WP2 Benchmarking

Jelgava State Gymnasium

6.06.2024.

G-STEAM
Green STEAM ecosystems

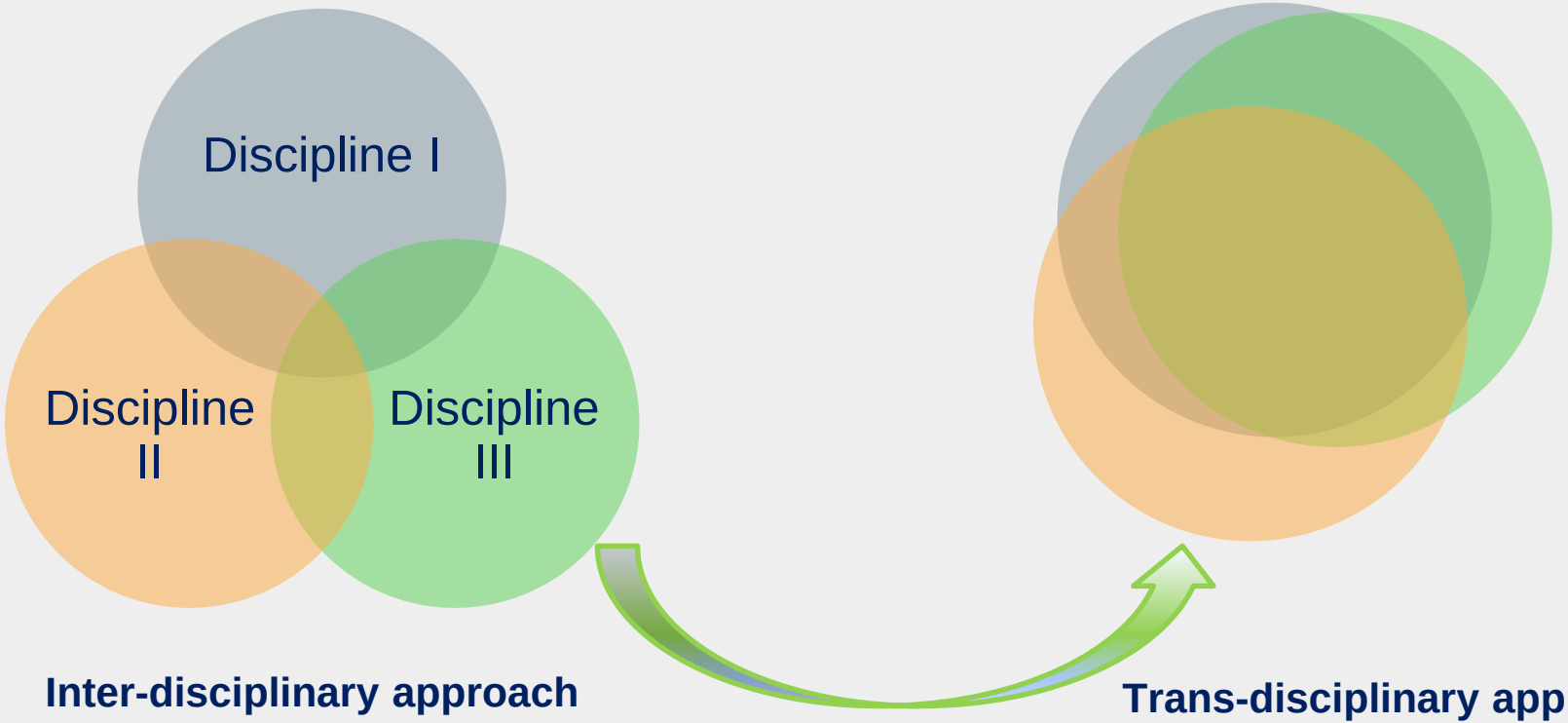
Erasmus+

JSG STEAM curriculum

Regular lesson | Lesson plan | Field trip | STEAM day

Grade	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
7		**Engineering:** Rube-Golberg machine	**Biology** - cell model **Biology + Visual arts**: visualization of cell microscope images **Math** - mathematical description of the process - Chooses a video, defines variables, creates a table+graph, creates a verbal description of the situation		**Theater Arts + Computer science** (Filmmaking) A production created in the process - a short film **Math +music+visual art** Scientific notation and multiples of units or Equal triangles				
8		GETLINI The largest solid waste landfill in the Baltic States		**Biology + Math** Peripheral vision	**Computer science + Visual arts** A poster that draws attention current problems of society	**Science fair projects** B - biology I - engineering U - creative industries M- math			**Raft** 1 day project
9	**Math + Biology** Tree height measurement+ Research in the forest		**Construction Tehnology** Lamps		**Computer science + Construction technology**: e-textiles			**Math, Physics, Geography** Solar panels	
10		**Math+Physics** Smooth straight line movement 3x40min	GREN Decentralised energy solutions ranging from sustainable district heating and cooling to renewable and industrial energy.				**Biology + Latvian language**: argumentative essay	**Math, Physics, Geography** Solar panels	
11	Scientific research work								
12	Project works								

STEAMs Day approach



Adapted from Smith & Paré, 2016; Thunberg, Salmi, & Fenyvesi, 2017

Developed STEAM activities

Scientific notation and multiples of units	Models for the Science Fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
• Mathematics • Music • Visual arts	• Mathematics • Engineering • Biology • Creative industries	• Geography • Physics • Engineering • Mathematics	• Engineering • Visual arts • Crafts • Mathematics • Physics	• Theatre arts • Computing	• Computing • Design and technology	• Mathematics • Physics	• Biology • Mathematics

Developed STEAM activities (12)

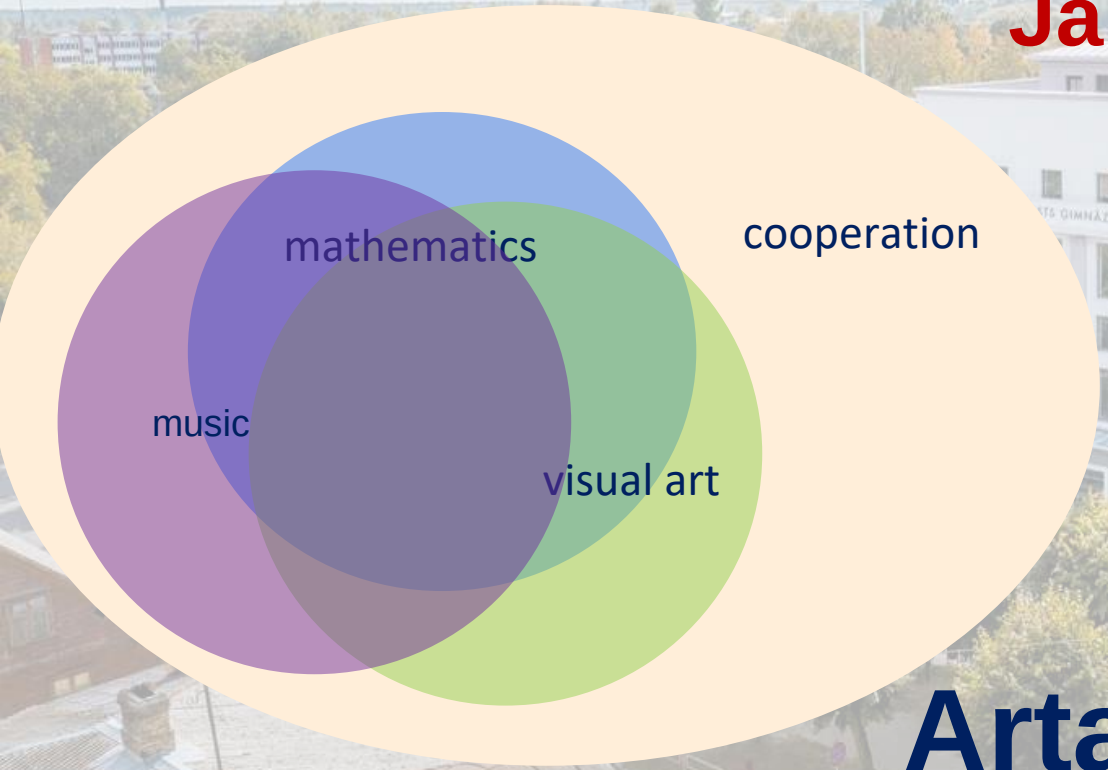
A poster that draws attention current problems of society	Mathematical description of the process	Building raft	Lamps	…			
• Computer science • Visual arts	• Mathematics • Real life situations	• Geography • Physics • Engineering • Mathematics • Design and technology	• Design and technology • Physics				

Developed STEAM activities

Scientific notation and multiples of units/ Congruent triangles	Mathematic models for the science fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
• Mathematics • Music • Visual arts	• Mathematics • Engineering	• Geography • Physics • Engineering • Mathematics	• Engineering • Visual arts • Crafts • Mathematics • Physics	• Theatre arts • Computing	• Computing • Design and technology	• Mathematics • Physics	• Biology • Mathematics

