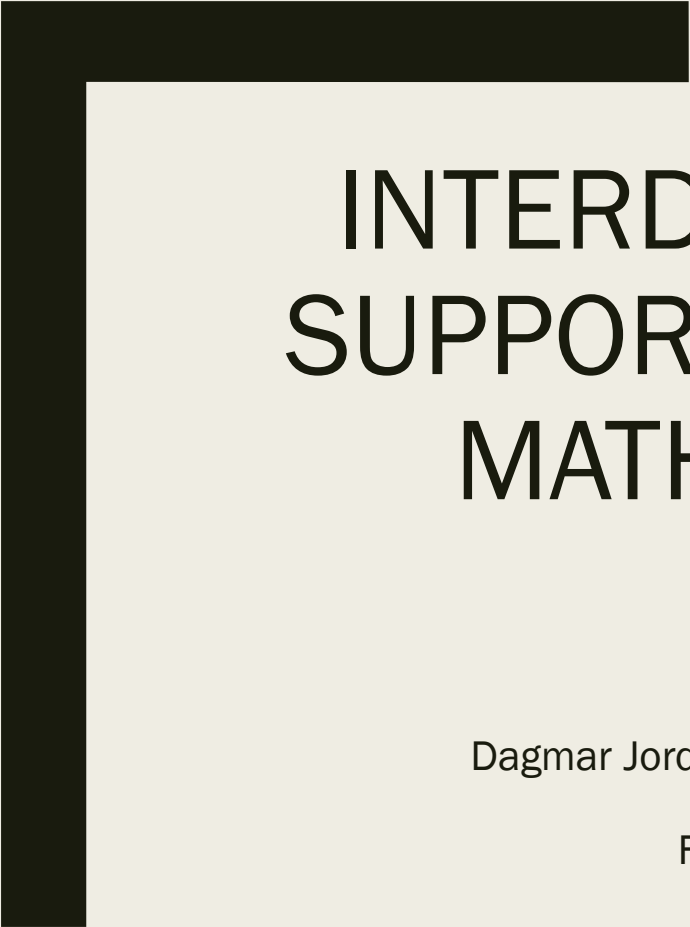




INTERDISCIPLINARY RELATIONS SUPPORTING PROPAEDEUTICS OF MATHEMATICS IN PRIMARY EDUCATION

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Education in the Czech Republic

- Based on two main curricular documents
 - *Framework educational programmes (FEPs)*
 - *School educational programmes (SEPs)*
- From 2020 new version of FEPs – „FEPs 2.0“
 - *Complete revision after 15 years*
 - *Redefines key competencies and expected outputs*
 - *Content change for many subjects (ICT)*

State testing and its findings

- State exam at the end of upper secondary schools (since 2013)
- School admissions (since 2018):
 - *Upper secondary schools*
 - *Grammar schools (4-year, 6-year and 8-year)*
- Mathematics has the worst results from all subjects!

