LEARNING MATHEMATICS USING DIGITAL TOOLS

- **E=MD^2: E**xcellence in **M**ath Education trough (e) – **D**ebate and **D**iversity

TSD

International Conference

TOWARDS SUSTAINABLE DEVELOPMENT

Mother Teresa University

https://conference.unt.edu.mk

Context of the problem:

In today complex society, learning and understanding mathematics and natural sciences has become necessary for full development of everyone.

One of the priorities of the European Union and our country was to increase the level of mathematics knowledge for the students in all ages (from 2011 to 2020y to be increased from 10% to 40%)- **the newest report in 2021 show the increasing of math knowledge and skills <20%)**

In the development of economy based on knowledge, development of math competences is necessary and big priority (EU - till 2030 >40%???)

Till 2030y, the EU will have job for more them 100 000 000 people with high level of math, language and digital competences

Situation in Macedonia and in the region:

❖Mathematics is **not favorite subject** among students in all level of education.

Promoting the need of math competences is necessary for changing students' attitudes toward math (why???)

Teachers should give maximal effort to contribute in increasing the effectiveness of studding math (when, how much???)

To overcome the phenomena that mathematics is not popular subject, the development of new methods by teachers is necessary in teaching math and the students should be active in the realization of the teaching process. (how???)

By the NCTM, "***Effective mathematics teaching*** *requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*"

❖Students learn mathematics through the experiences that teachers provide.
❖Teachers must know and understand deeply the mathematics they are teaching.
❖There is no one "right way" to teach.
❖Effective teaching requires deciding what aspects of a task to highlight, how to organize and orchestrate the work of students.
❖Effective teaching requires continuous efforts to learn and improve. Teachers need to increase their knowledge about mathematics and pedagogy.

Motivation for working:

❖Realized projects in the field of mathematical education, where different methods are considered **without any innovativeness**

❖There have been not developed an approach by which students will **actively participate in the process of teaching mathematics** in a way that **they alone will choose** the method that would be included in the curriculum content.

❖**Negative Math debate in Macedonia** – excluding mathematics as obligatory subject in the state mature which is opposite than experiences over the world, decreasing obligatory hours in national curriculum…

❖Teachers should be **seriously prepared** to answer to the requirements of the economy based on knowledge, and the ability to “offer product” with appropriate qualifications and competences on the labor market

Motivation for working:

❖Weaker students' results on international tests in mathematics and other natural sciences

❖"Fear" of mathematics is one of the reasons why students don't go in gymnasium and technical schools. Natural sciences and technical faculties also are less attractive for students when they make choice what to study

❖Students are not asked anything about this problems!!!

Lessons learned – past European Math projects

MathLabyrinth

Main result: First interactive math e-book for secondary education in MK-2016

www.math-labyrinth.eu

Math Debate – the voice of students

Main result: First educational e-platform for learning mathematics - 2018

www.mathdebate.eu

LearnersMot2- Creating a continuous supportive learning environment for the 45+, low-educated and low skilled-adults

Main result: First on-line course and web-application for learning mathematics and increasing digital competences in area of adult education in MK

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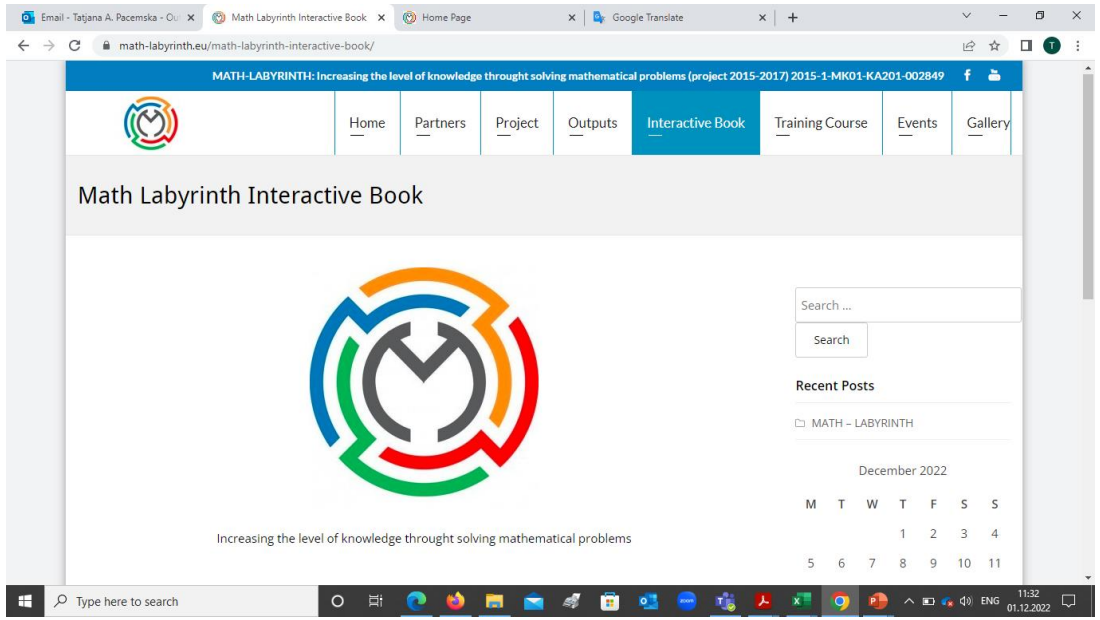