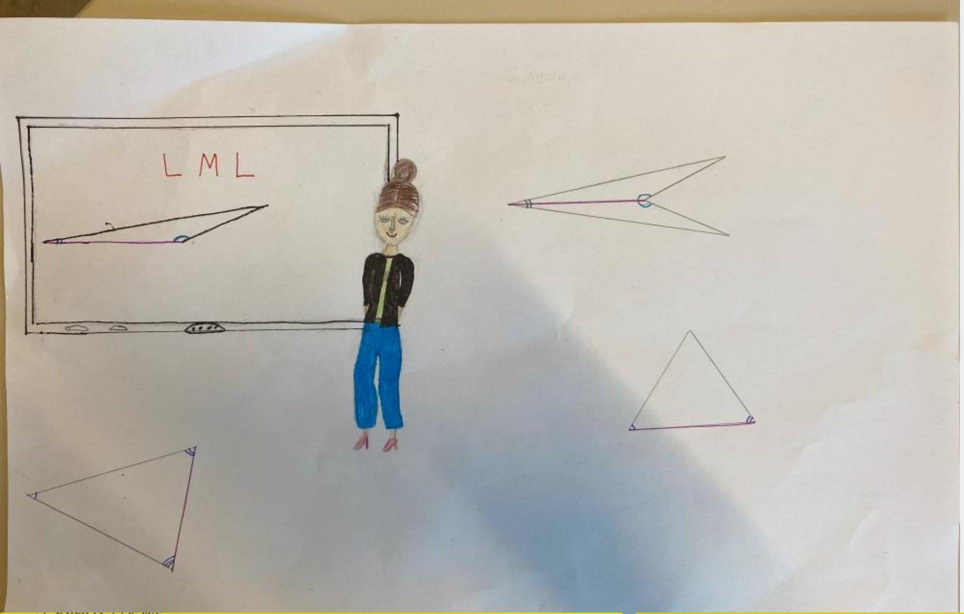
The rules of congruent triangles

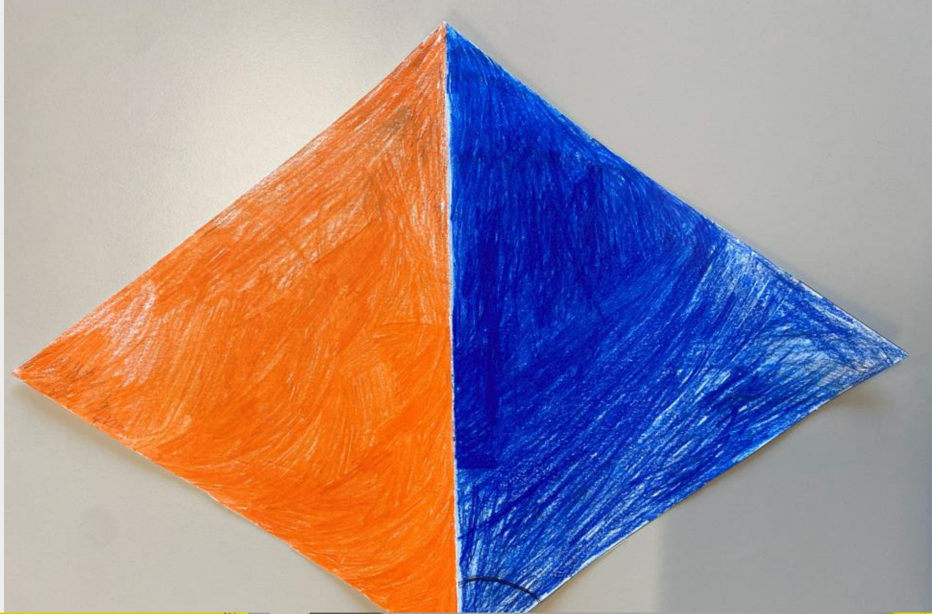
January 2024

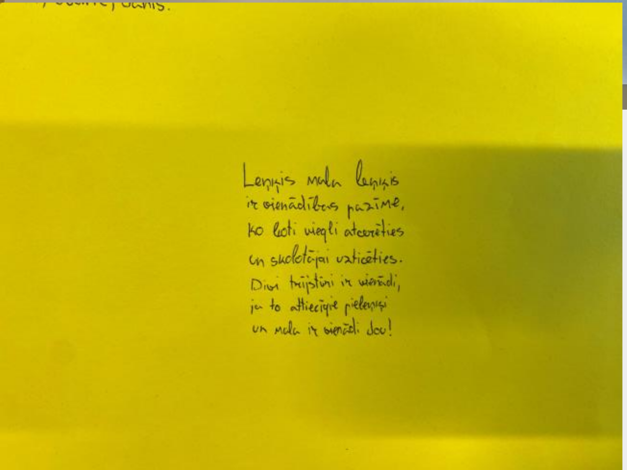


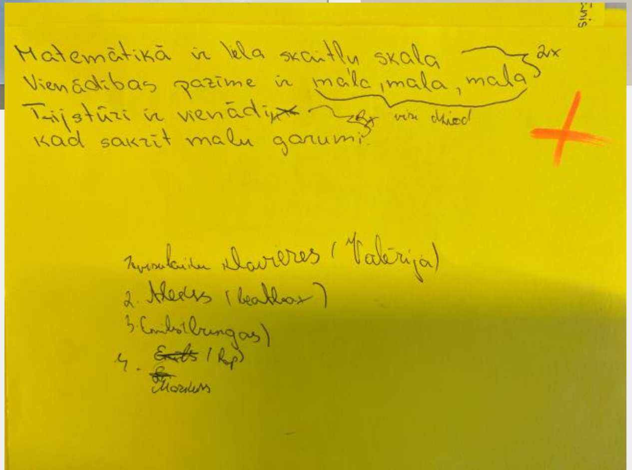
Trans-disciplinary approach

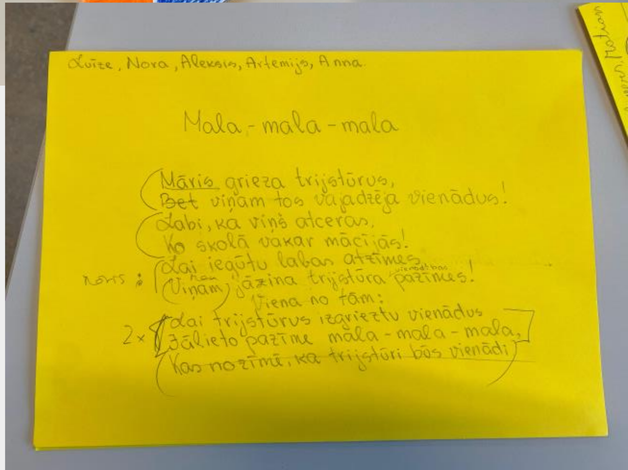
Arta Jurgenovska

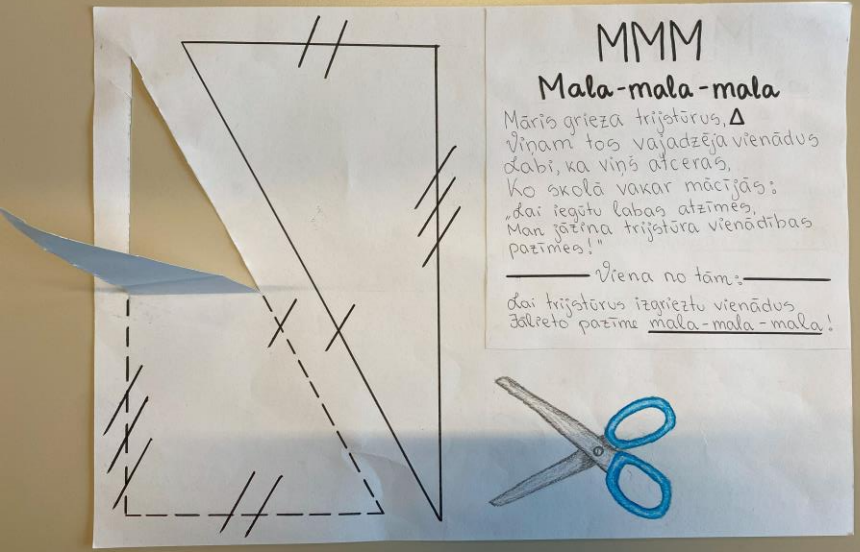

L M L

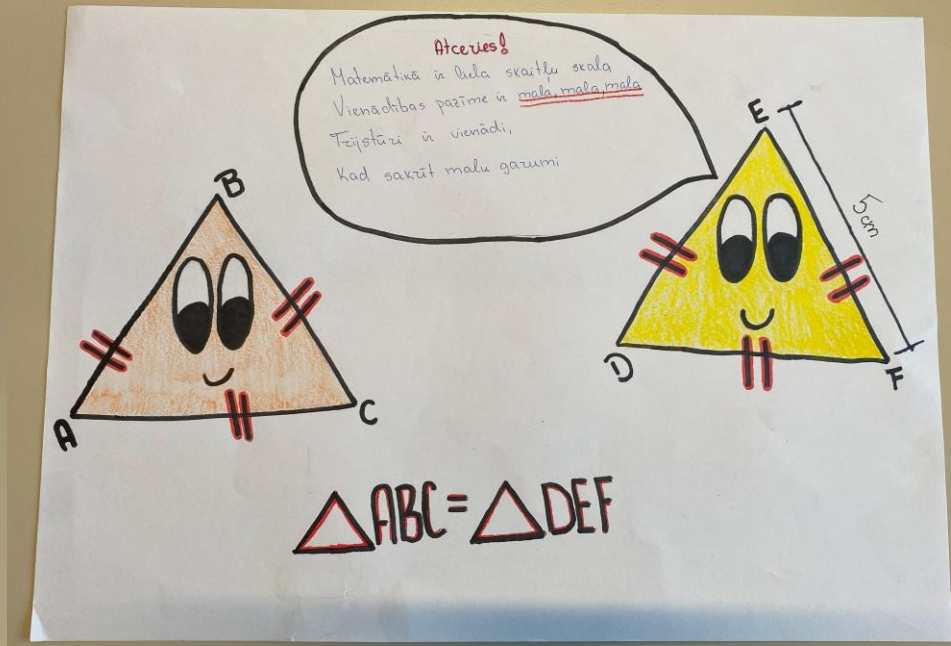



Lenķis mala lenķis
ir vienādības pazīme,
ko ļoti viegli atcerēties
un skolotājai uzticēties.
Divi trijstūri ir vienādi,
ja to attiecīgie pieleņķi
un mala ir vienādi dou!


Matemātikā ir liela skaitļu skala
Vienādības pazīme ir mala, mala, mala
Trijstūri ir vienādi
kad sakrīt malu garumi.
2x
(Valērija)
2. Aleksis (beatbox)
3. (bungas)
4. (Rap)

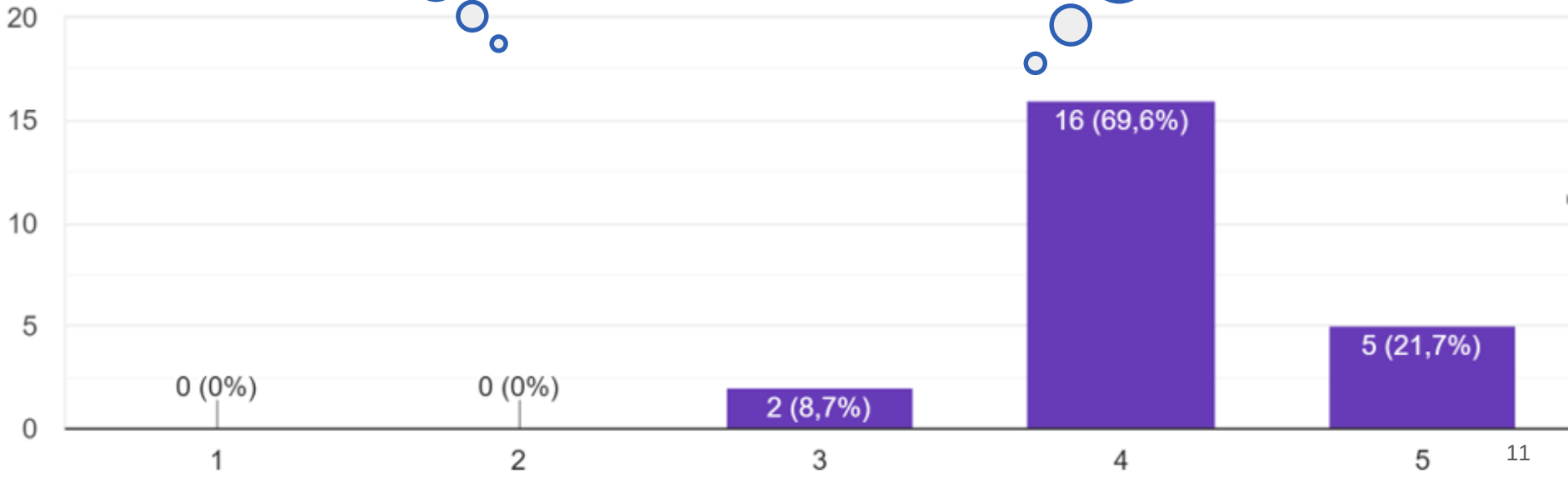

Luīze, Nora, Aleksis, Artemijs, Anna.
Mala - mala - mala
Māris grieza trijstūrus,
Bet viņam tos vajadzēja vienādus!
Labi, ka viņš atceras,
Ko skolā vakar mācījās!
Lai iegūtu labas atzīmes
Viņam jāzina trijstūra vienādības pazīmes!
Viena no tām:
Lai trijstūrus izgrieztu vienādus
Jālieto pazīme mala - mala - mala,
Kas nozīmē, ka trijstūri būs vienādi
2×


MMM
Mala-mala-mala
Māris griezа trijstūrus, Δ
Viņam tos vajadzēja vienādus
Labi, ka viņš atceras,
Ko skolā vakar mācījās:
„Lai iegūtu labas atzīmes,
Man jāzīmē trijstūra vienādības
pazīmes!"
Viena no tām:
Lai trijstūrus izgriezt vienādus
Jāievēro pazīme mala-mala-mala!

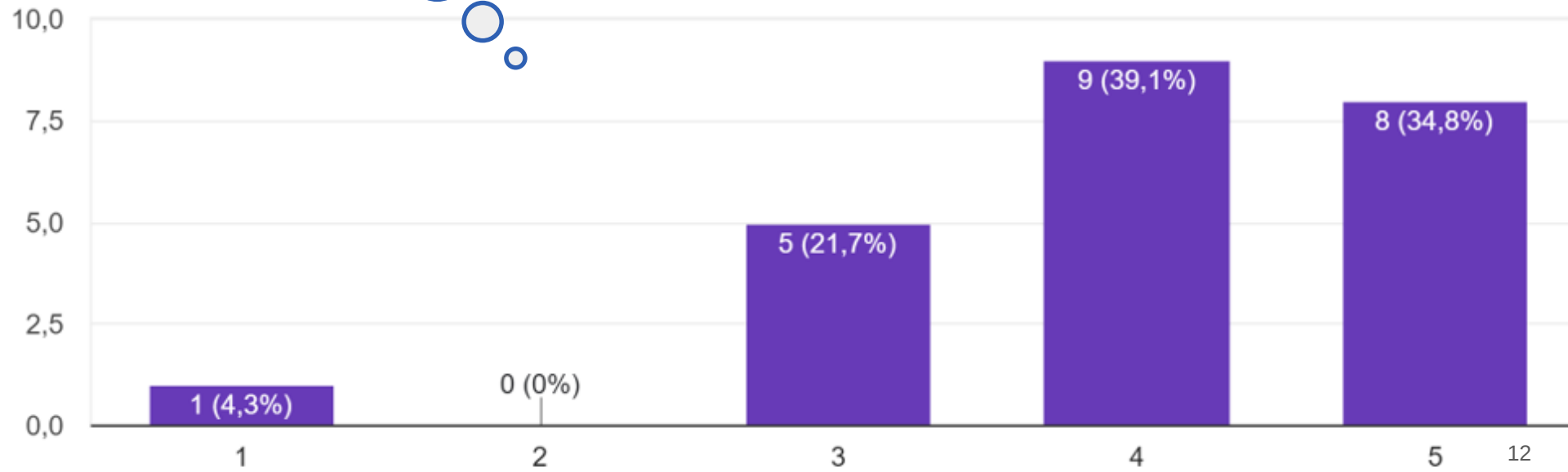

Atceries!
Matemātikā ir liela skaitļu skala
Vienādības pazīme ir mala, mala, mala
Trijstūri ir vienādi,
Kad sakrīt malu garumi
B
A
C
E
D
F
5cm
△ABC=△DEF

23
respondents
7th grade

To what extent are you achieving results?



Appropriateness of the environment for the task



What were the biggest challenges?

Composing a text (3)
Cooperation (6)
Make up a melody, a rhythm (5)

What knowledge/skills were acquired?
(multiple answers are possible)

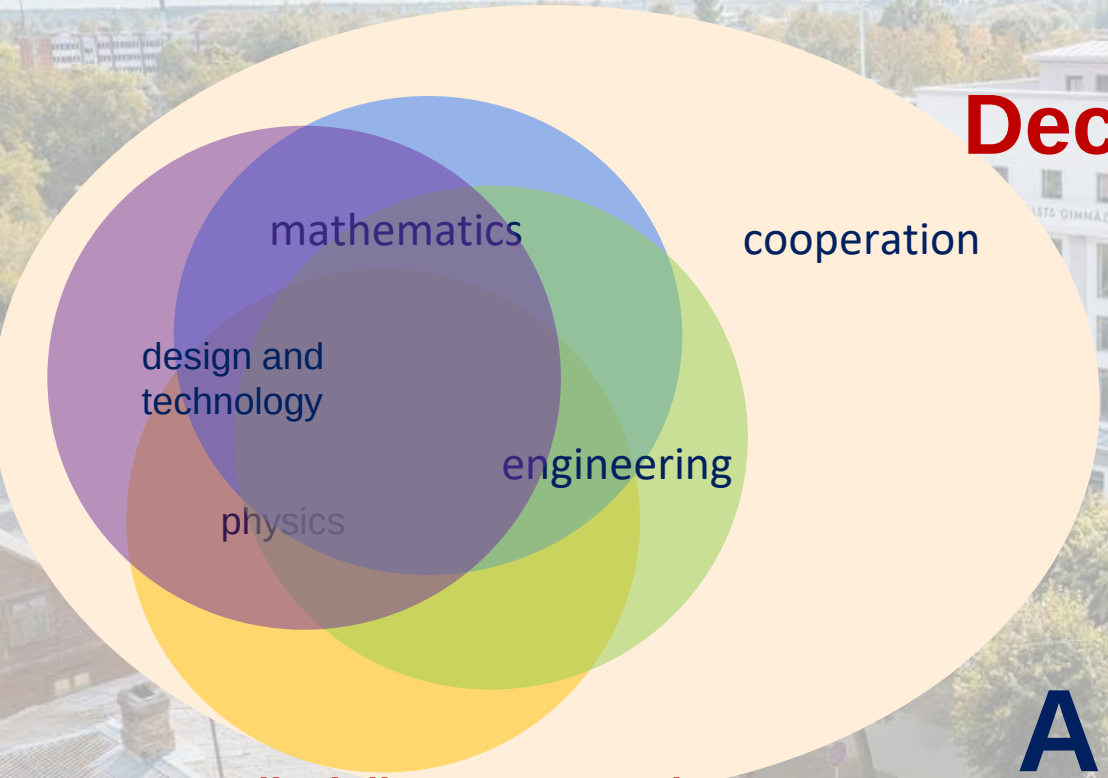
Team building, cooperation (2)
Creativity, to combine the seemingly incompatible (creativity+mathematics) (16)

Developed STEAM activities

Scientific notation and multiples of units	Mathematic models for the science fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
• Mathematics • Music • Visual arts	• Mathematics • Engineering	• Geography • Physics • Engineering • Mathematics	• Engineering • Visual arts • Crafts • Mathematics • Physics	• Theatre arts • Computing	• Computing • Design and technology	• Mathematics • Physics	• Biology • Mathematics

