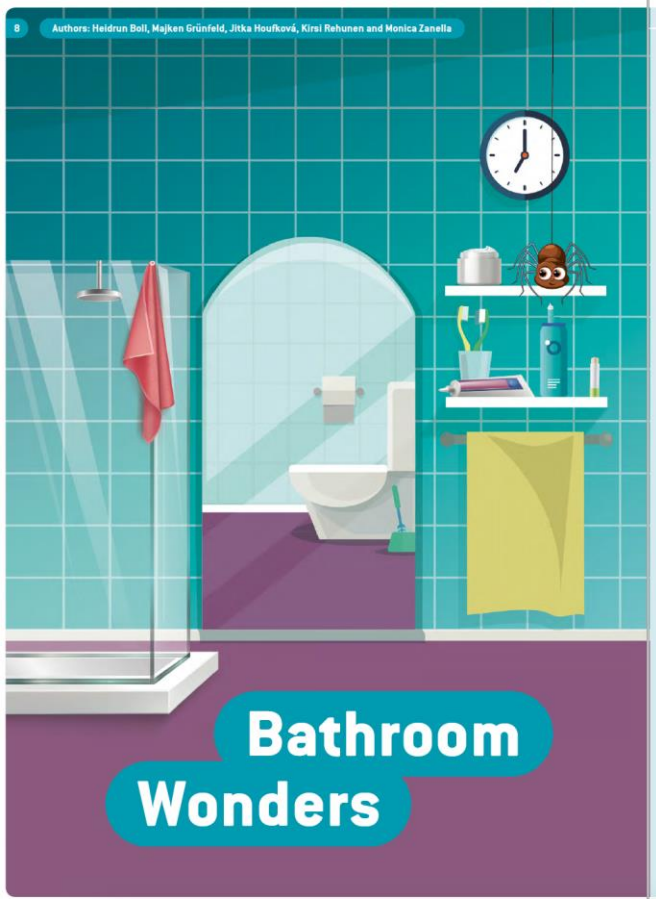
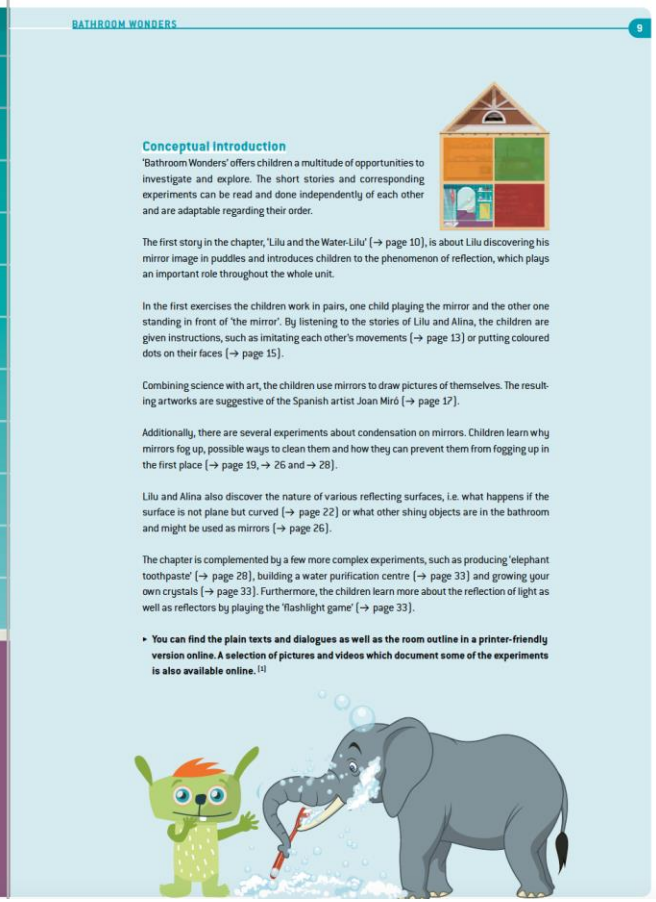
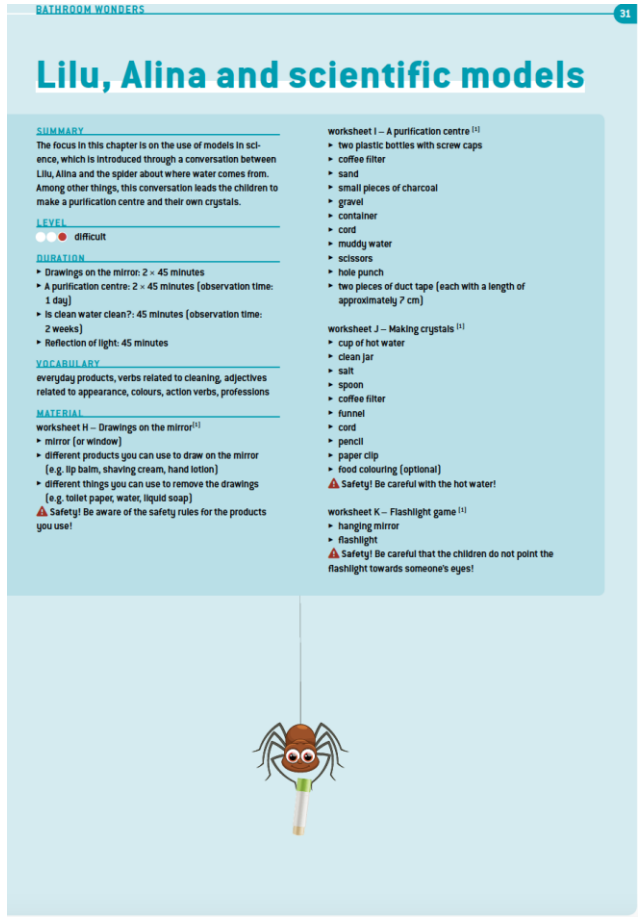
Lilu's House