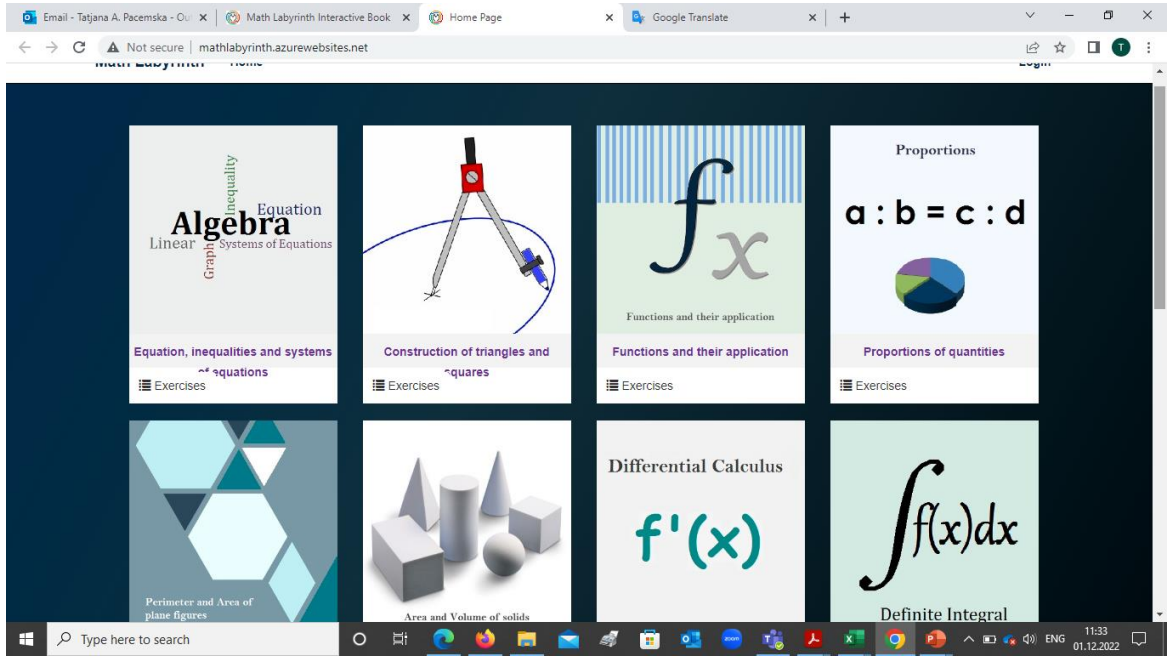

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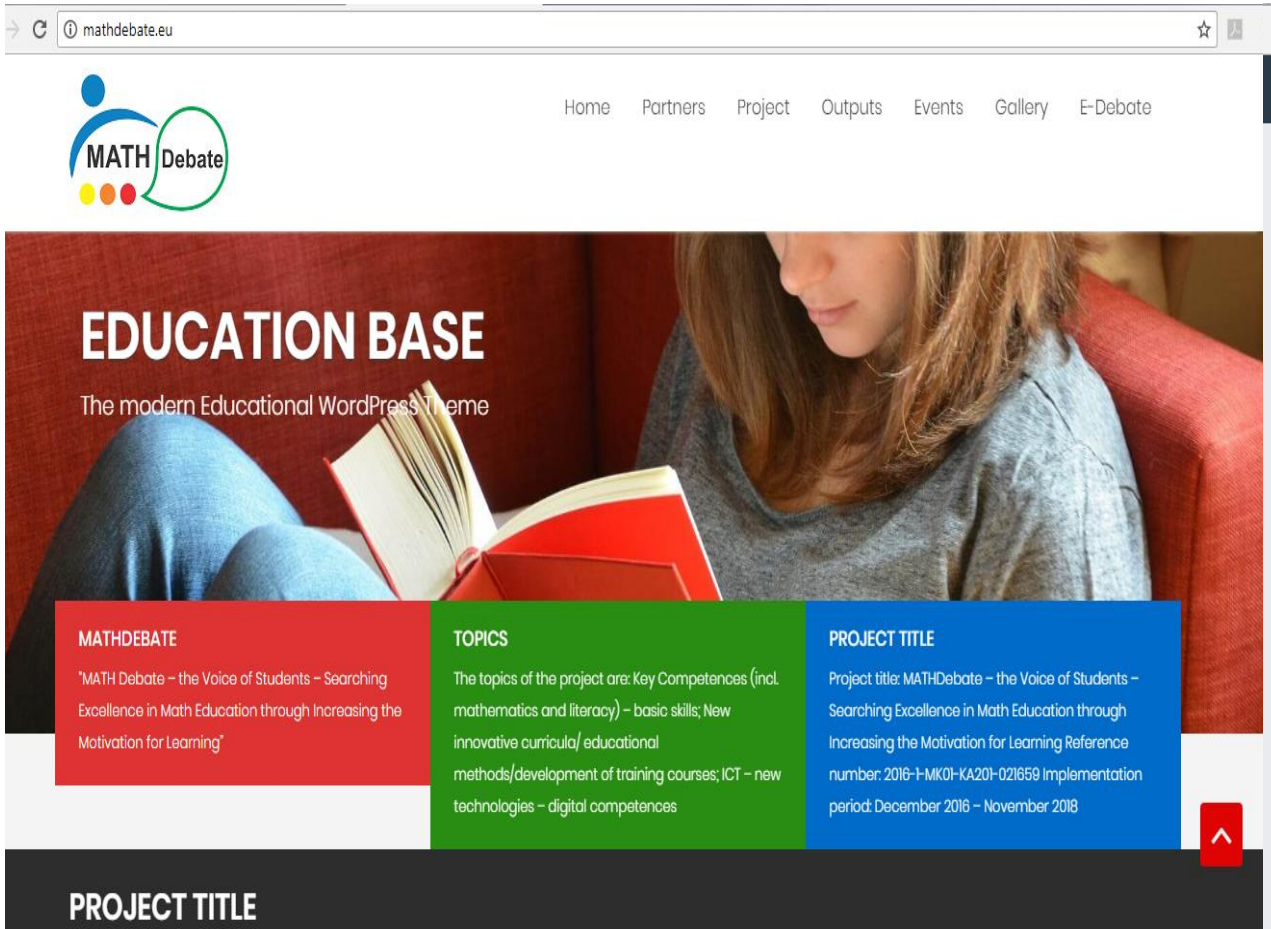