Rube Goldberg machine

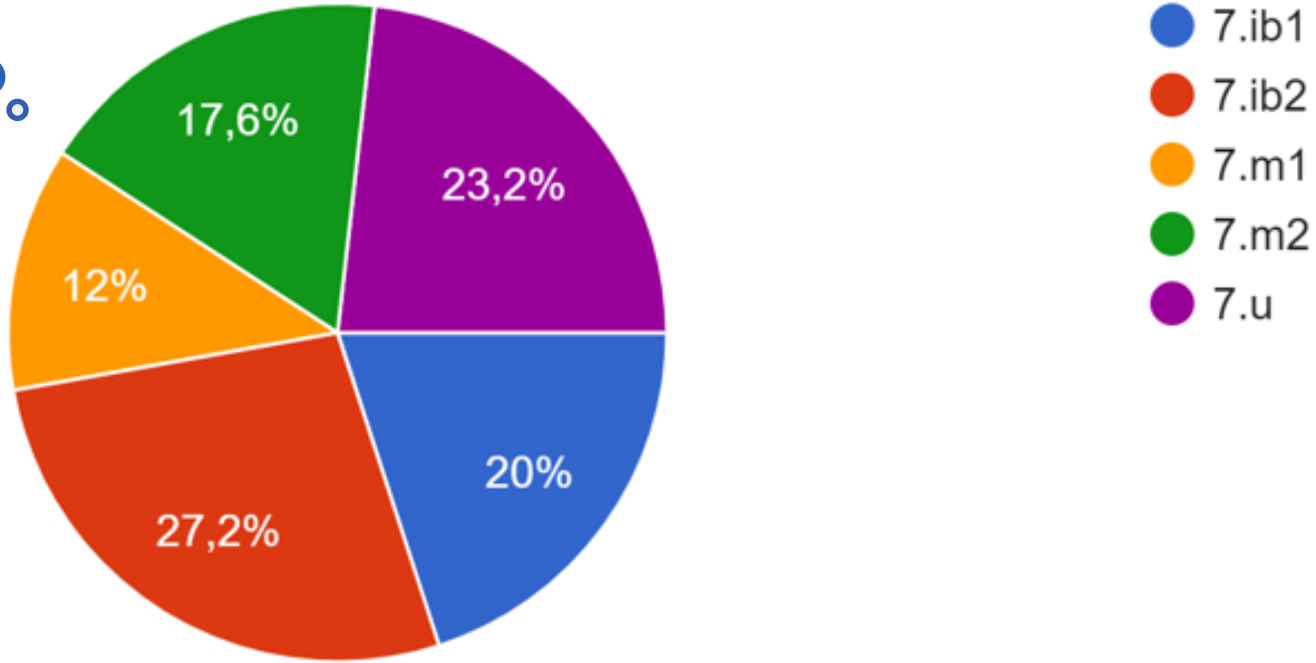
December 2024



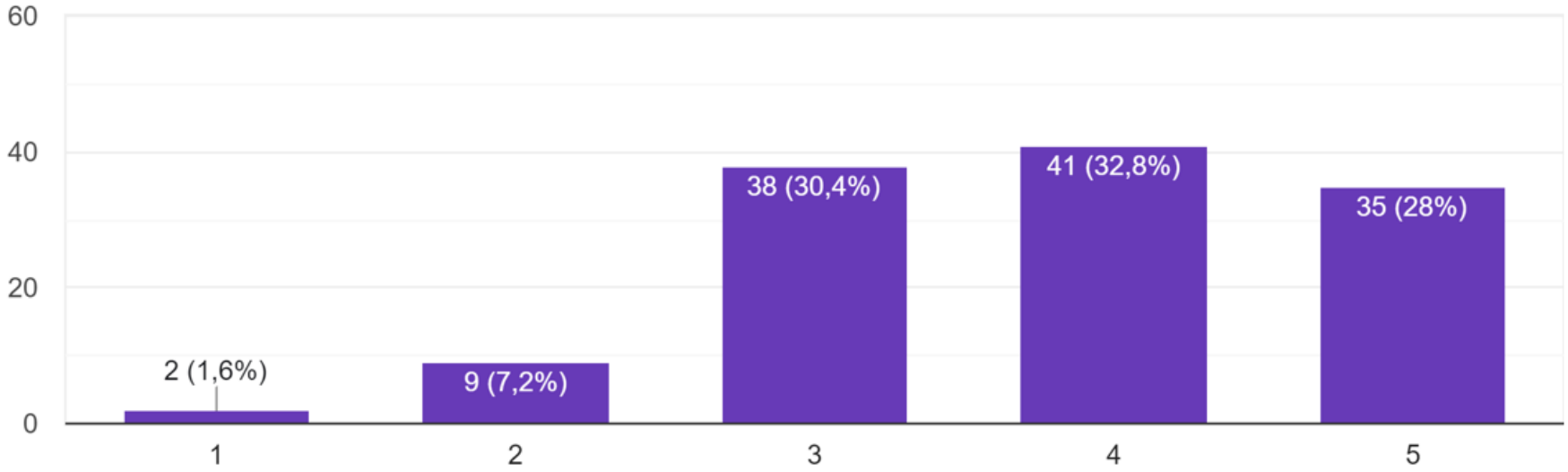
Anna Petrago

Trans-disciplinary approach

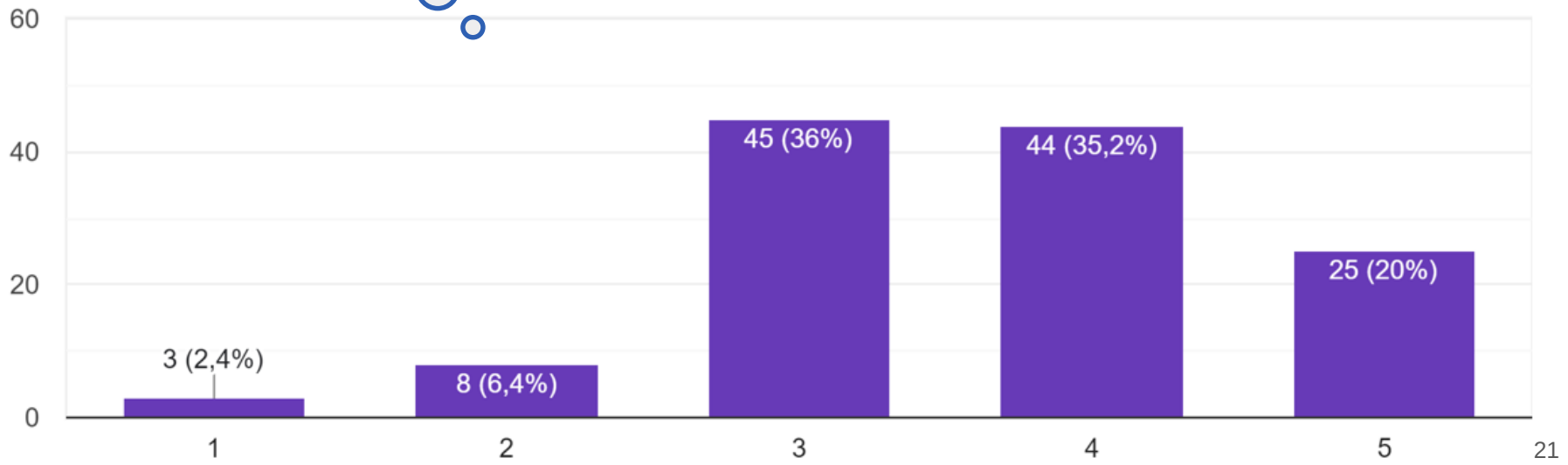
125
respondents
7th grade



To what extent are you achieving results?



Appropriateness of the environment for the task



What were the biggest challenges?

Come up with an idea (17)
Technical issues (57)
Cooperation (16)

What knowledge/skills were acquired?
(multiple answers are possible)

Engineering, Physics, Math (35)
Cooperation (24)
Logical thinking, strategic thinking (6)
I knew everything (18)

Interesting answers

- I don't want to work with women ever again
- The task was easier than sleeping
- I learned to cheat from other teams

Developed STEAM activities

Scientific notation and multiples of units	Mathematic models for the science fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
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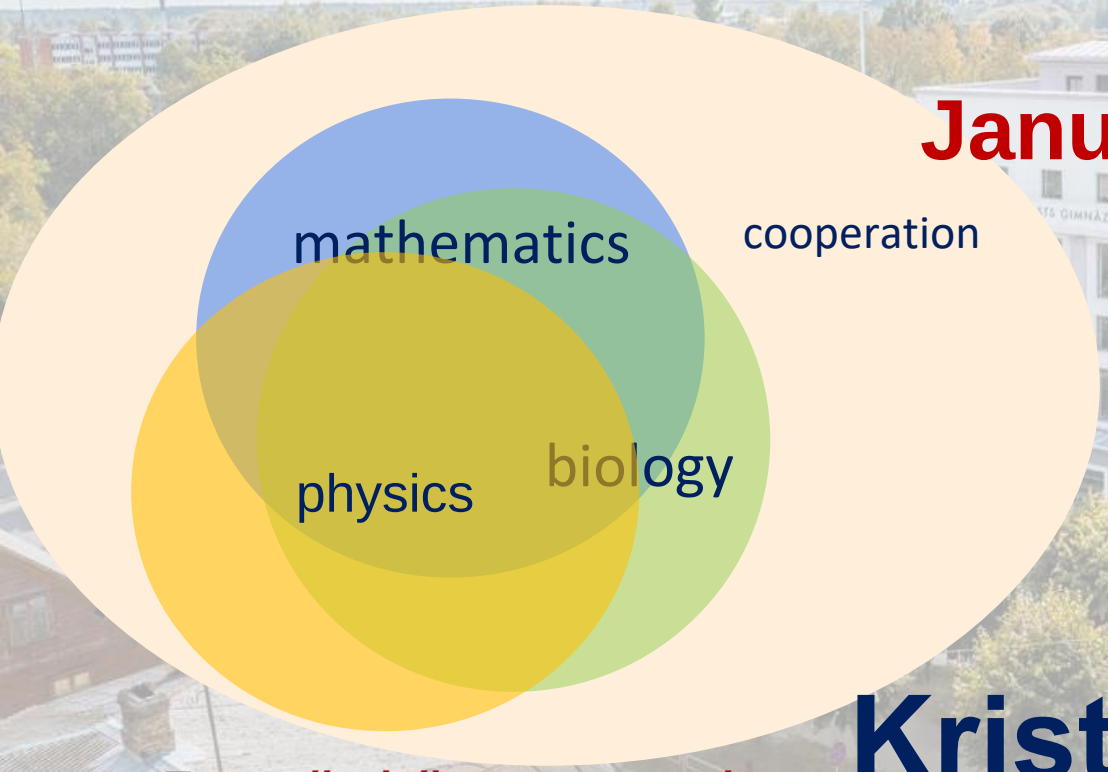
Peripheral vision

January 2024



Trans-disciplinary approach

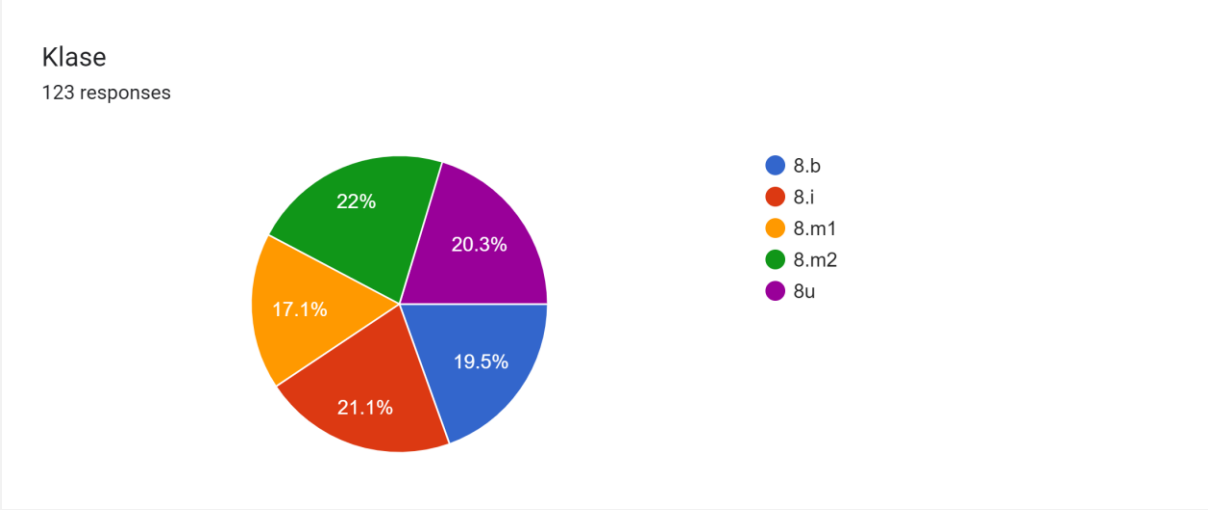
Kristīne Nagornaja

Under construction

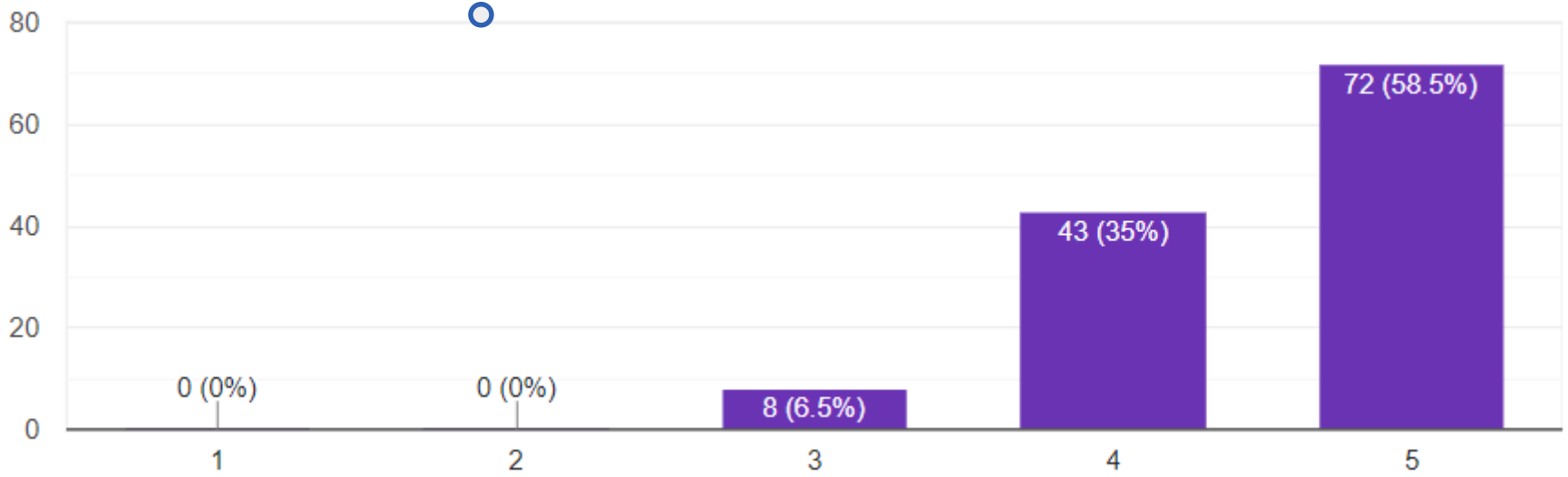
Is it going to work?

Test

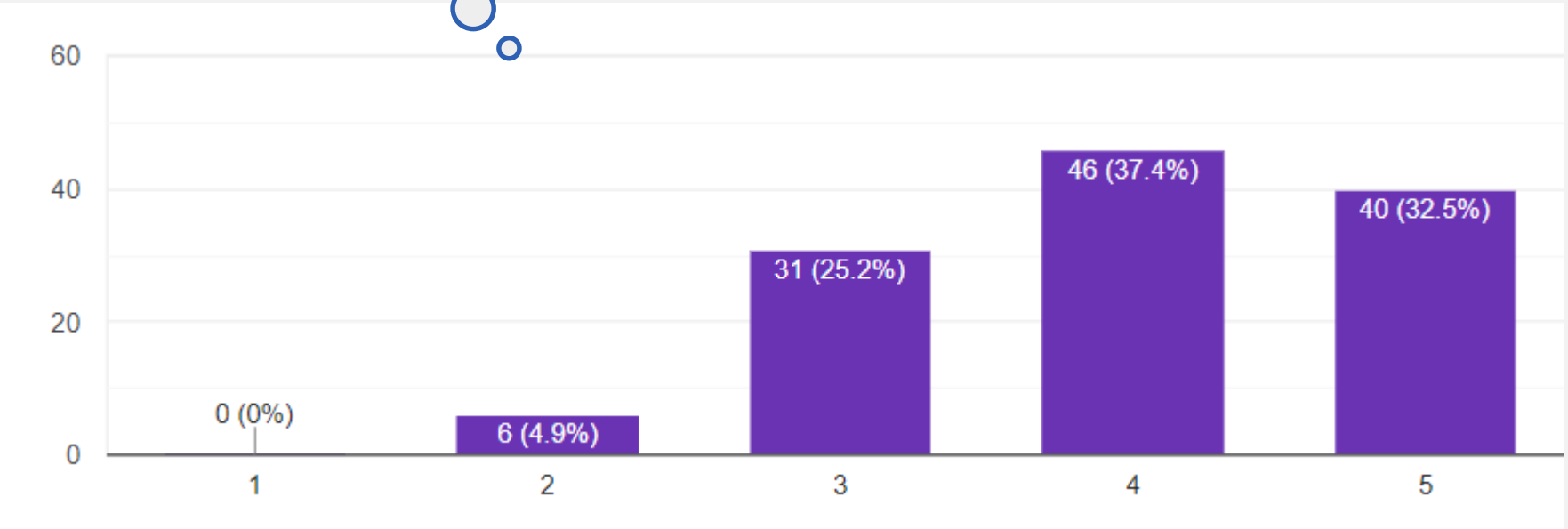
123
respondents
8th grade



To what extent are you achieving results?