8
Authors: Heidrun Boll, Majken Grünfeld, Jitka Houfková, Kirsi Rehunen and Monica Zanella
Bathroom
Wonders


BATHROOM WONDERS 9
Conceptual Introduction
'Bathroom Wonders' offers children a multitude of opportunities to investigate and explore. The short stories and corresponding experiments can be read and done independently of each other and are adaptable regarding their order.
The first story in the chapter, 'Lilu and the Water-Lilu' (→ page 10), is about Lilu discovering his mirror image in puddles and introduces children to the phenomenon of reflection, which plays an important role throughout the whole unit.
In the first exercises the children work in pairs, one child playing the mirror and the other one standing in front of 'the mirror'. By listening to the stories of Lilu and Alina, the children are given instructions, such as imitating each other's movements (→ page 13) or putting coloured dots on their faces (→ page 15).
Combining science with art, the children use mirrors to draw pictures of themselves. The resulting artworks are suggestive of the Spanish artist Joan Miró (→ page 17).
Additionally, there are several experiments about condensation on mirrors. Children learn why mirrors fog up, possible ways to clean them and how they can prevent them from fogging up in the first place (→ page 19, → 26 and → 28).
Lilu and Alina also discover the nature of various reflecting surfaces, i.e. what happens if the surface is not plane but curved (→ page 22) or what other shiny objects are in the bathroom and might be used as mirrors (→ page 26).
The chapter is complemented by a few more complex experiments, such as producing 'elephant toothpaste' (→ page 28), building a water purification centre (→ page 33) and growing your own crystals (→ page 33). Furthermore, the children learn more about the reflection of light as well as reflectors by playing the 'flashlight game' (→ page 33).
▸ You can find the plain texts and dialogues as well as the room outline in a printer-friendly version online. A selection of pictures and videos which document some of the experiments is also available online. [1]