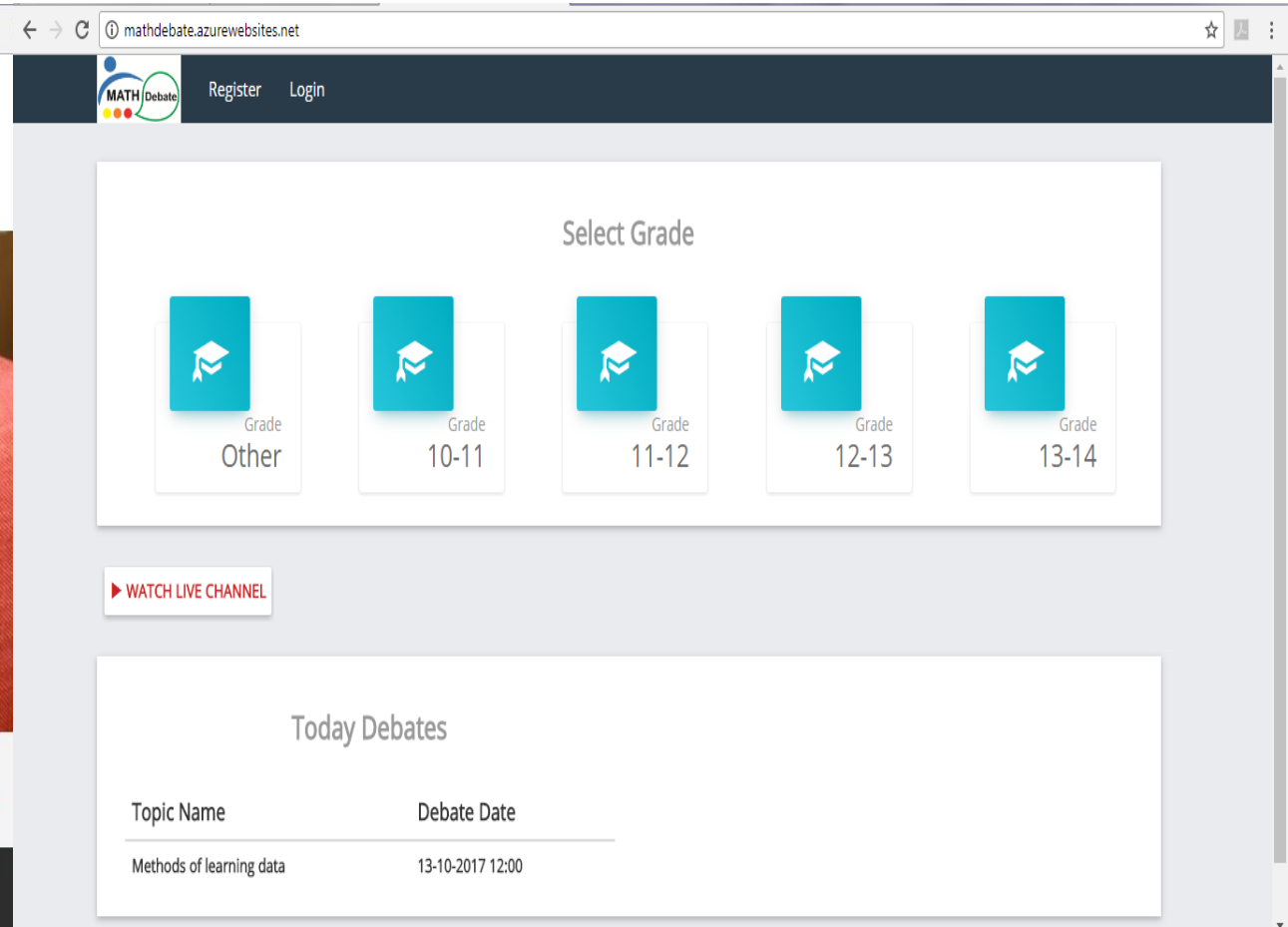

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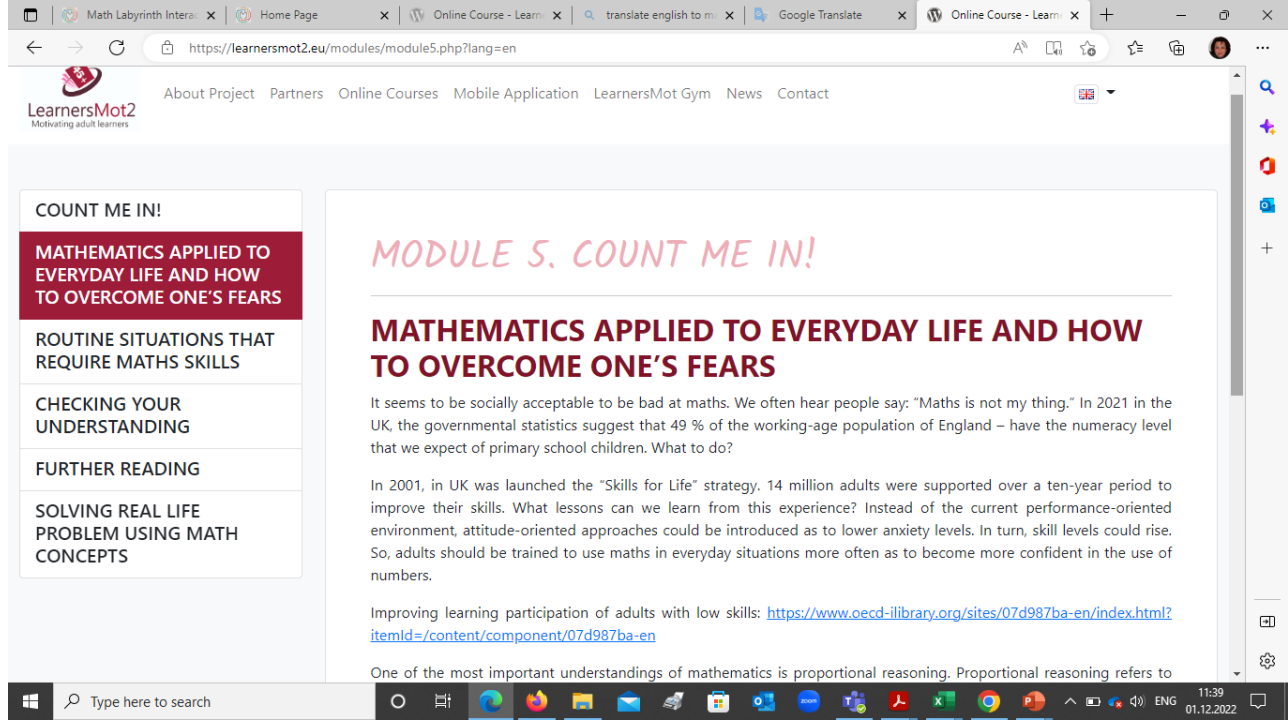
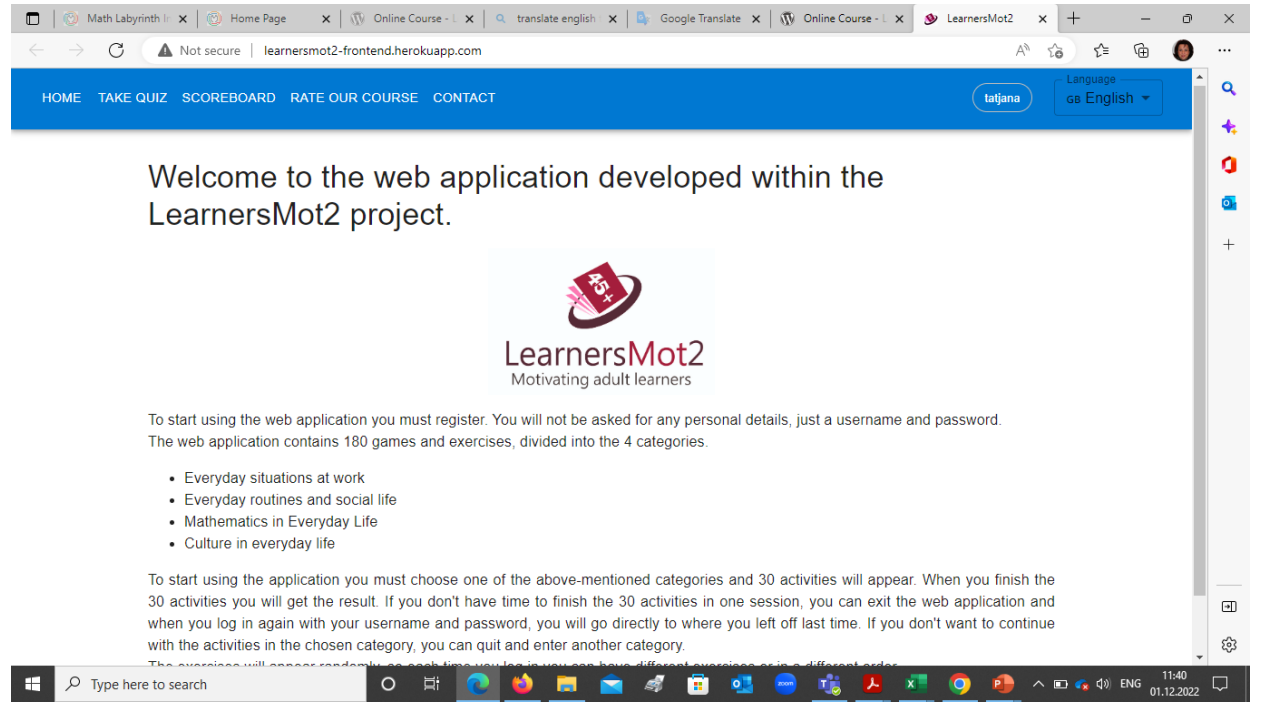
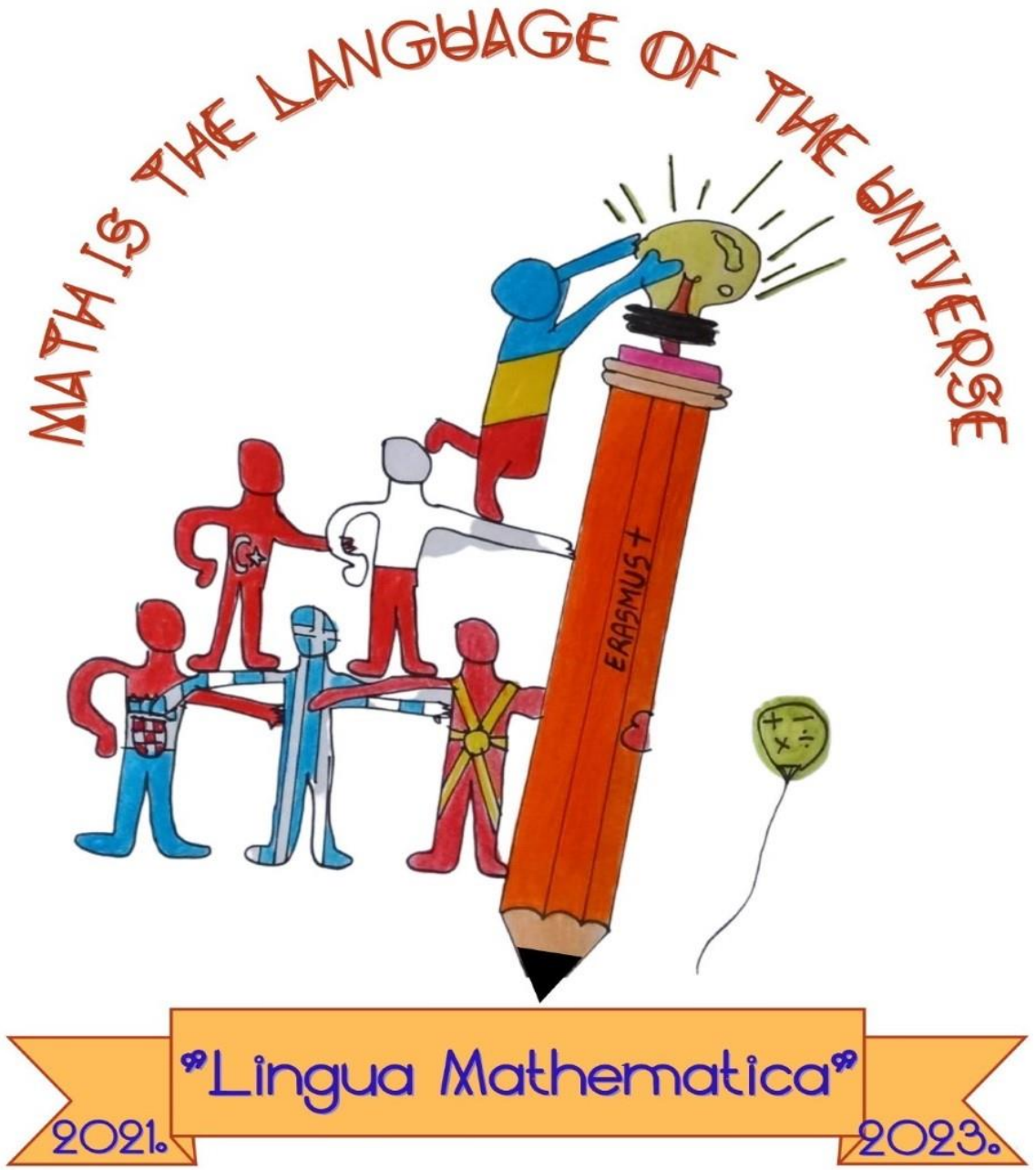