Appropriateness of the environment for the task



What were the biggest challenges?

Register data (17)
Measure angle (40)
Write conclusions (12)

What knowledge/skills were acquired?
(multiple answers are possible)

Knowledge about vision (83)
Cooperation (24)
Calculate angles (16)

Interesting answers

- It is very good that our school conducts experiments and there are no ordinary boring days
- I would like such STEAM days in other classes as well

Developed STEAM activities

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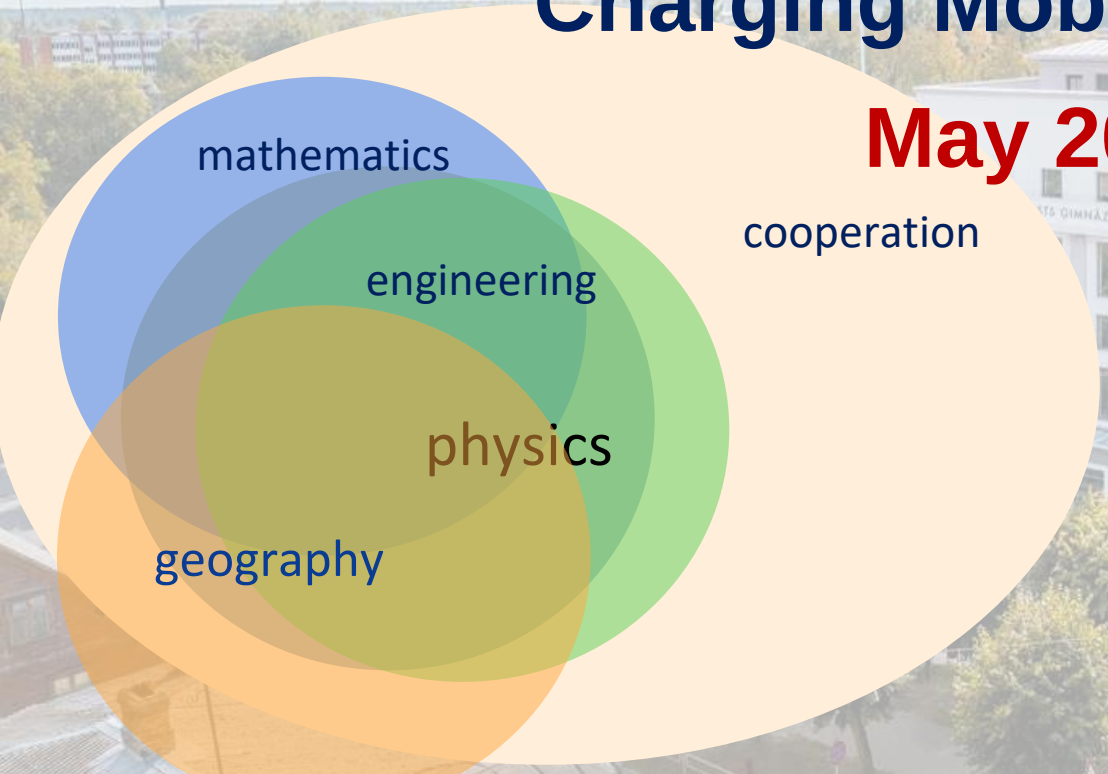
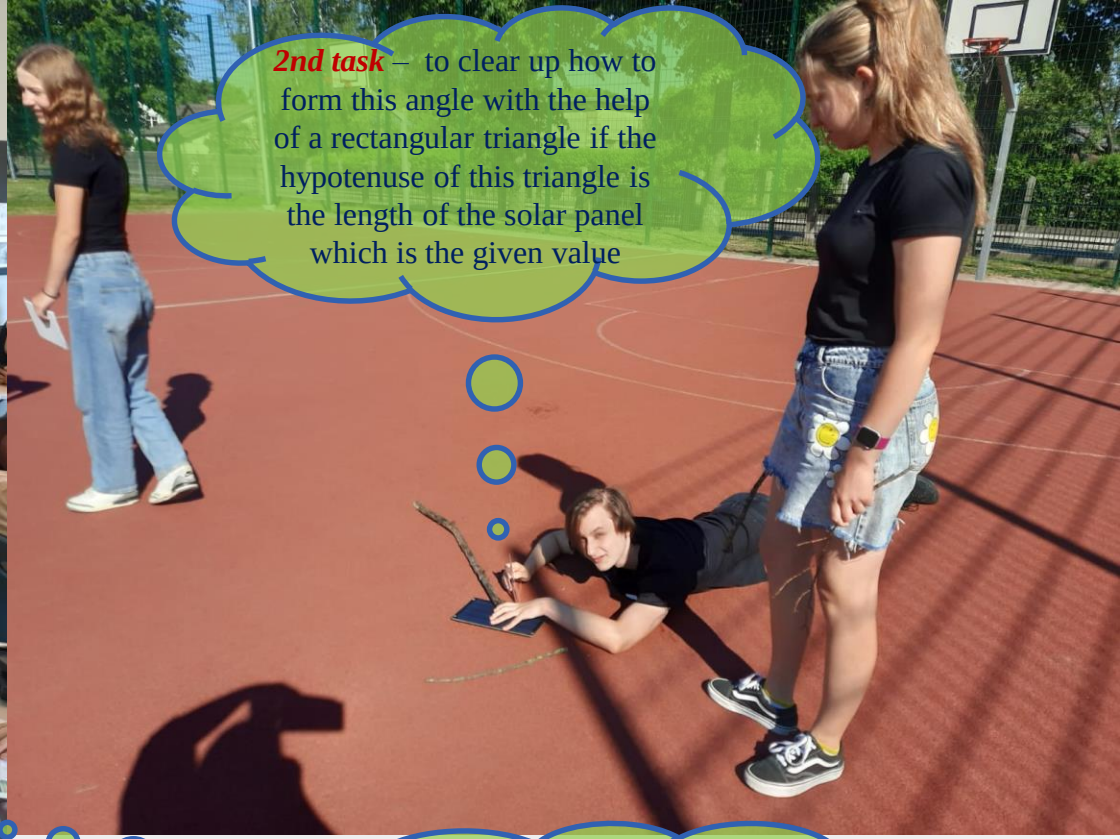
Effective Usage of Small Solar Panels for Charging Mobile Phones

May 2024



Trans-disciplinary approach



2nd task – to clear up how to form this angle with the help of a rectangular triangle if the hypotenuse of this triangle is the length of the solar panel which is the given value

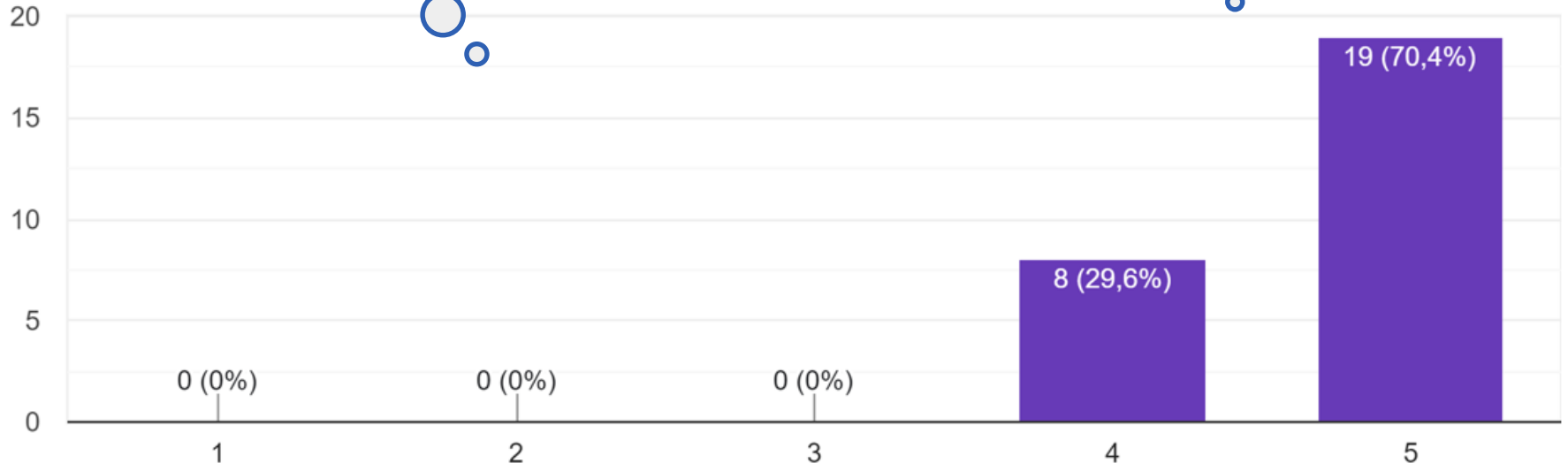
1st task – pupils have to calculate what the angle of the solar panel in relation to the land should be, so that the maximum of solar energy could be used

3rd task – to make a model using the accessible resources and not using a ruler

Enjoy the result…

To what extent are you achieving results?

27 respondents **10th grade**



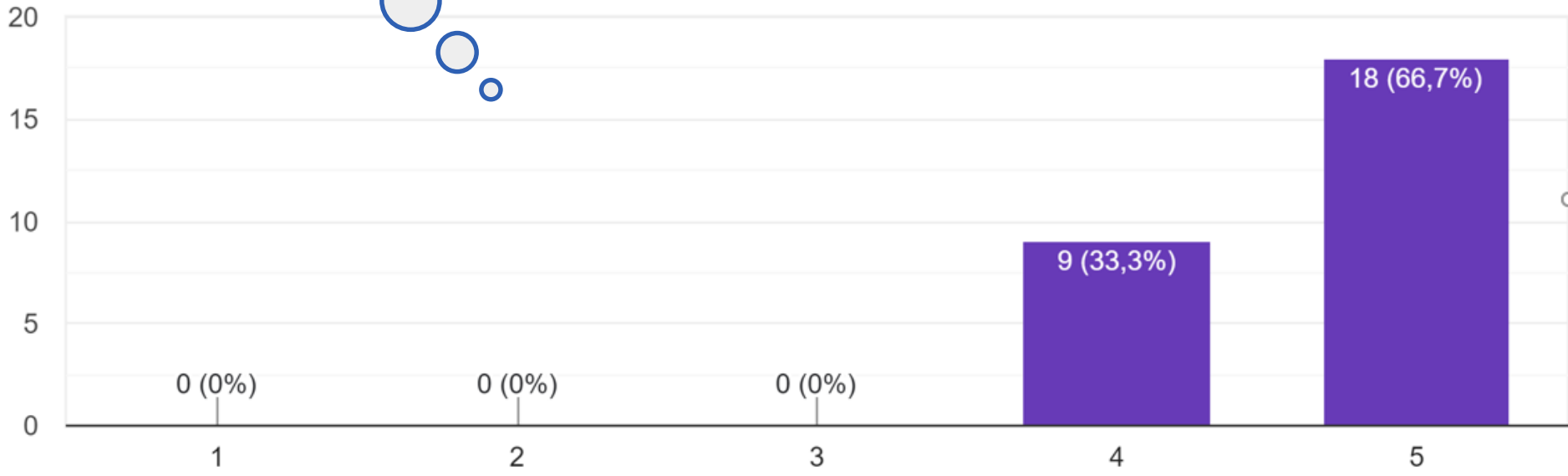
What were the biggest challenges?

Calculation (7)
Searching for materials (6)
Wait while charging (4)

What knowledge/skills were acquired?
(multiple answers are possible)

Engineering, Math, Geography (11)
Many things about solar panels (15)

Appropriateness of the environment for the task



What were the biggest challenges?

Come up with an idea (17)
Technical issues (57)
Cooperation (16)

What knowledge/skills were acquired?
(multiple answers are possible)

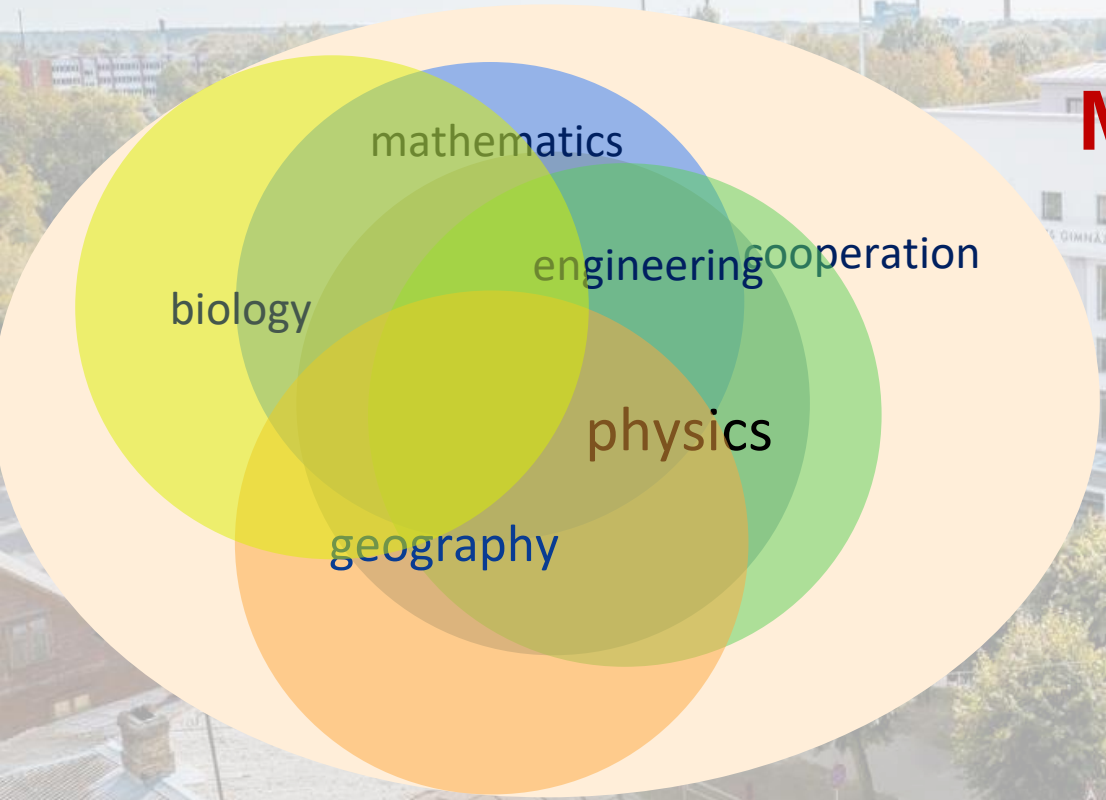
Engineering, Physics, Math (35)
Cooperation (24)
Logical thinking, strategic thinking (6)
I knew everything (18)

Developed STEAM activities

A poster that draws attention current problems of society	Mathematical description of the process	Building raft	…				
• Computer science • Visual arts	• Mathematics • Real life situations	• Geography • Physics • Engineering • Mathematics • Design and technology					