BATHROOM WONDERS 31
Lilu, Alina and scientific models
SUMMARY
The focus in this chapter is on the use of models in science, which is introduced through a conversation between Lilu, Alina and the spider about where water comes from. Among other things, this conversation leads the children to make a purification centre and their own crystals.
LEVEL
difficult
DURATION
▸ Drawings on the mirror: 2 × 45 minutes
▸ A purification centre: 2 × 45 minutes (observation time: 1 day)
▸ Is clean water clean?: 45 minutes (observation time: 2 weeks)
▸ Reflection of light: 45 minutes
VOCABULARY
everyday products, verbs related to cleaning, adjectives related to appearance, colours, action verbs, professions
MATERIAL
worksheet H – Drawings on the mirror [1]
▸ mirror (or window)
▸ different products you can use to draw on the mirror (e.g. lip balm, shaving cream, hand lotion)
▸ different things you can use to remove the drawings (e.g. toilet paper, water, liquid soap)
⚠ Safety! Be aware of the safety rules for the products you use!
worksheet I – A purification centre [1]
▸ two plastic bottles with screw caps
▸ coffee filter
▸ sand
▸ small pieces of charcoal
▸ gravel
▸ container
▸ cord
▸ muddy water
▸ scissors
▸ hole punch
▸ two pieces of duct tape (each with a length of approximately 7 cm)
worksheet J – Making crystals [1]
▸ cup of hot water
▸ clean jar
▸ salt
▸ spoon
▸ coffee filter
▸ funnel
▸ cord
▸ pencil
▸ paper clip
▸ food colouring (optional)
⚠ Safety! Be careful with the hot water!
worksheet K – Flashlight game [1]
▸ hanging mirror
▸ flashlight
⚠ Safety! Be careful that the children do not point the flashlight towards someone's eyes!

Lilu's House

- Water Purification Centre

A purification centre

Vocabulary: verbs: run, move, soak, fill; adjectives: muddy, brown, clear

Material:

- two plastic bottles with screw caps
- coffee filter
- sand
- small pieces of charcoal
- gravel
- container
- cord
- muddy water
- scissors
- hole punch
- two pieces of duct tape (each with a length of approximately 7 cm)

Procedure:

1. Let the teacher make a hole in a bottle. The hole has to be a couple of centimetres from the bottom and has to be big enough to be used as a starting point for cutting off the bottom of the bottle.
2. Use the scissors to cut the bottom of the bottle.
3. Place a piece of duct tape on the bottom of the bottle. The duct tape has to stick on both the outer and the inner sides of the bottle to strengthen the bottle around the holes that have to be made.
4. Place in the same way another piece of duct tape opposite the first piece of duct tape.
5. Use a hole punch to make two holes in the bottle. The holes have to be placed opposite each other and are made where the bottle is strengthened with duct tape. If possible, place the holes a couple of centimetres from the edge of the bottom.
6. Put some cord through the holes, so the bottle is ready to hang up.
7. Hold the bottle upside down and place the coffee filter at the bottom.
8. Put 4-5 cm of sand on top of the coffee filter.
9. Put 4-5 cm of broken charcoal on top of the sand.
10. Put 4-5 cm of gravel on top of the charcoal.
11. Hang the bottle up, remove the lid and place a container underneath it.
12. Pour some muddy water into the second bottle.
13. Carefully pour the muddy water into the hanging bottle and watch what happens.
14. Does the water in the container look like the muddy water you poured in the bottle?

Alternatively, the purification centre could be made like this.