Ongoing EU Math projects:



E = MD^2:Excellence in Math Education through (e-) Debate and Diversity

www.excellenceinmath.eu

Motivation and detected problems

The process of adaptation of students from on-line to physical education process and their impact in math learning process was regarded and discussed.

Can we achieved better math result in this period?

What about using digital devices?

Can we create attractive learning environment and open math questions in STEAM context which will lead to better understanding of society?

Can we change learning process to be more democratic?

Can we are ready to listen the voice of students and change educational paradigm?

What we are doing now?

- Developing the methodology for **searching excellence in math education in inclusive classroom** in school settings and aims to create a bridge between theory and practice/real life.

- Developing of new teaching method named E=MD^2 as a math teaching method in STEAM context, **peer to peer guided/supported** by teacher education in inclusive classroom, diversity concept in math , through:

a) developing an interactive e-MATHDEBATE platform as a part of new methodology for teaching mathematics for students between age 11-15, based on using ICT. The most important part, will be address **to learners with math disabilities**, supporting peer to peer guided process of learning.

b) Preparing tutorial for using the e-platform. This tutorial will guide teachers, parents and students how to use e-debate platform.

Motivation and detected problems

Although there are changes in the approach in the process of teaching mathematics, the pupils in the primary and secondary schools have aversion for this school subject? Why?

How the students imagine the math studding and its application?

Students need mathematics. Where and when? (For example: Debate with students – Can you imagine one day in your life without numbers and arithmetical operations?)

Is there need more integration of the mathematics in other areas? (For example: including mathematics in real life problems.)

How students can help each others and with ICT tools in the process of teaching mathematics?