Building raft

May 2024



Trans-disciplinary approach

8th grade
pupils

The speed of the stream and wind are calculated

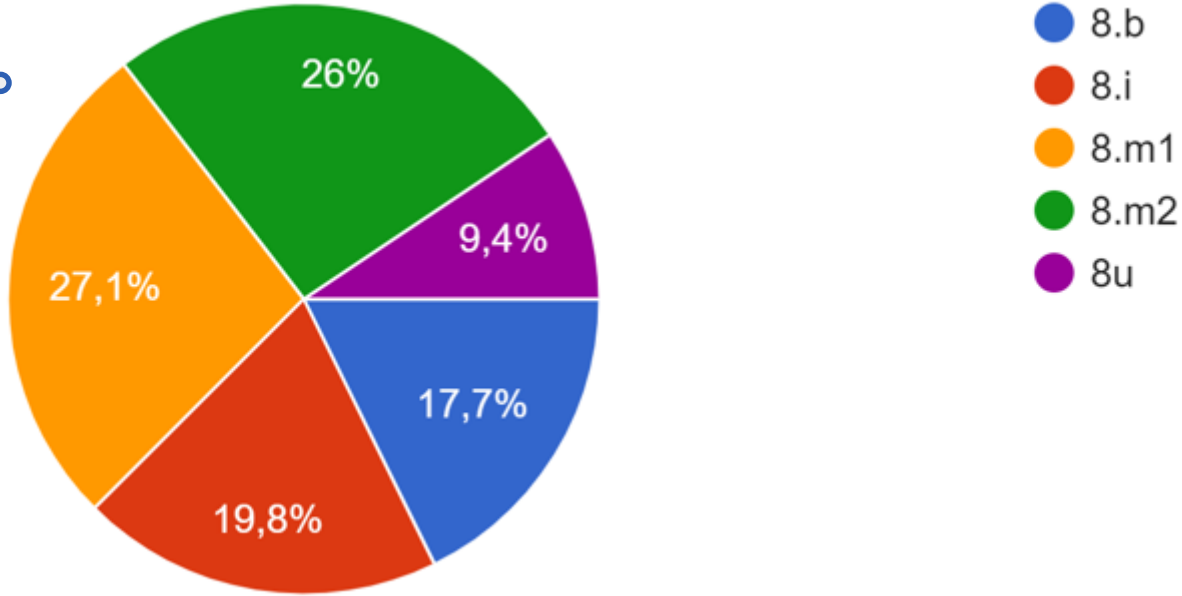
Construction of an anemometer

Raft under construction

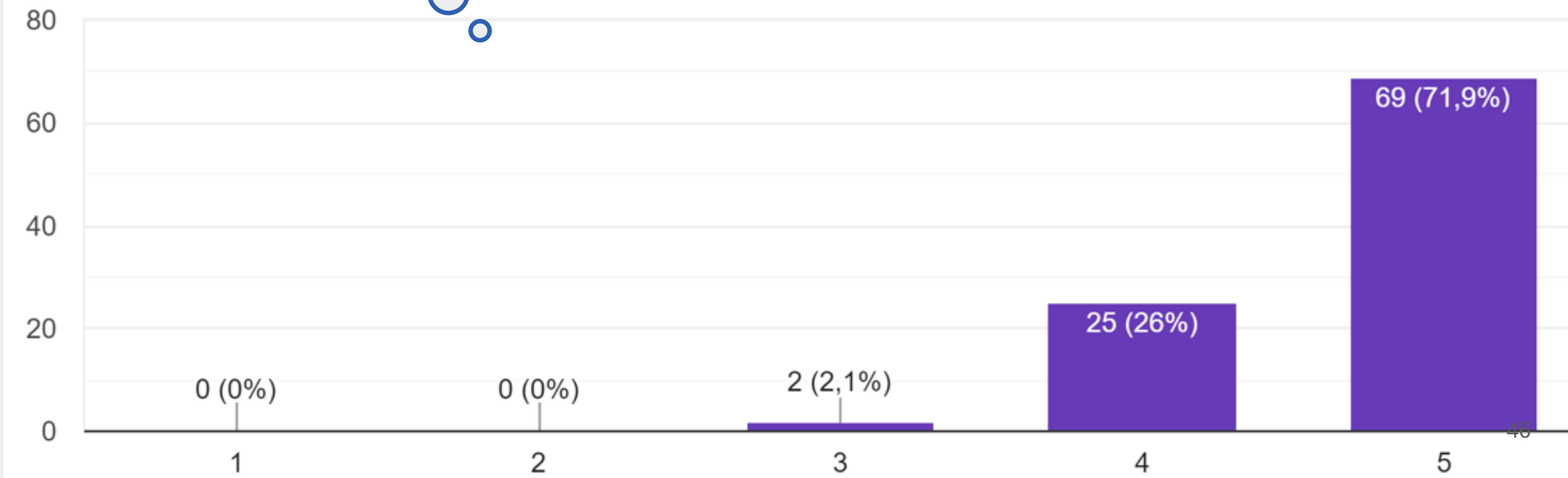
8th grade pupils

Raft being tested

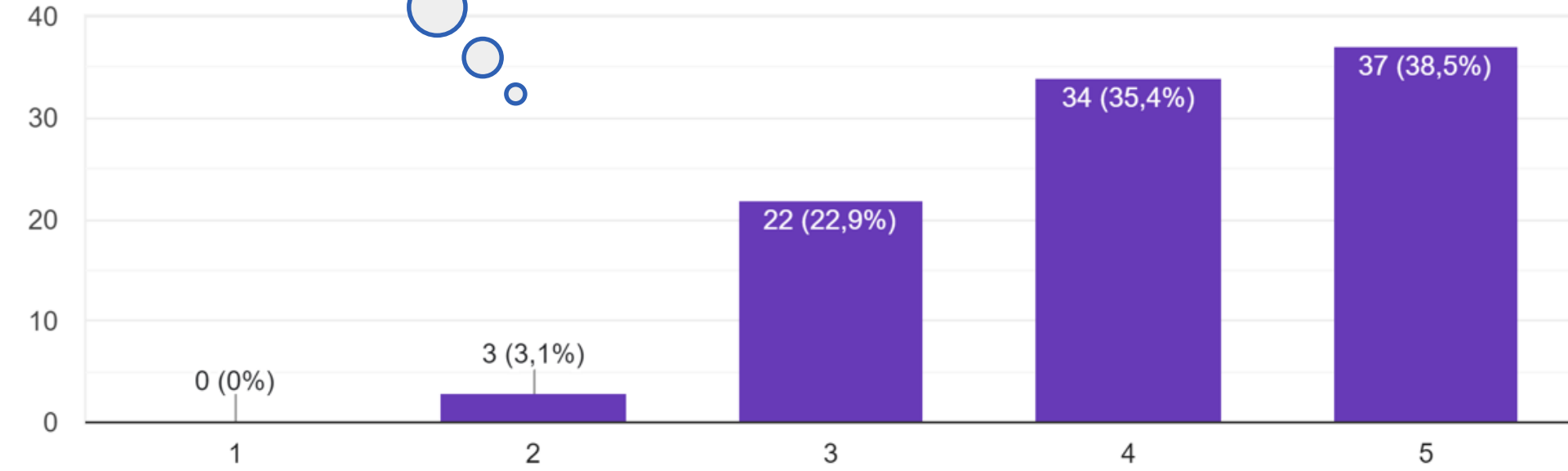
96
respondents
8th grade



To what extent are you achieving results?



Appropriateness of the environment for the task

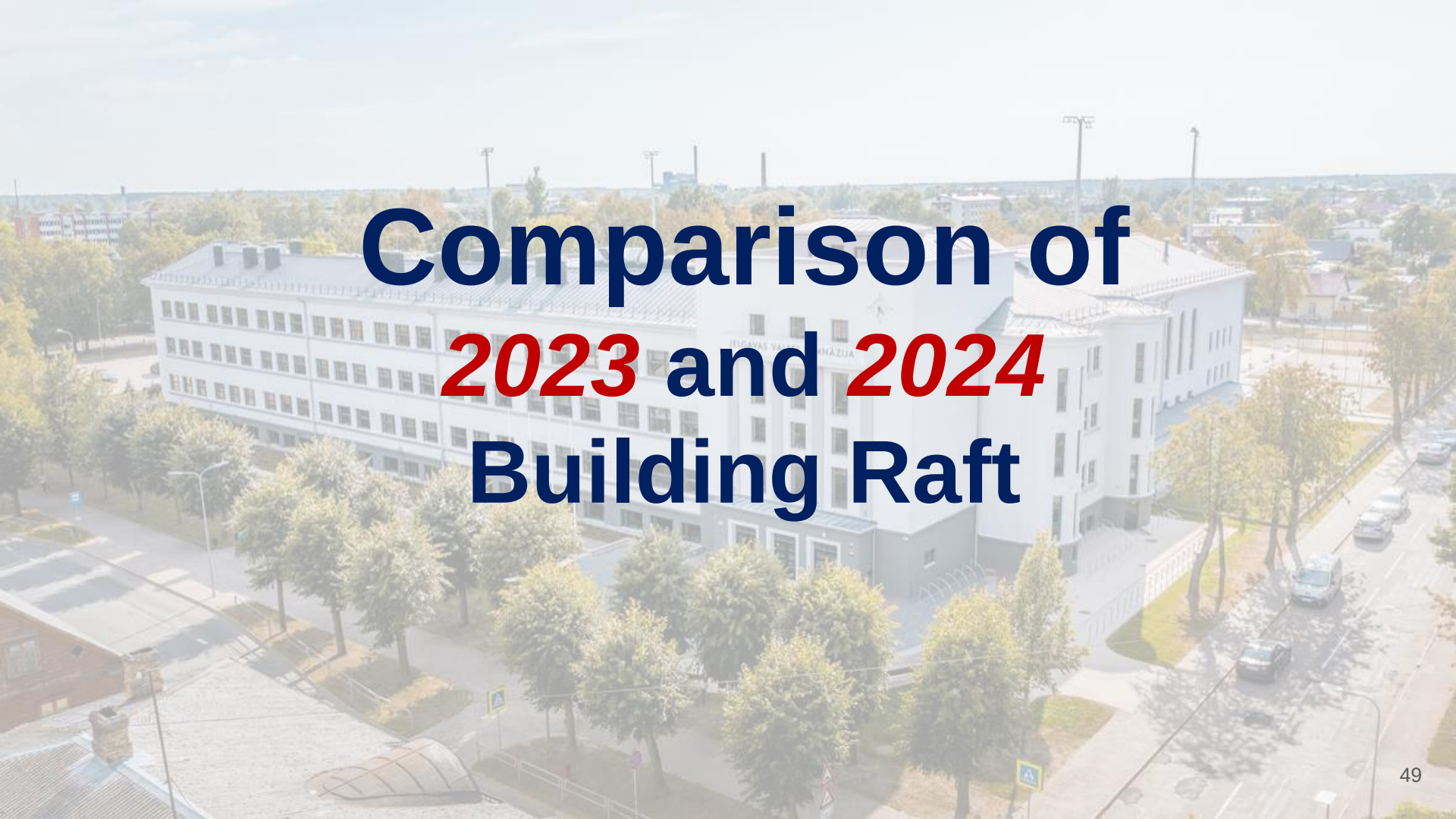


What were the biggest challenges?

Calculation (48)
Cooperation (9)
Build an anonometer (4)

What knowledge/skills were acquired?
(multiple answers are possible)

I remembered the formulas, math, physics (56)
Cooperation (8)
Applying theoretical knowledge in practice (18)



Comparison of *2023* and *2024* Building Raft

Developed STEAM activities

Scientific notation and multiples of units	Models for the Science Fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
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In process made short-film

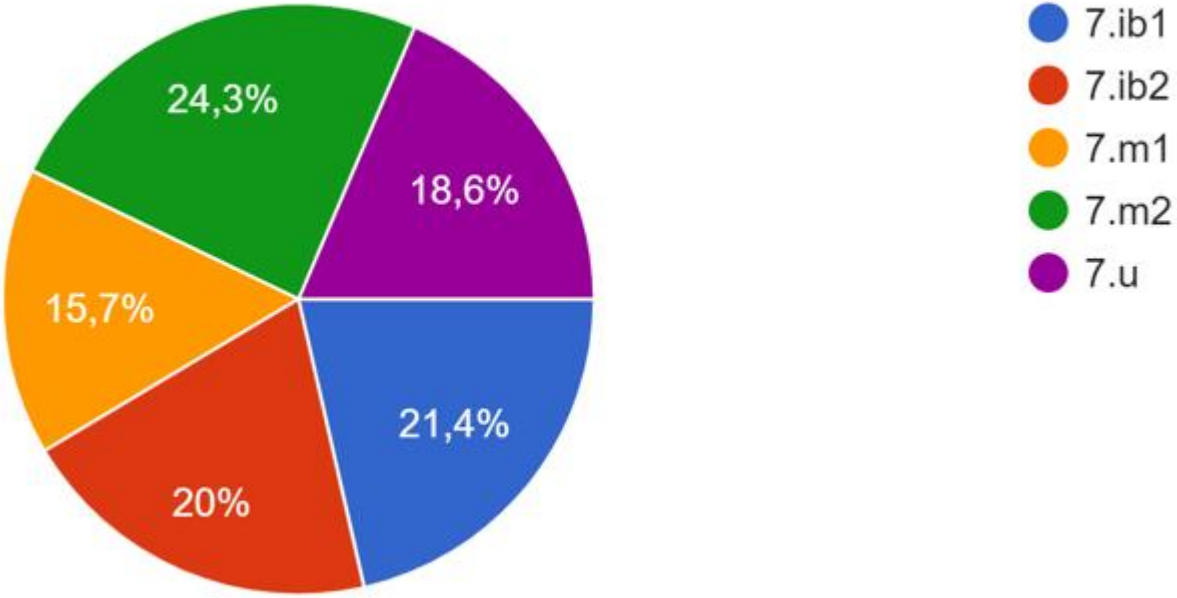
May 2024

The planned result to be achieved by the students:
Through experience and practice, an understanding of the artistic (directing, acting) and technical (device preparation for filming, filming, video editing) aspects of the process of creating a production (short film) is created, combining previously learned theater art skills in the creation of a production - a short film - created in the process.

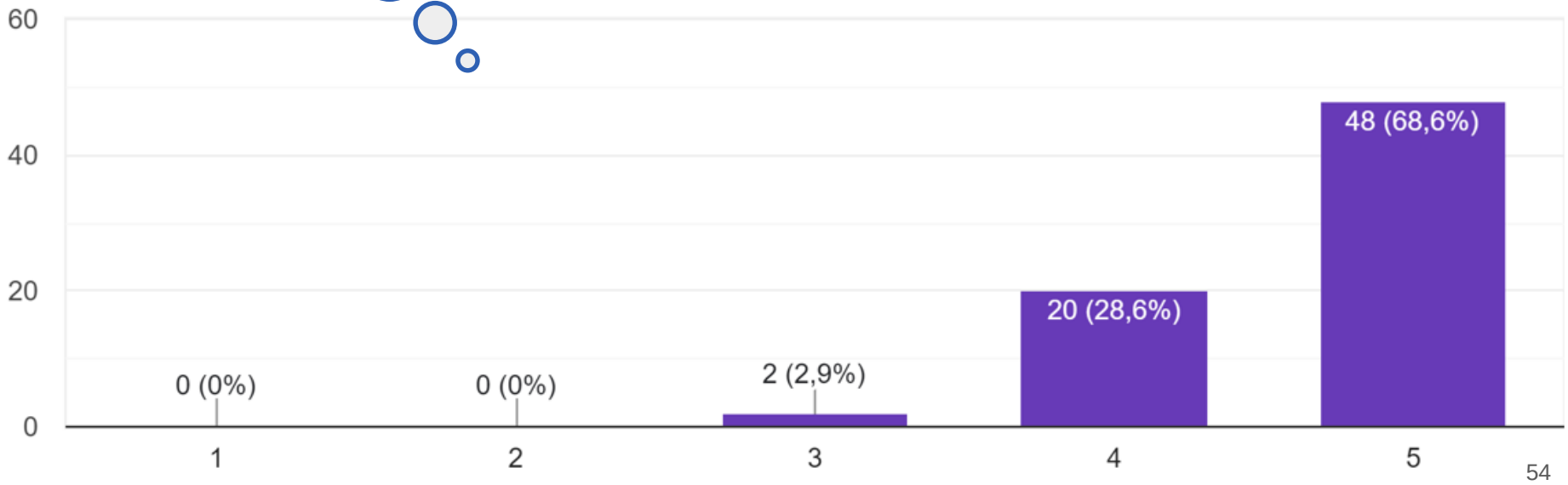
1) Students, having agreed on the idea of a short film in groups, created its script.
2) Students learned skills in filming.
3) Students filmed footage for their short films in groups, showing their acting skills and moving towards the joint discovery of the artistic idea of the short film.
4) Students learned video editing skills that they used when editing their short films.