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Final Presentations

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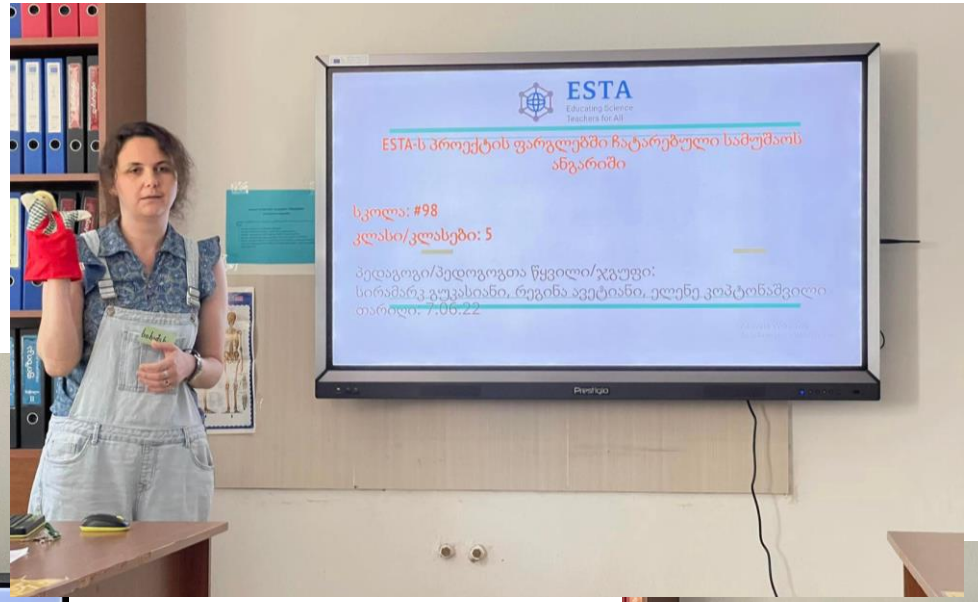
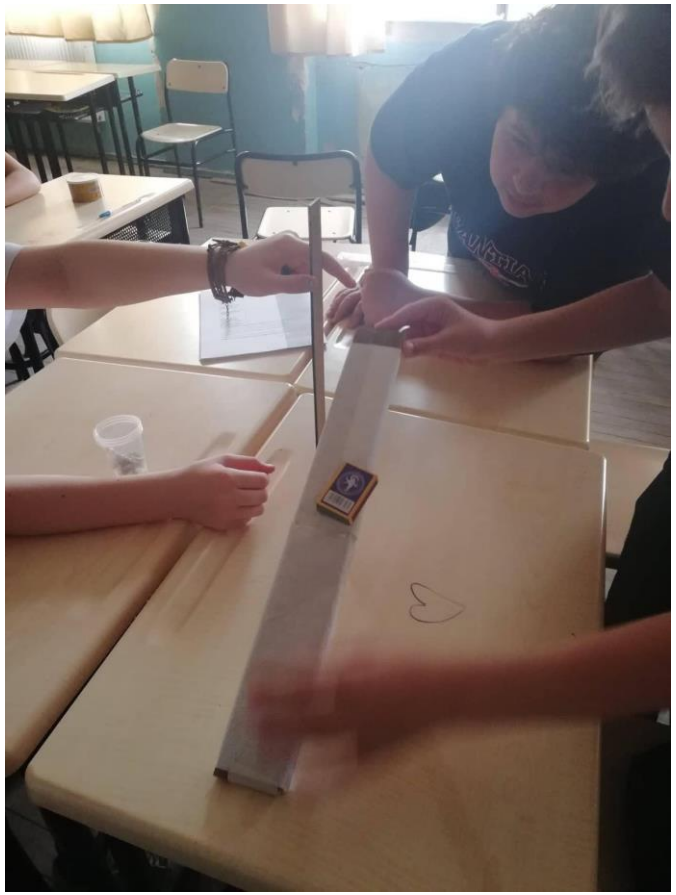


Implementation of ESTA experiments



Implementation of ESTA experiments

Further Steps

Preparation of ESTA course for pre-service teacher

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Science Education Research Centre SALiS

Thank you for your attention!

დიდი მადლობა!

marika_kapanadze@iliauni.edu.ge

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Higher education

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Enrollment - 3 main national exams according to the Ministry of Education guidelines and instruction.

Three types of HEIs:

- University –all three cycles of higher education and scientific research;
- Teaching University – the second cycle – Master's educational programme/programmes;
- College – only the first cycle academic higher education programmes.

56 stately recognized (authorized) HEIs:

- 19 public
- 37 private