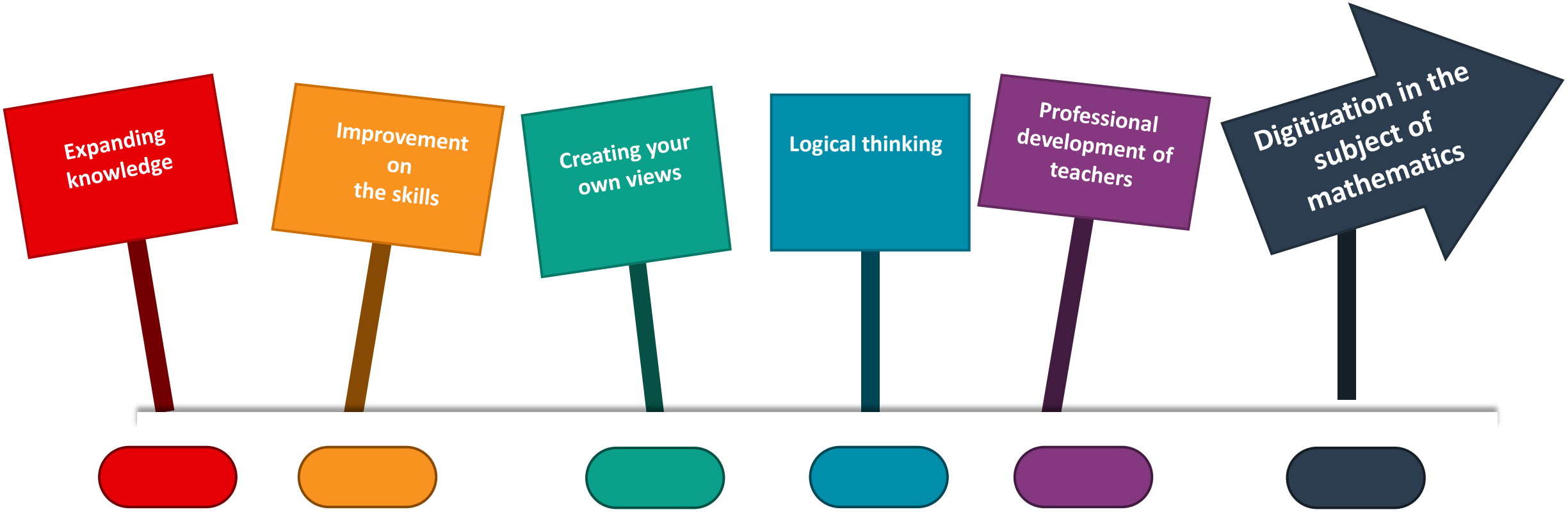
How can we convince students that mathematics is so important in their lives?

Digitalization process in Macedonia, needs, chalenges or…

- The need for digitization in education, especially in the field of mathematics with the help of digital tools

- Monitoring of the technical-technological development
- Following up on the challenges of the new age
- Analysis of the situation in relation to news in education
- The needs of digitization in the field of mathematics

Digitization of mathematics learning materials enables



KEY DOMAINS

...necessary with the changes in the educational process

digitization

...allows faster access and visualization in learning mathematics

mathematics

...prepared for the new challenges in the educational process

teachers

...to make a change in creating new competencies among teachers and students

educational process

education

...aims for sustainable development that integrates key issues in teaching and learning

New approach in learning mathematics

-First digital math e-book, IV grade -

All daily routines are connected with math skills, so, math knowledge is a need

Mathematics creates insightful individuals with a high degree of self-confidence, fair, responsible but also very creative…

Working method in the e-book

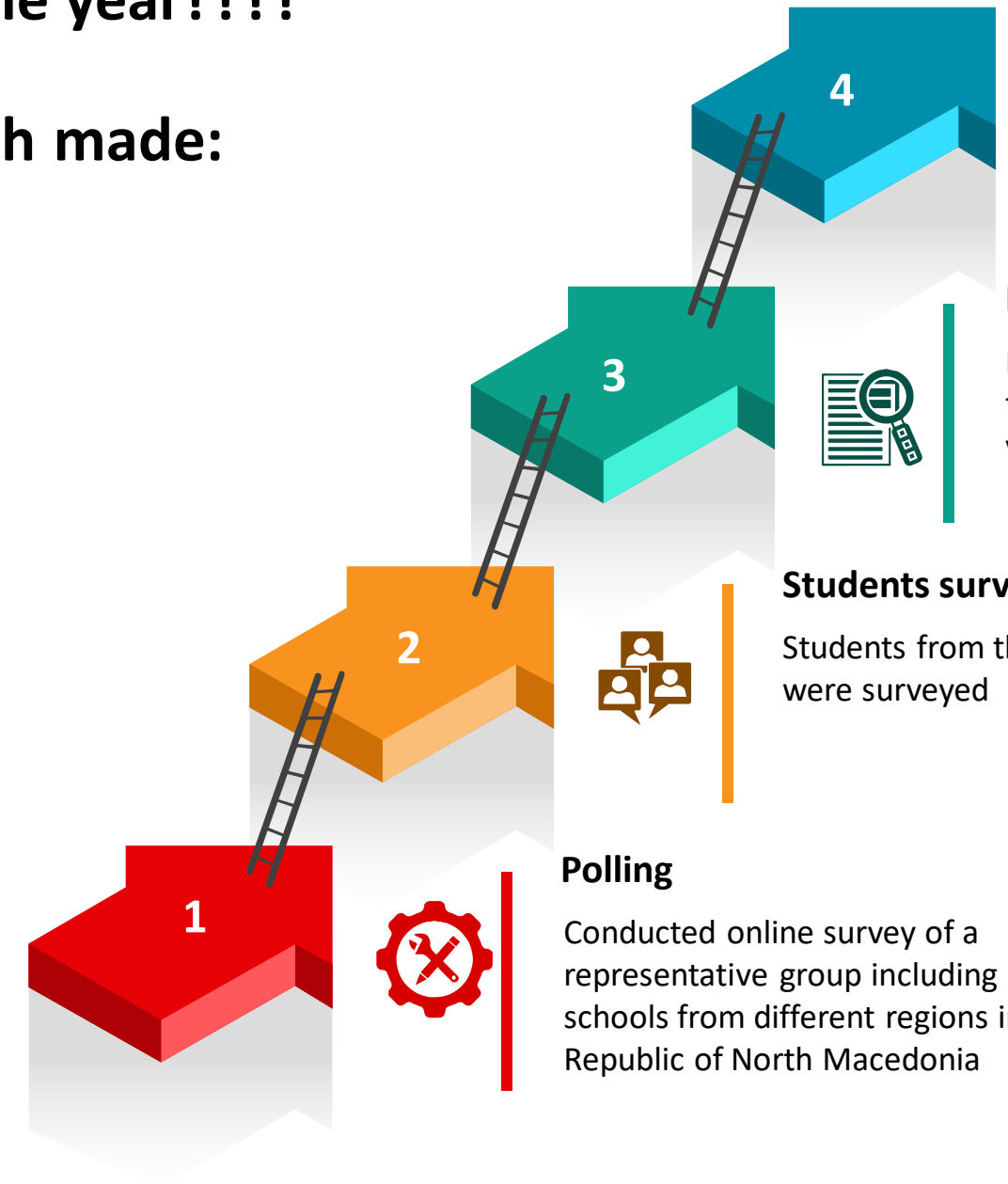
- Investigative – revealing
- It arouses curiosity among students
- Creates a stimulating learning environment

We are building the way to creating future, responsible, numerically and digitally competent individuals…

Many digital tools which support learning and teaching process

After one year????