Video

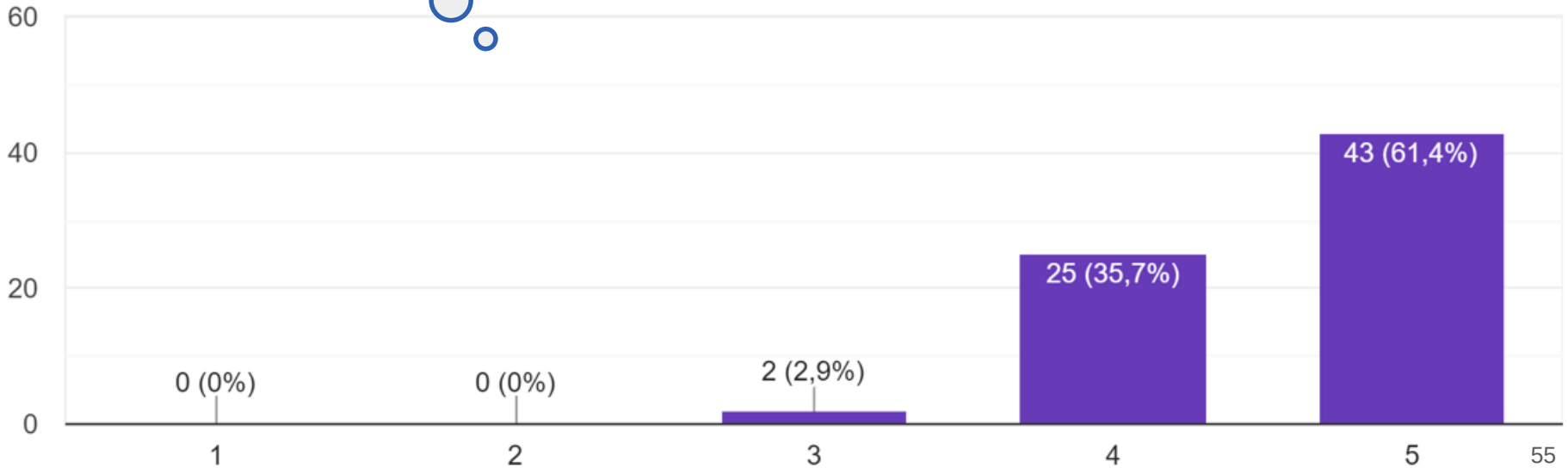
70
respondents
7th grade



To what extent are you achieving results?



Appropriateness of the environment for the task



What were the biggest challenges?

Editing a film (9)
Cooperation (18)
Being serious and not laughing (17)

What knowledge/skills were acquired?
(multiple answers are possible)

Cooperation (9)
Film editing skills (37)
Acting and speaking in front of the camera (10)

Interesting answers

- Accept what is and don't give up
- Why did we get 9 out of 10 ??? our film was very good 😠 😳 😔
- The pancakes came out very tasty during the film-making process and I'm glad I got 10

Developed STEAM activities

Scientific notation and multiples of units	Models for the Science Fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
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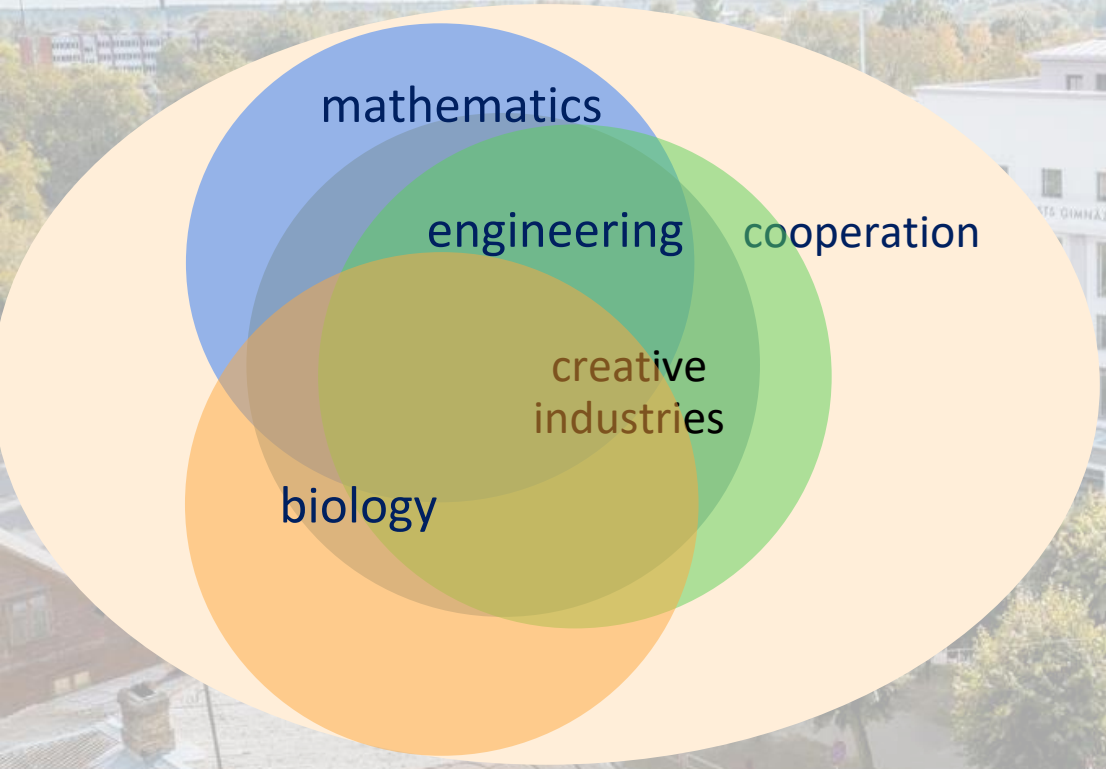
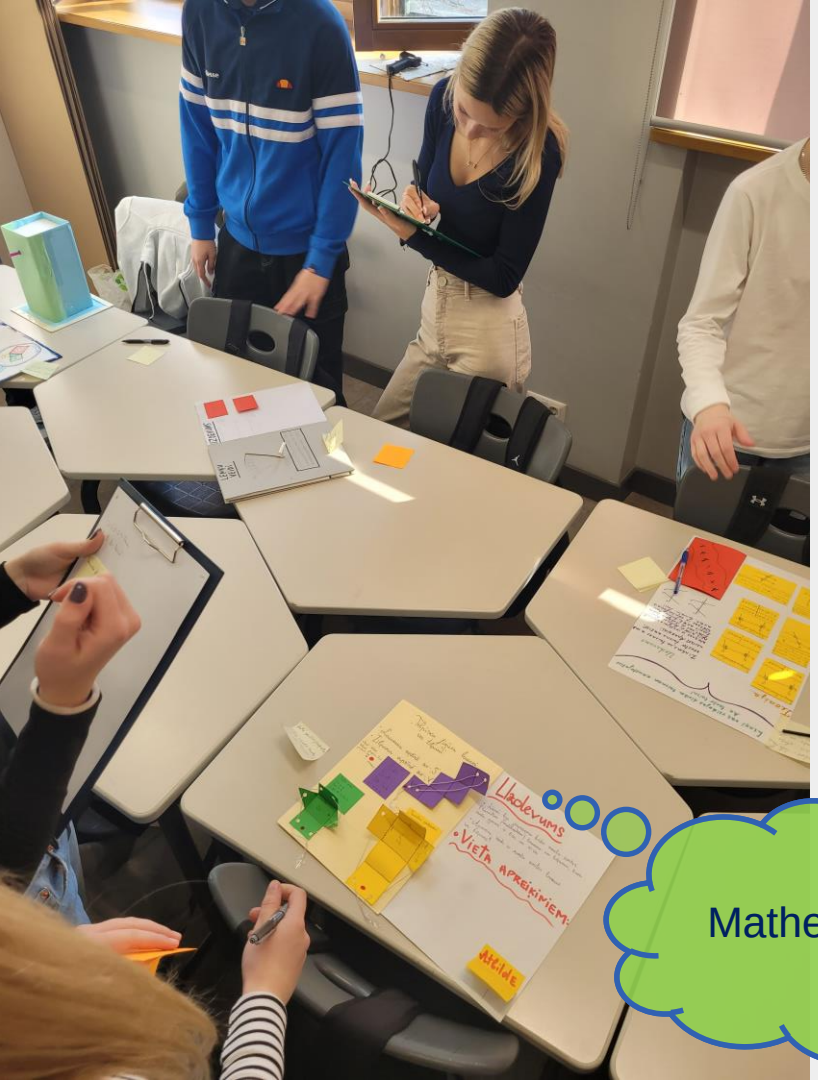
Sciene Fair