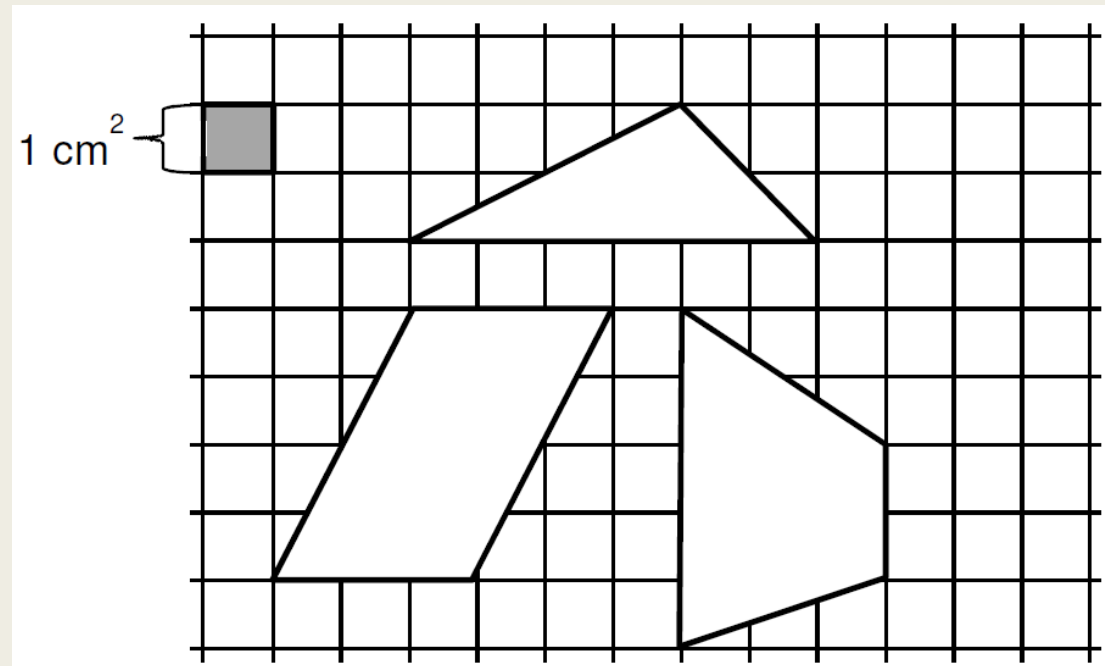
Results of state exam didactic test

Year	Share of the subject (%)	Number of students		Success rate
		Attended	Passed	
2013	38,70%	29516	23580	79,89%
2014	36,00%	25130	19077	75,91%
2015	29,60%	19304	14689	76,09%
2016	27,20%	16988	13048	76,81%
2017	25,20%	14756	11675	79,12%

Source: CERMAT, 2018

Example from the exam

Figure displays three planar object with vertices in the nodes.



What is the sum of the areas of all three objects? (Multiple choices)

Possible ways to improve current situation

- Strengthening of propaedeutics of mathematics in primary school and lower secondary school
- Utilization of:
 - *Interdisciplinary relations between mathematics and ICT*
 - *Integrated learning*

Interdisciplinary education

- Interdisciplinary education is characterized as the process in which pupils integrate information, methods, tools, perspectives, possibilities, ideas, concepts and theories from two or more fields in order to create “products”, explain the phenomenon or solve problems. Pupils are not able to do it using the means of only one field, such as information, methods, tools, ideas and concepts. (Boix-Mansilla, 2010)
- The interdisciplinary approach allows pupils becoming more involved in their learning and teachers can work toward eliminating discipline lines. Pupils can become independent, confident individuals who “learn how to learn” and develop lifelong learning skills (Duerr, 2008; Jones, 2009).

Integrated education

- Education which realizes interdisciplinary relations and strive to connect theoretical knowledge with practical activities is called Integrated education. This kind of education is implemented in four main forms:
 - *Integrated subjects, courses,*
 - *Modules or topics included across several subjects,*
 - *Projects connecting knowledge from different subjects with practical activities,*
 - *Whole-school integrated days on common topic.*

(Kovalik, 1995)

Goals

- Set of materials
 - *Propaedeutics for topics such as areas and coordinates*
 - *Utilization of Interdisciplinary relations and Integrated education*
 - *Variable difficulty*
- Reaction to planned changes in curricular documents
- Creative environment for pupils to create and discover
- Interconnection of programming (Scratch) and mathematics

Scratch

- Scratch is full programming environment created by specialist from Lifelong Kindergarten from Massachusetts Institute of Technology for purposes of informal education.

■ Scratch offers:

- *Full programming environment with object and event programming*
- *Community of programmers, who adopt, edit and comment on others projects*
- *Online accessibility (necessary registration) with Flash compatible browser*
- *Creating code using blocks*
- *Cloud storage*

SCRATCH



Created materials

- 4-5 grade pupils
- Created materials are not worksheets.
- Suitable for teachers with some experience with Scratch.
- Difficulty of final task depends on teacher.

Links:

- <https://scratch.mit.edu/users/ITDMath/>

Conclusion

- Limited pilot testing on pupils:
 - *Only a few pupils*
 - *Individual approach*
 - *Problems mainly with programming*
- Future plans
 - *Expand the set of tasks to cover more topics.*
 - *Planned co-operation with several teachers from our region from September.*

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THANK YOU FOR YOUR ATTENTION.

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