Research made:



Teachers surveyed

the opinion of teachers who last year led the fourth grade, and this year lead the fifth grade, was taken

Parents surveyed

Parents of students who finished the fourth grade last year were surveyed

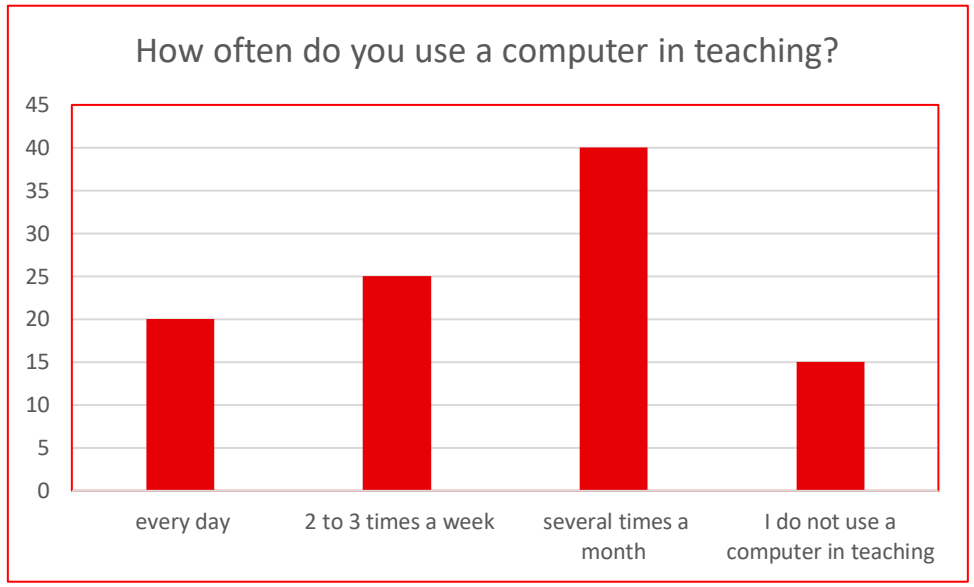
Students surveyed

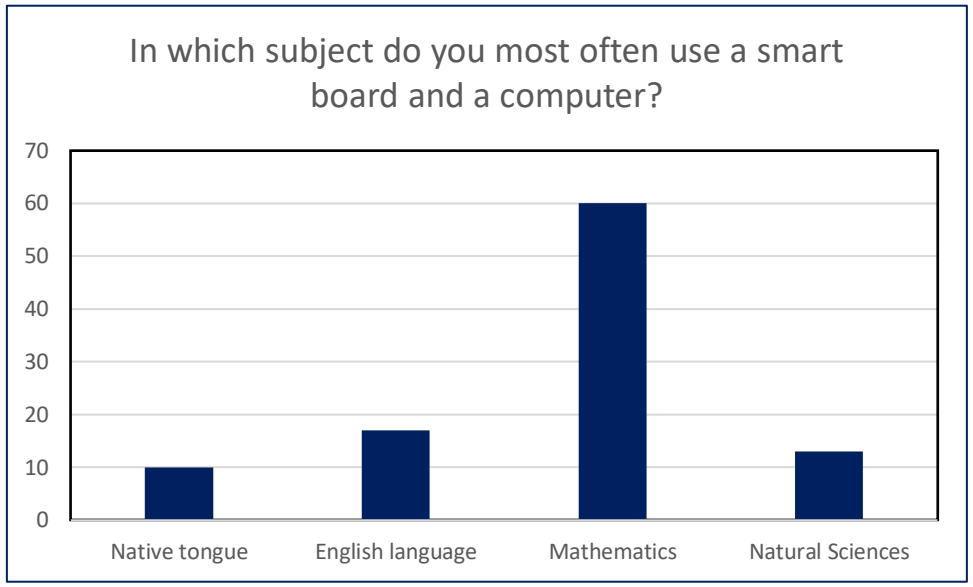
Students from the fifth grade were surveyed

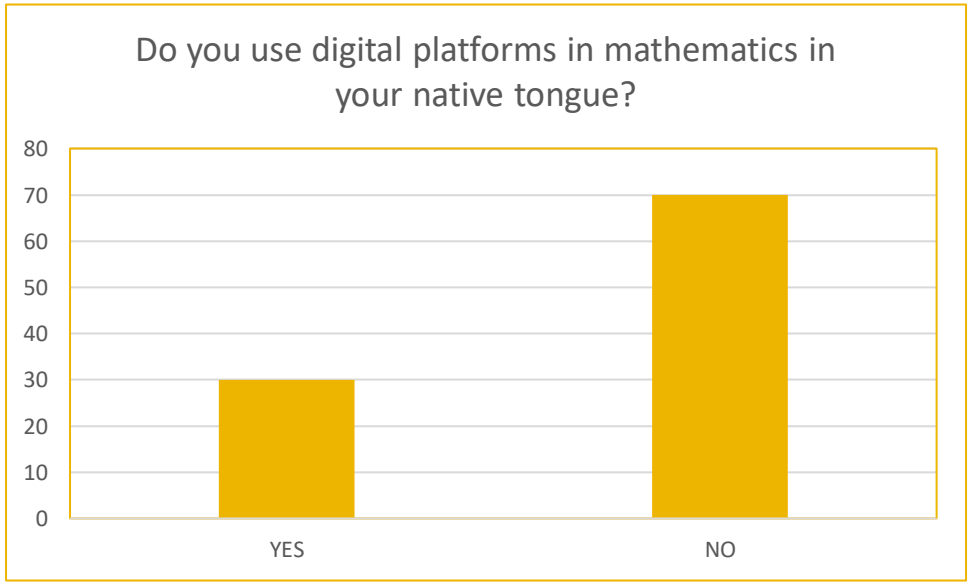
Polling

Conducted online survey of a representative group including 20 schools from different regions in the Republic of North Macedonia