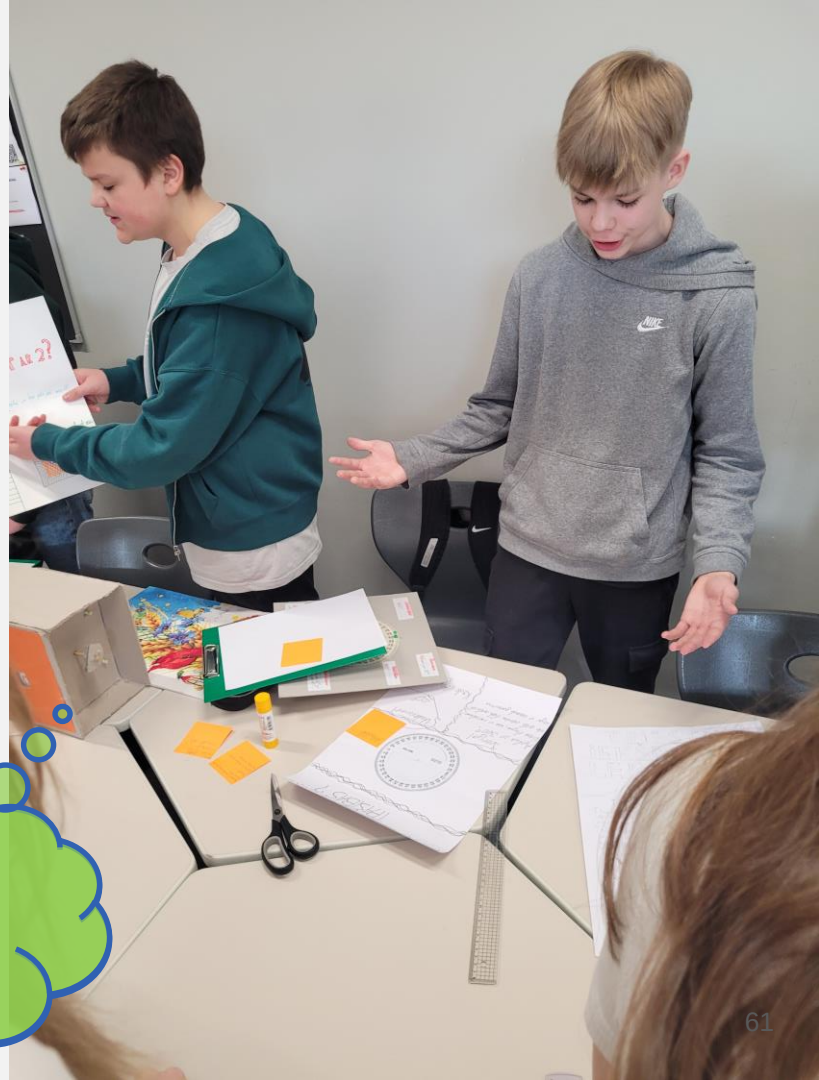
2024



Trans-disciplinary approach


Mathematics


Mathematics

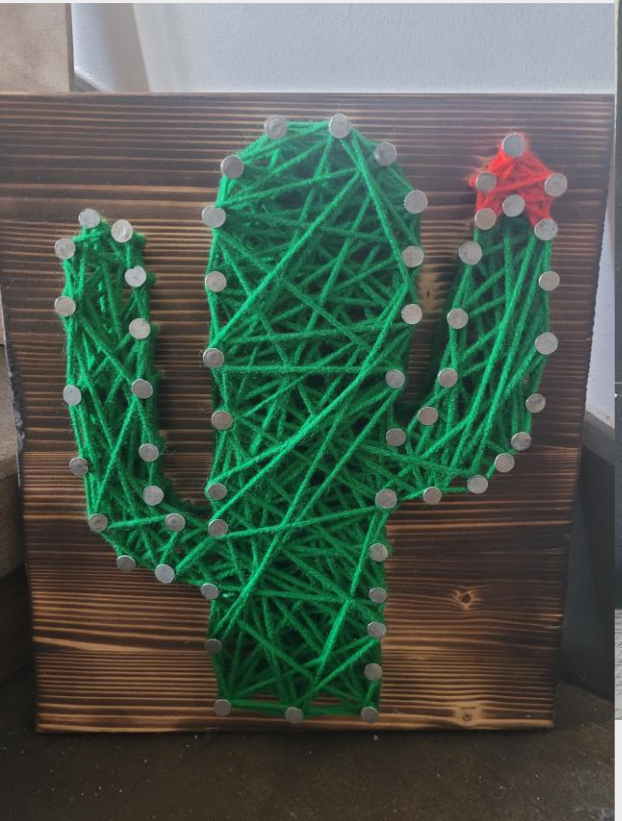


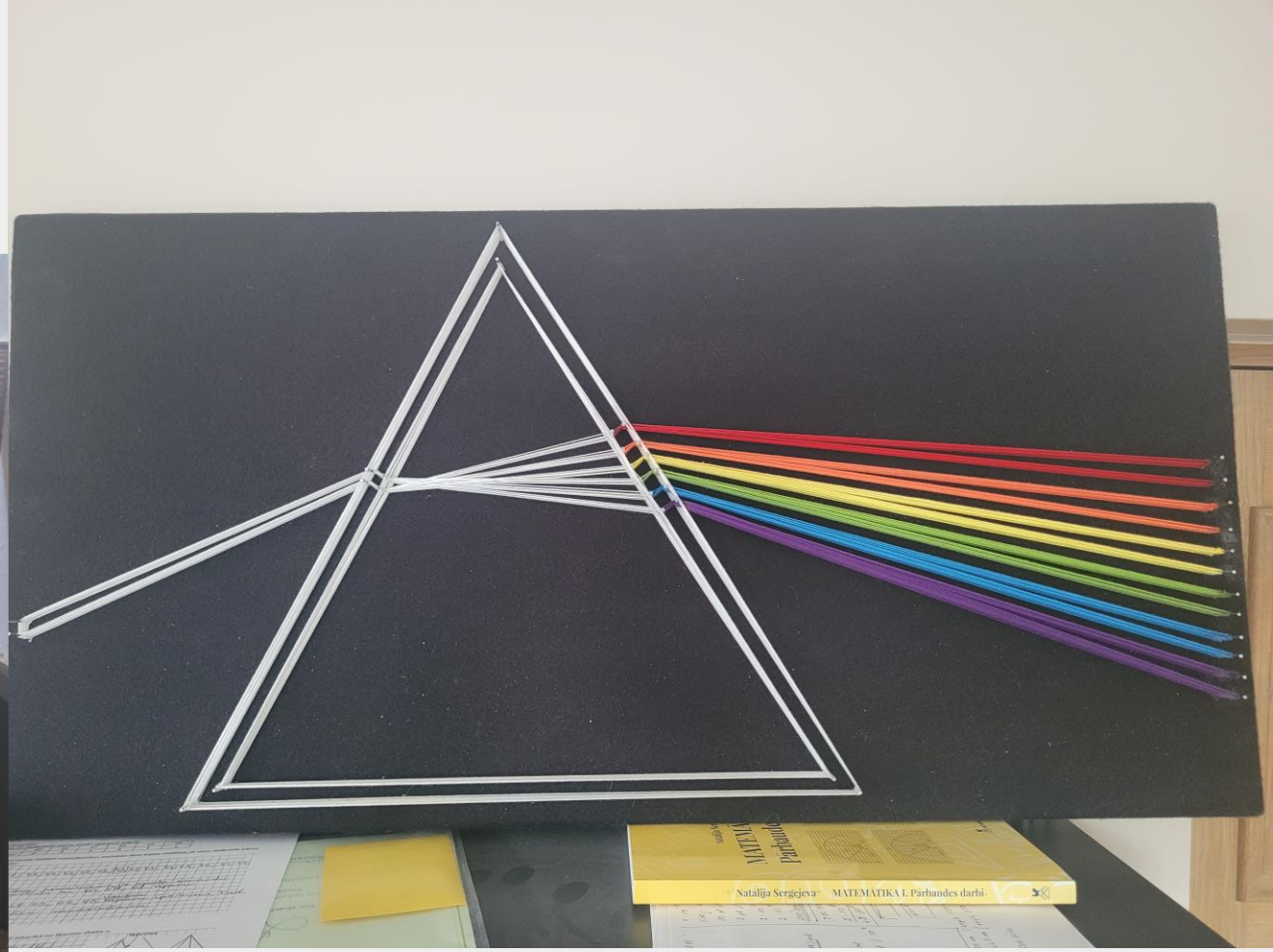
Mathematics

Biology

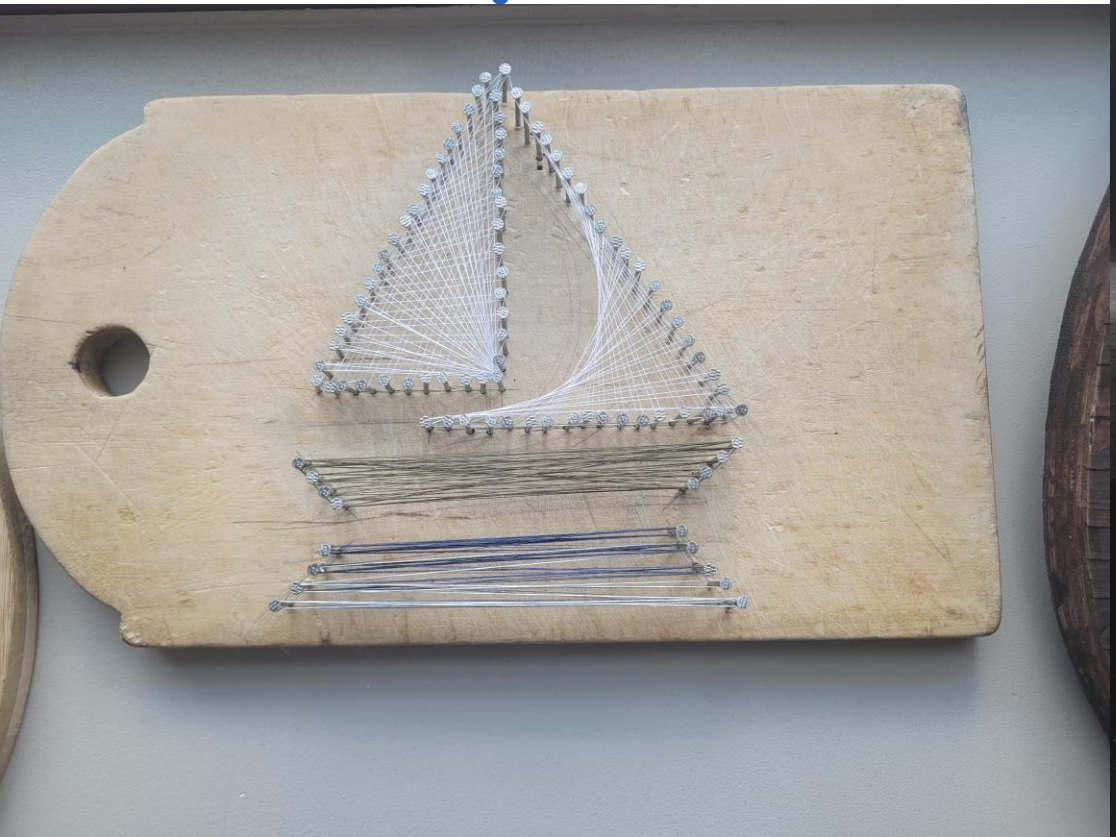
Biology

Creative industries



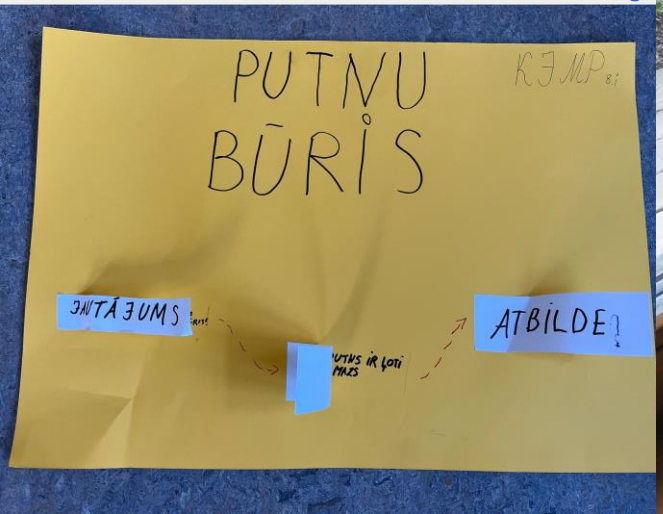


Creative industries



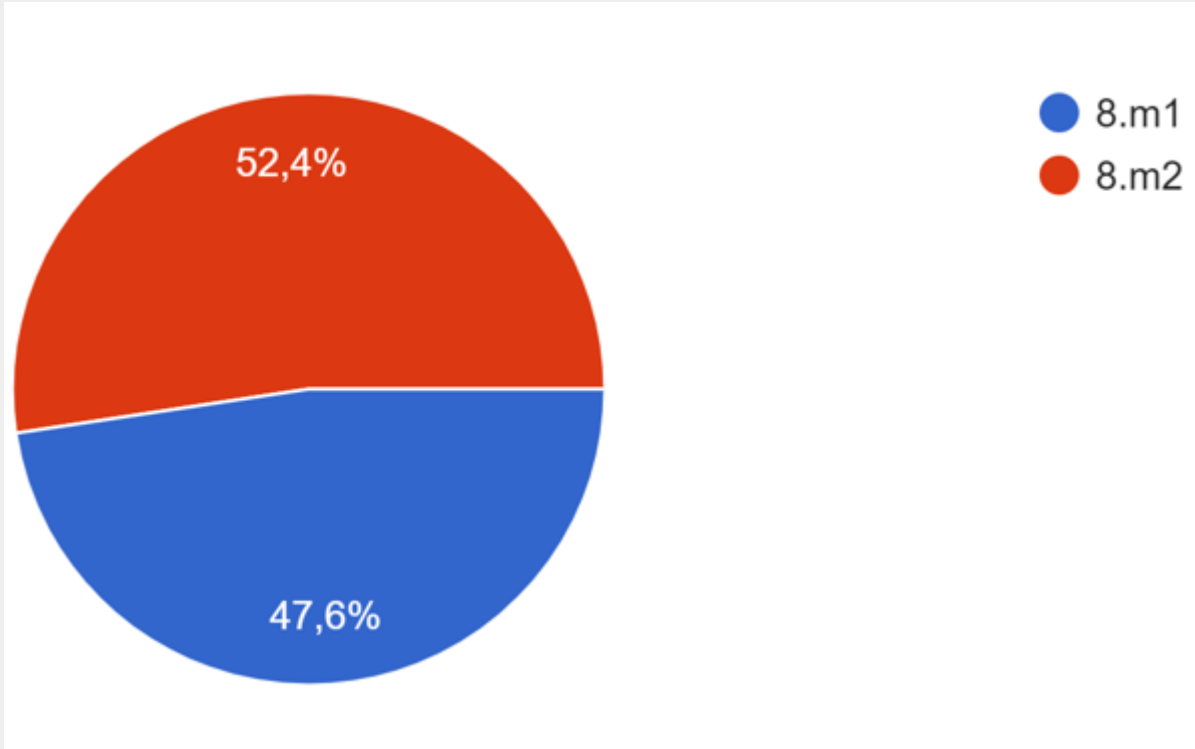
Creative industries

Engineering

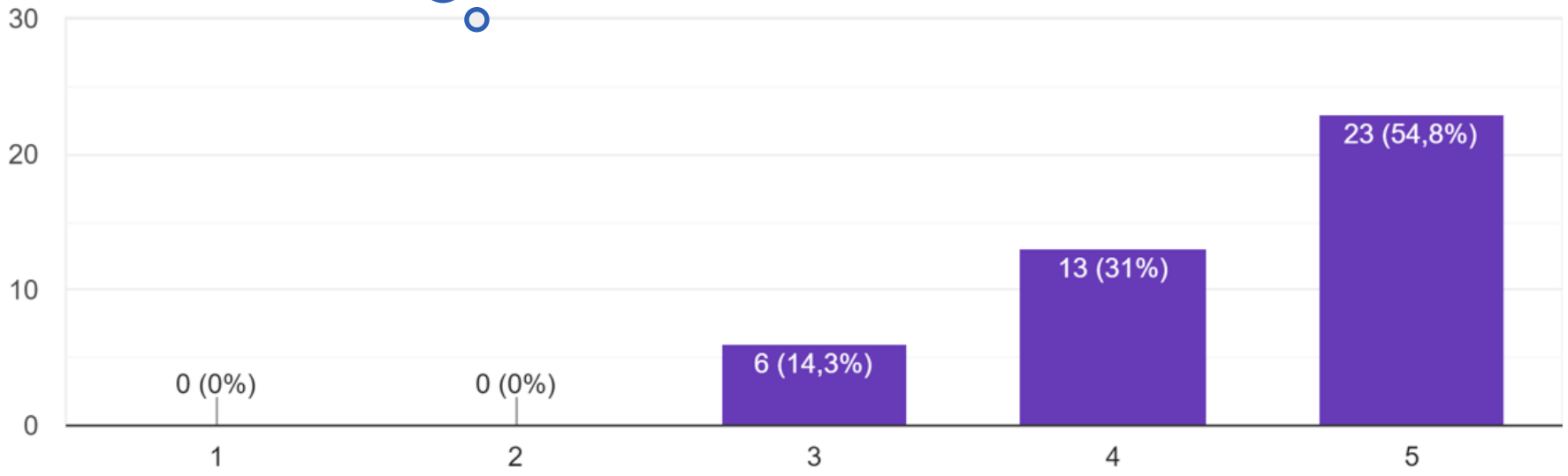


Engineering

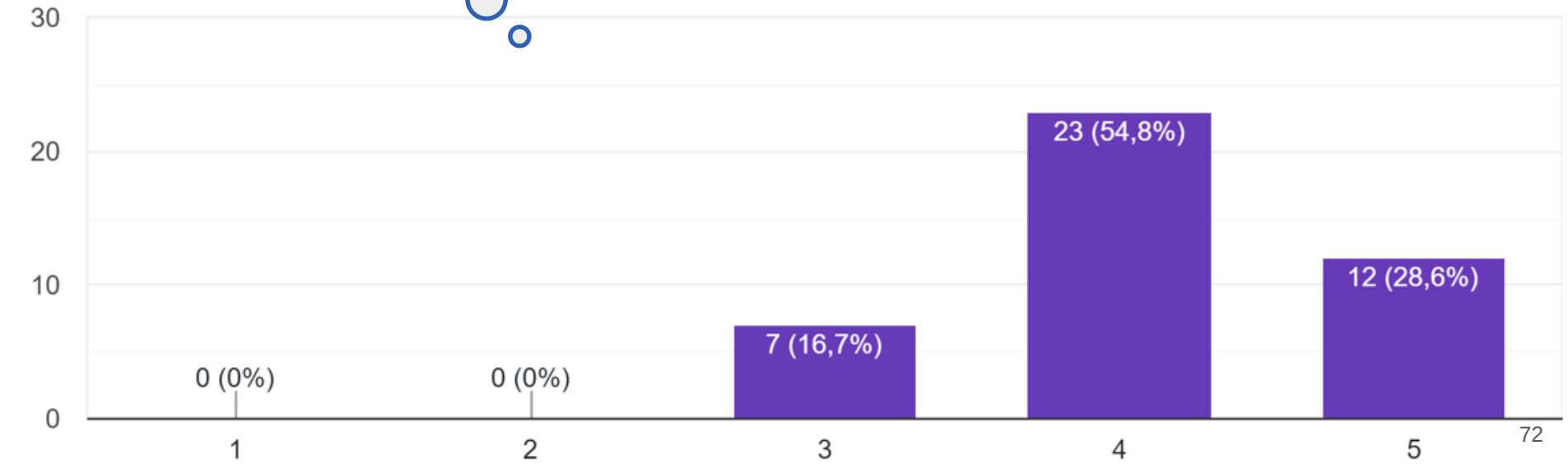
42
respondents
8th grade



To what extent are you achieving results?



Appropriateness of the environment for the task



What were the biggest challenges?