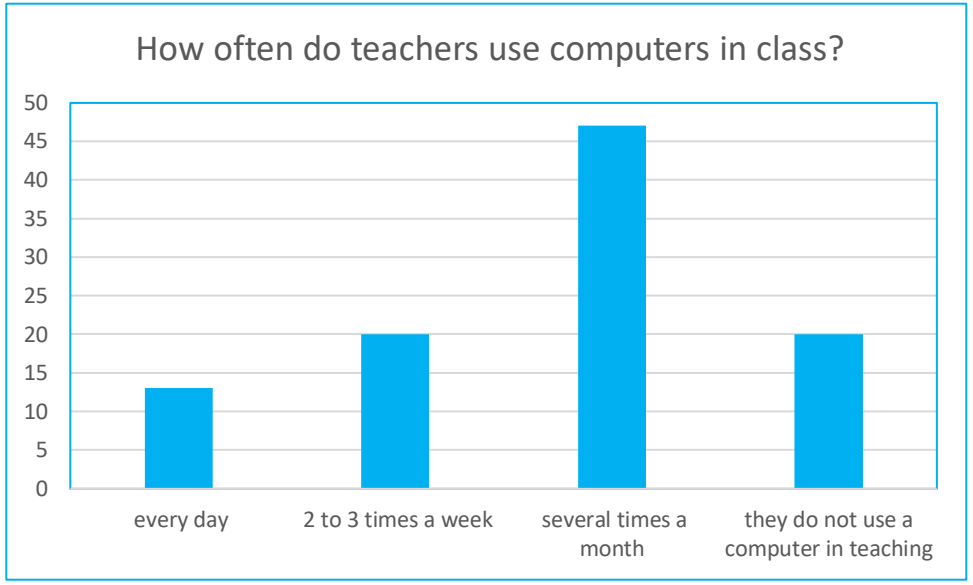
RESULTS OF TEACHER SURVEY

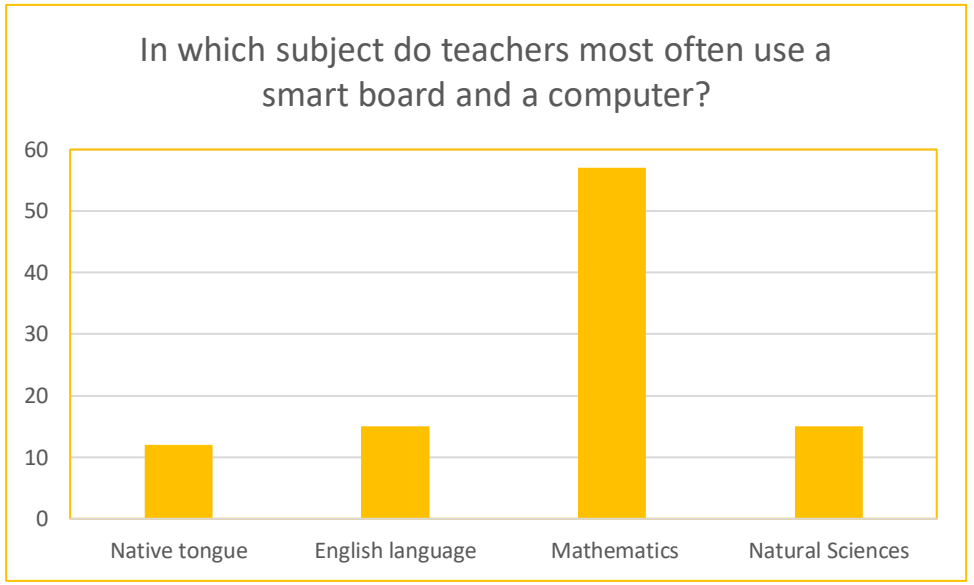


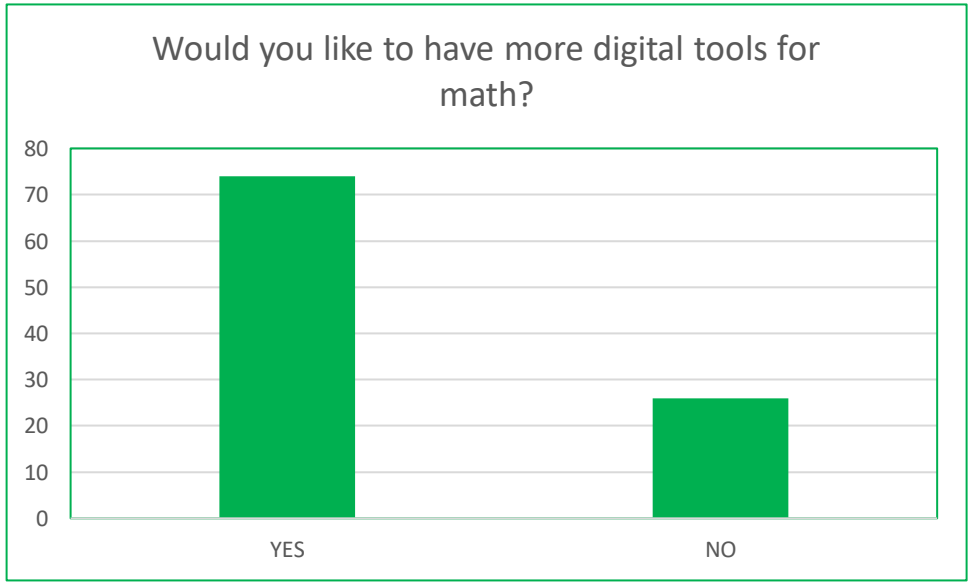




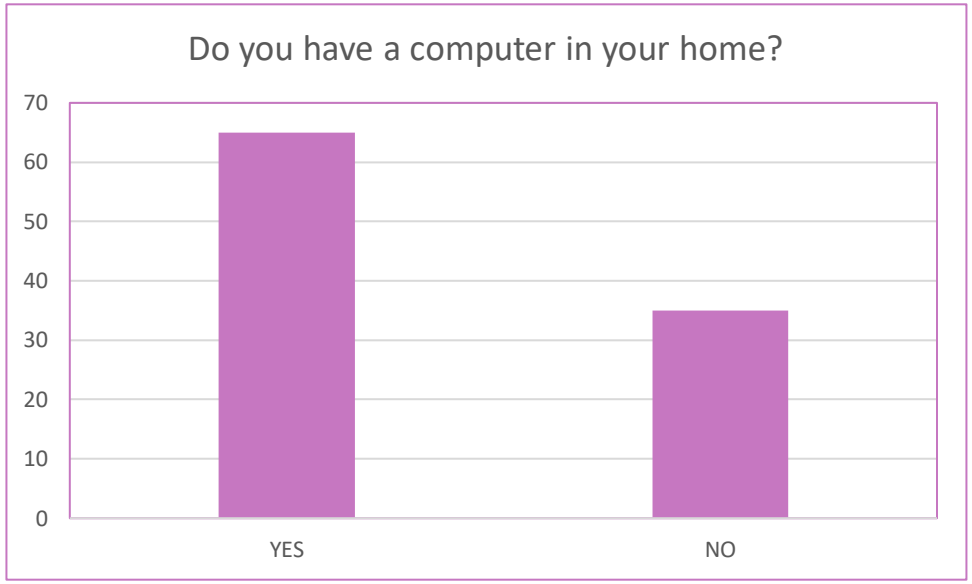
RESULTS OF A SURVEY WITH STUDENTS

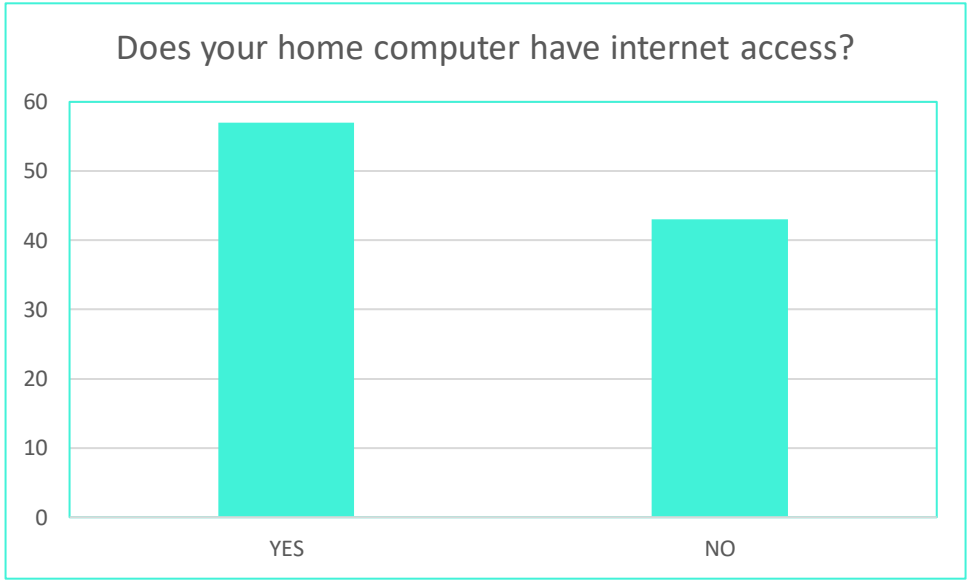


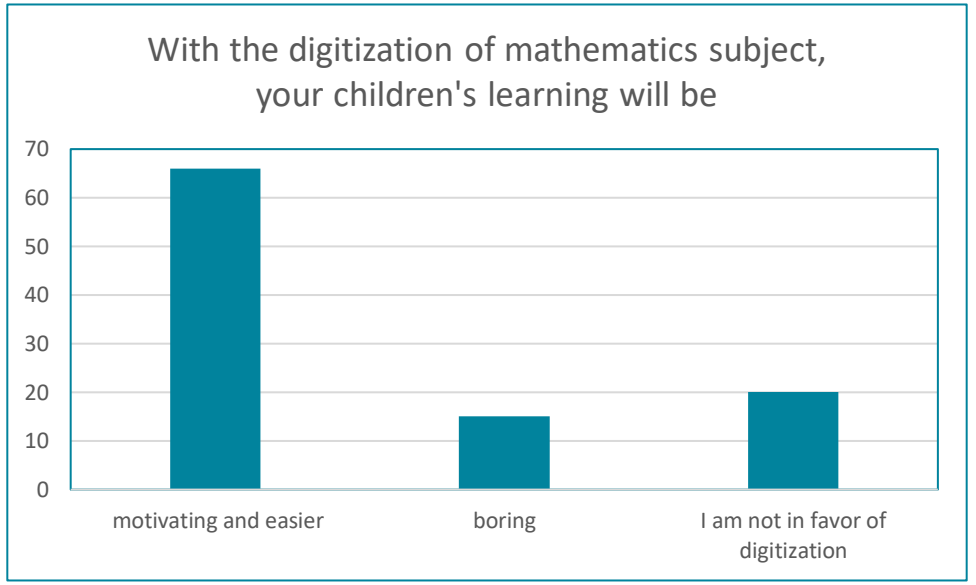




RESULTS OF A SURVEY WITH PARENTS

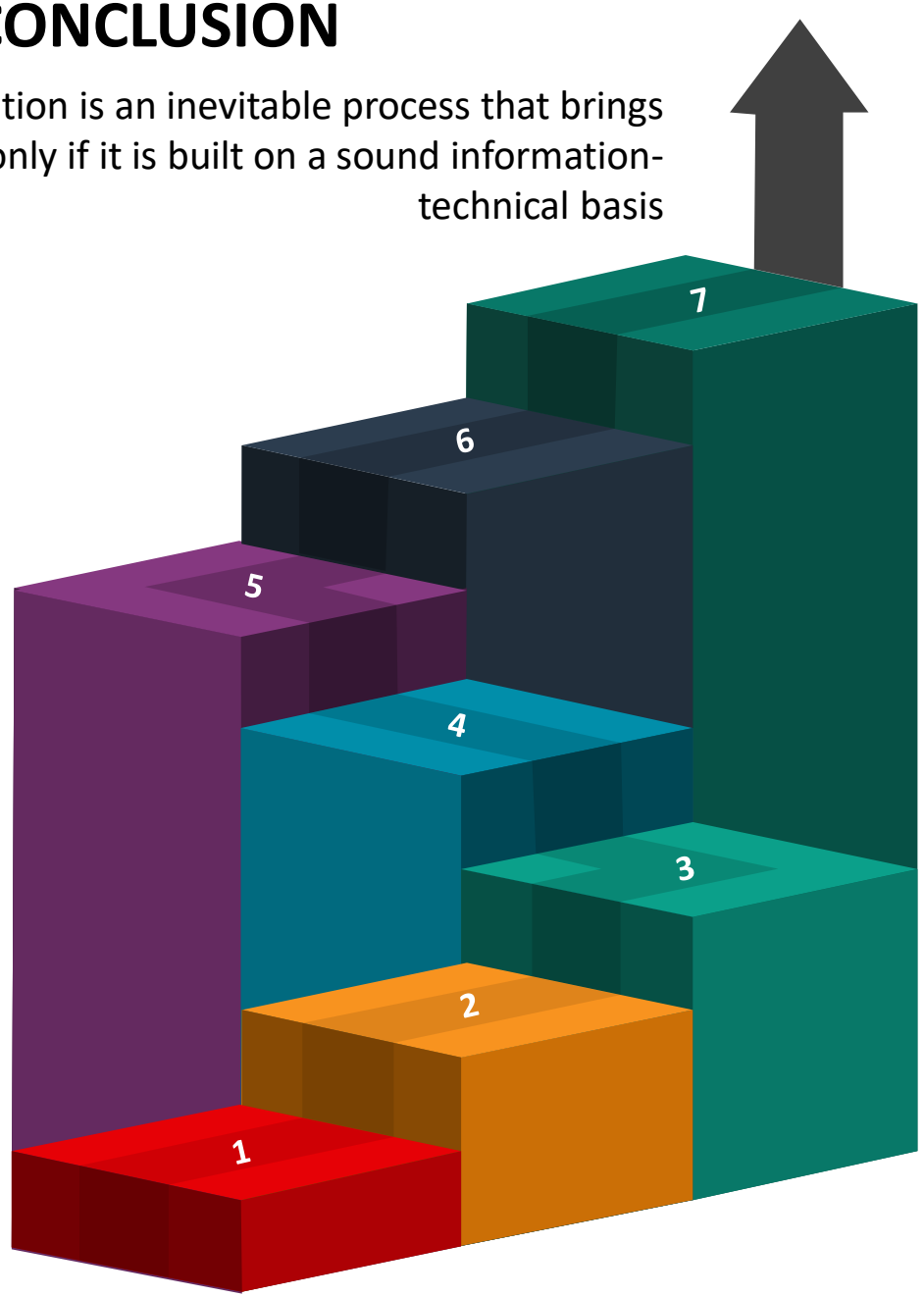






RESEARCH CONCLUSION

Digitization in education is an inevitable process that brings great benefits, but only if it is built on a sound information-technical basis



- Initial phase for digitalization of education in Republic of North Macedonia
- Creation of equal conditions in all schools in Republic of North Macedonia for digitization of education
- Adaptation of already existing tools and software for learning mathematics
- Creating math learning worksheets in the native language
- Creating an interactive platform for learning mathematics
- Digitization of mathematics teaching .....
- Digitization of learning materials will answer the challenges in the educational process

After one year of digitalization process …

Are our expectations met?

What is happen - Digitalization or Improvisation?

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