Come up with an idea (17)
Technical issues (cut out shapes) (19)
Write in neat handwriting (2)

What knowledge/skills were acquired?
(multiple answers are possible)

Revise topics on angles, Pythagorean theorem (29)
Practical knowledge (5)
I knew everything (6)

Interesting answers

- I realized that I need to think better before I start making something

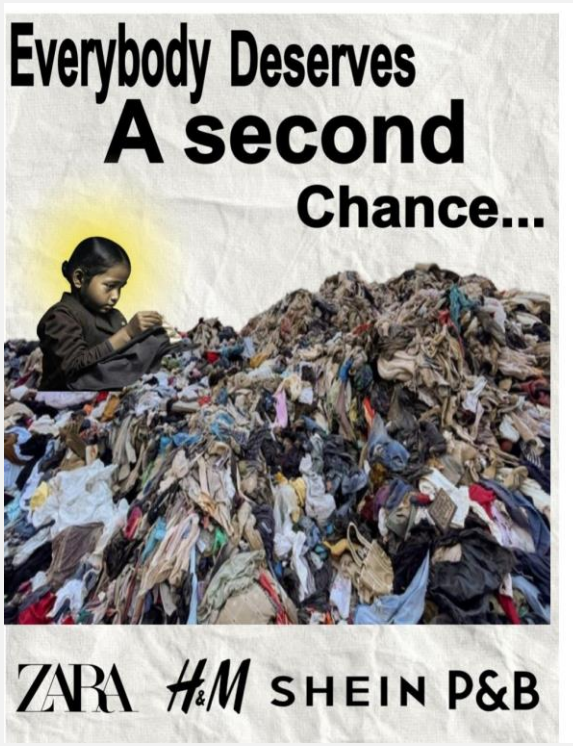
Developed STEAM activities (12)

A poster that draws attention current problems of society	Mathematical description of the process	Building raft	Lamps	…			
• Computer science • Visual arts	• Mathematics • Real life situations	• Geography • Physics • Engineering • Mathematics • Design and technology	• Design and technology • Physics				

Poster art

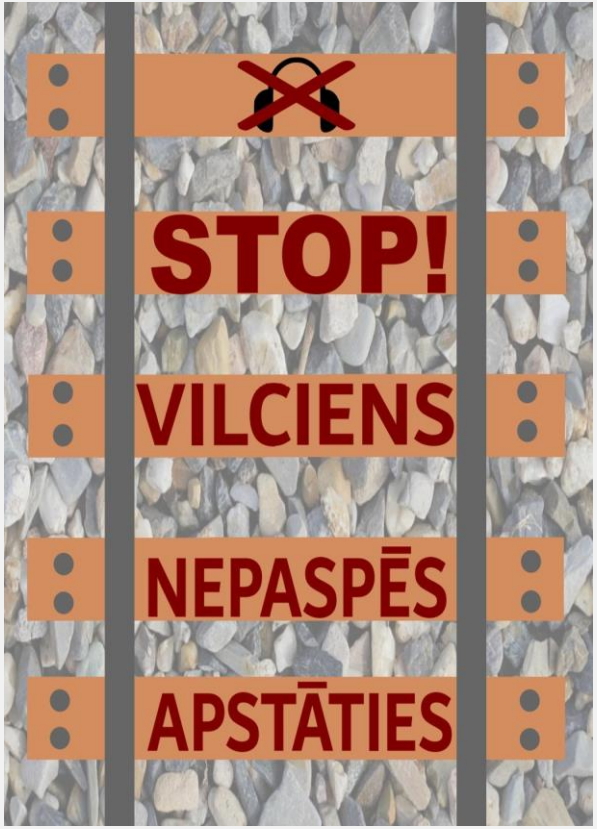
The previously acquired skills in the vector graphics program are used to realize unusual visual combinations and humor in order to draw public attention to current problems and express one's opinion.

This task is successfully implemented already in grade 8, in the process of lessons.



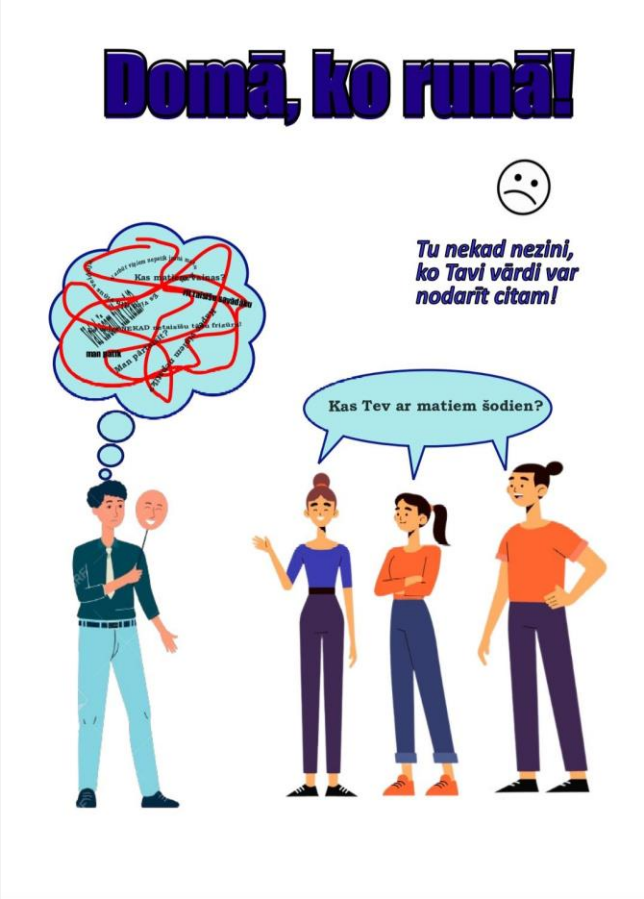
The earth is our home,
not a pile of garbage

There is NO life without water



Stop! The train won't stop

Don't let the screen take away your time



Think what you say

Dad! Will you listen to me?

Developed STEAM activities

Scientific notation and multiples of units	Models for the Science Fair	Effective Usage of Small Solar Panels for Charging Mobile Phones	Rube Goldberg machine	Short film production	E-Textiles	Equation of line and rectilinear motion	Peripheral vision
• Mathematics • Music • Visual arts	• Mathematics • Engineering • Biology • Creative industries	• Geography • Physics • Engineering • Mathematics	• Engineering • Visual arts • Crafts • Mathematics • Physics	• Theatre arts • Computing	• Computing • Design and technology	• Mathematics • Physics	• Biology • Mathematics

E-textile

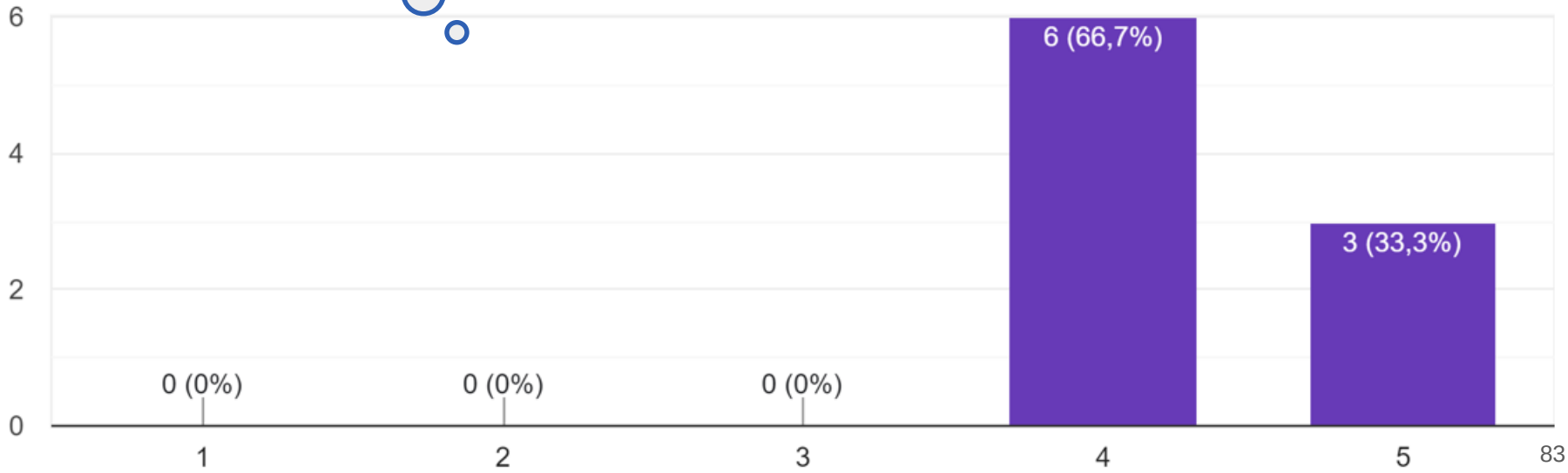
The e-textile goal is making crafting a twinkling treat bag. We're using pre-made designs and attach to your bag using an iron-on transfer. Then add all components - Leds, LilyTwinkle Microcontroller and other.Then a code is created on the computer, in which the correspondingly sewn LEDs should light up.

The lesson did not take place this year for technical reasons, the purchased microcontrollers differed from those tried before. And then, due to the coincidence of various other circumstances, it was not possible to manage this lesson, but next year we are prepared and ready to realize.

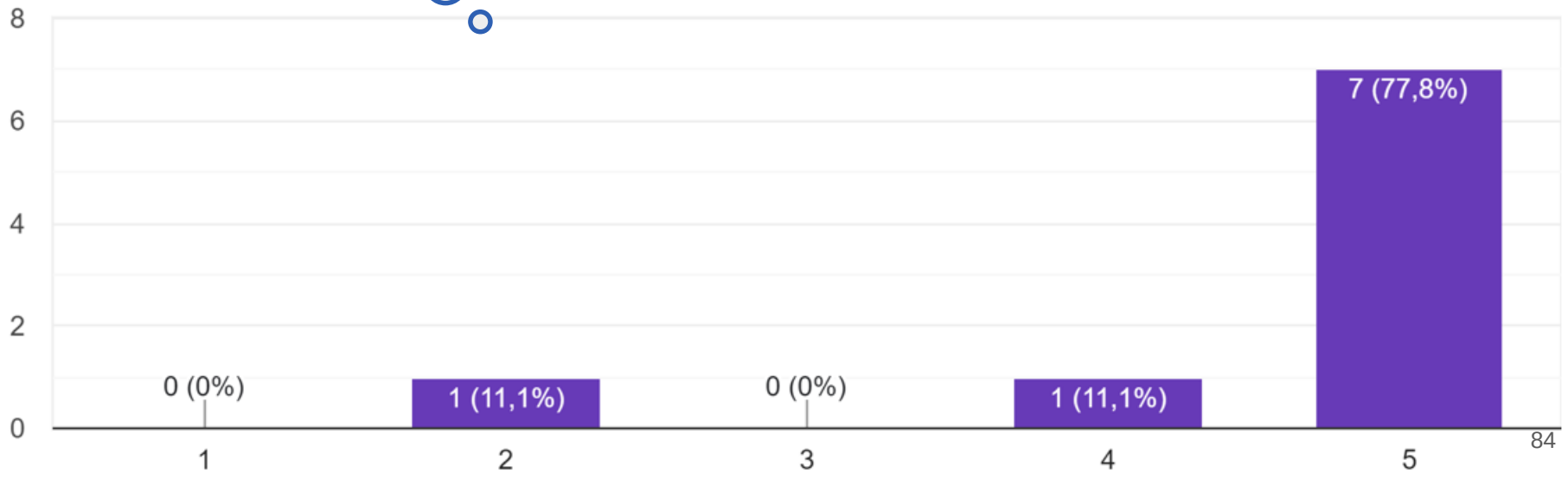
Teachers (9) about STEAM Days

2024

To what extent did pupils succeed?



Appropriateness of the environment for the task



What were the biggest challenges?

- Keeping attention at the end of the lesson when the whole class had to put their cars together
- Select a video and get data from it
- Work together to put everyone's opinions into the work, so that the thoughts of all team members are taken into account
- Creating an idea
- Split responsibilities

What knowledge/skills were acquired?

(multiple answers are possible)

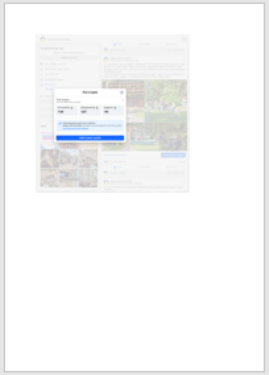
- Cooperation, team work
- Planning
- Transfer of knowledge
- Put knowledge from several subjects together to get the best result
- Strengthened knowledge

Dissemination

G-STEAM
Green STEAM ecosystems

Erasmus+

1



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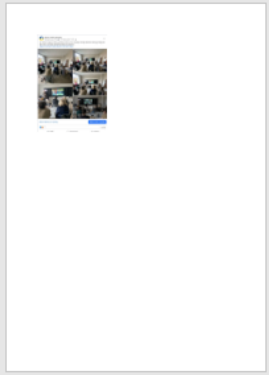

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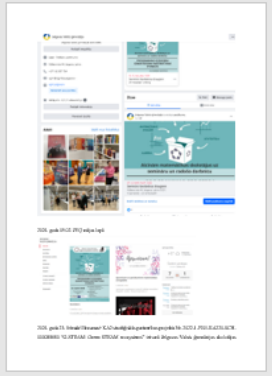

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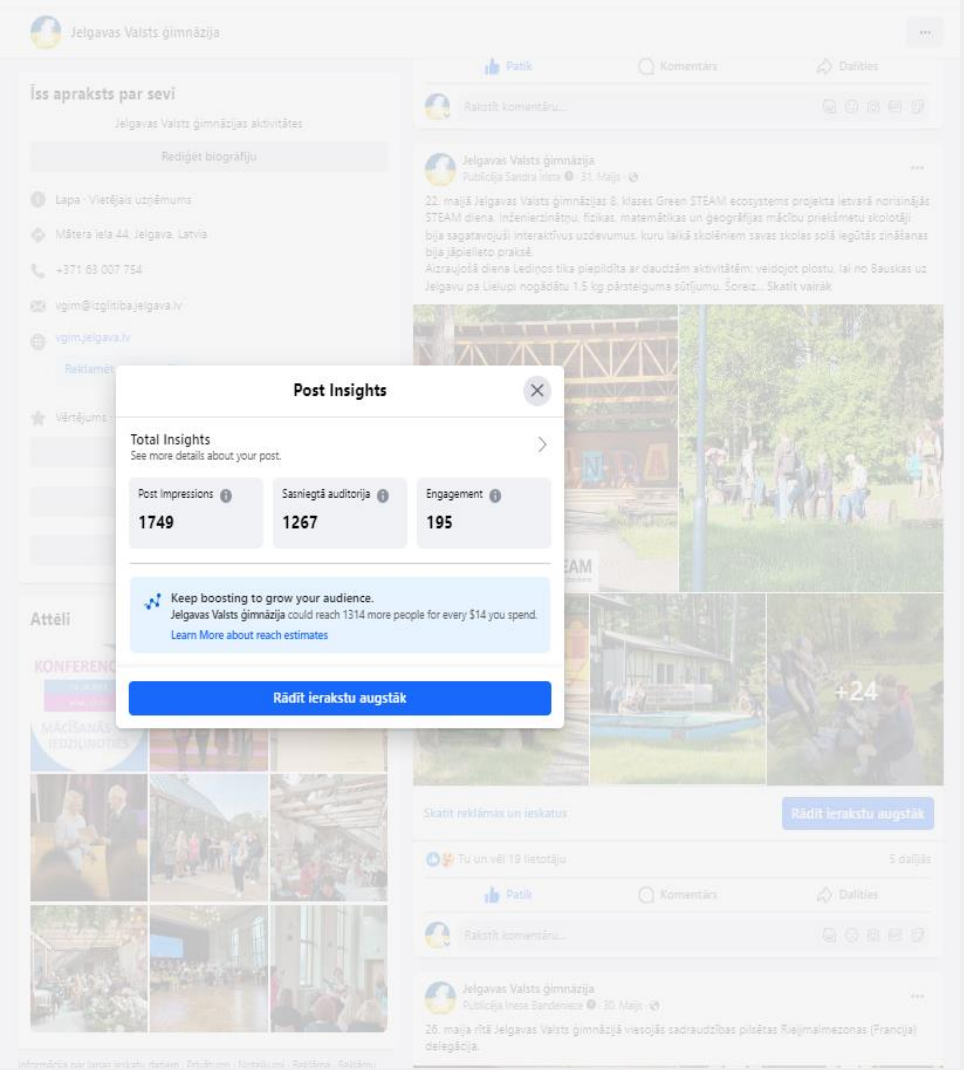
14

Facebook, Instagram



Post Insights

Thank you for your attention!

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