

DEVELOPMENT OF INQUIRY SKILLS IN TEACHING LINEAR DEPENDENCE

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Programme for International Student Assessment (OECD PISA) 2012

- ◉ reducing the level of mathematical literacy of students,
- ◉ evaluation of tasks requiring working with different representations of data and understanding of dependencies between quantities,
- ◉ illustrative task from the area of finance used in testing ([question1](#), [question2](#))

Implementation of IBSE into mathematics and science education

- ◉ International projects PRIMAS, FIBONACCI
(<http://www.primas-project.eu/>)
(<http://www.fibonacci-project.eu/>)
- ◉ National projects Modernization of education at primary and secondary schools
(<https://www.modernizaciavzdelavania.sk/>)
- ◉ Current project: Research on the efficiency of innovative teaching methods in mathematics, physics and informatics education

Classification of inquiry skills (Berg, 2013)

1. Determining the problem and planning of the experiment / model:
 - > to formulate a question, hypothesis,
 - > to propose a model,
 - > to develop a procedure to test the hypothesis.
2. Making the experiment / modelling:
 - > to construct the model,
 - > to record results.

Classification of inquiry skills (Berg, 2013)

3. Analysis and interpretation of the experiment / model:
 - > to transform the results into transparent tables, graphs,
 - > to interpret results and discuss the suitability / limitations of the modelling process,
 - > to express relationships between variables.
4. Sharing and presentation:
 - > to present results,
 - > to find appropriate arguments to justify relations.
5. Application and further exploitation:
 - > to make hypotheses for further investigation,
 - > to apply modelling procedures to new problems.

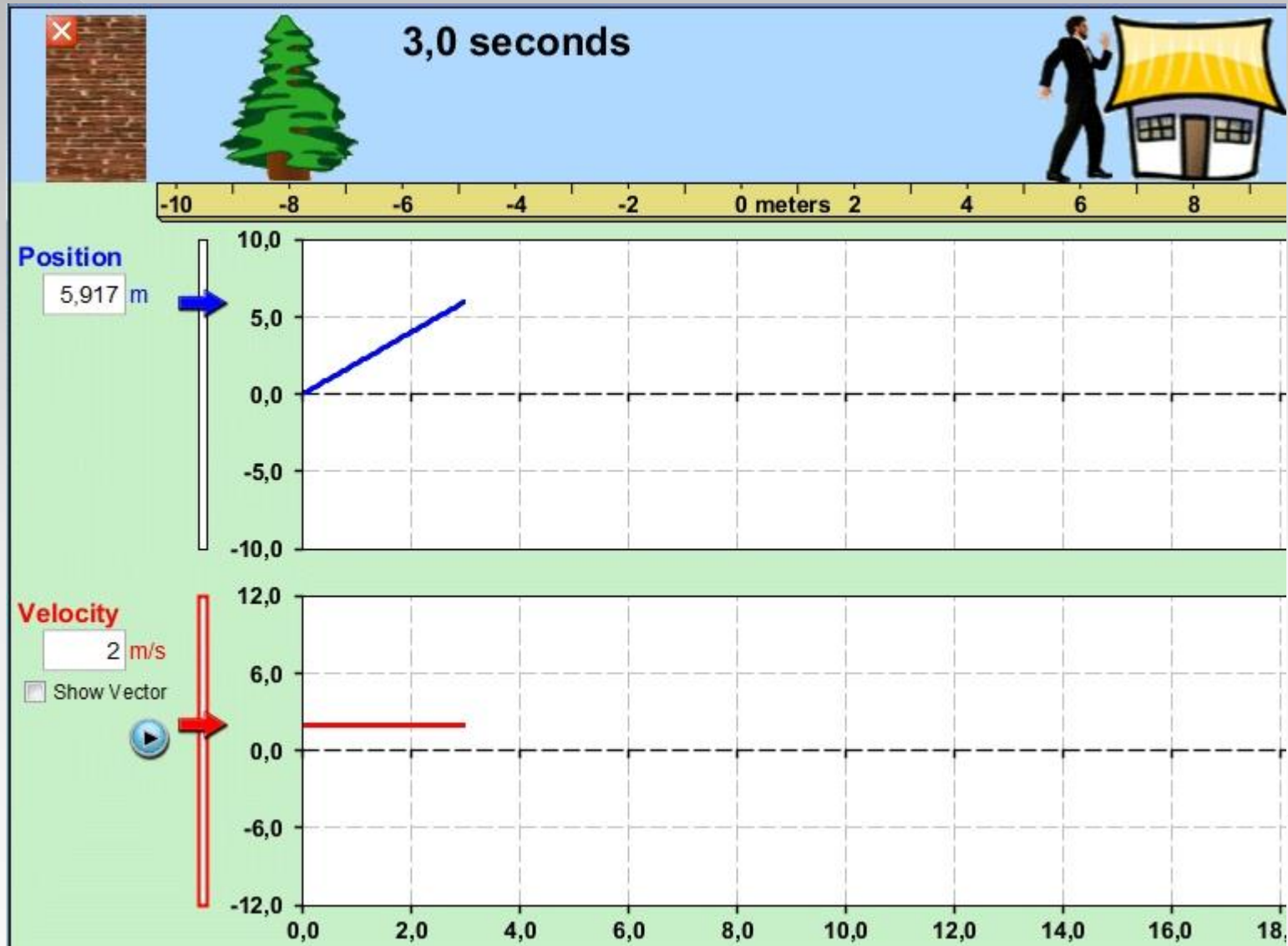
Preparation of the pre-test for experimental classrooms

- ◉ trying of the first version of the pre-test containing 13 tasks,
- ◉ the task for diagnosing the skills to interpret the relationships expressed in the form of symbolic notations,
- ◉ the task for diagnosing the skills to express relationships between variables using symbolic notations.

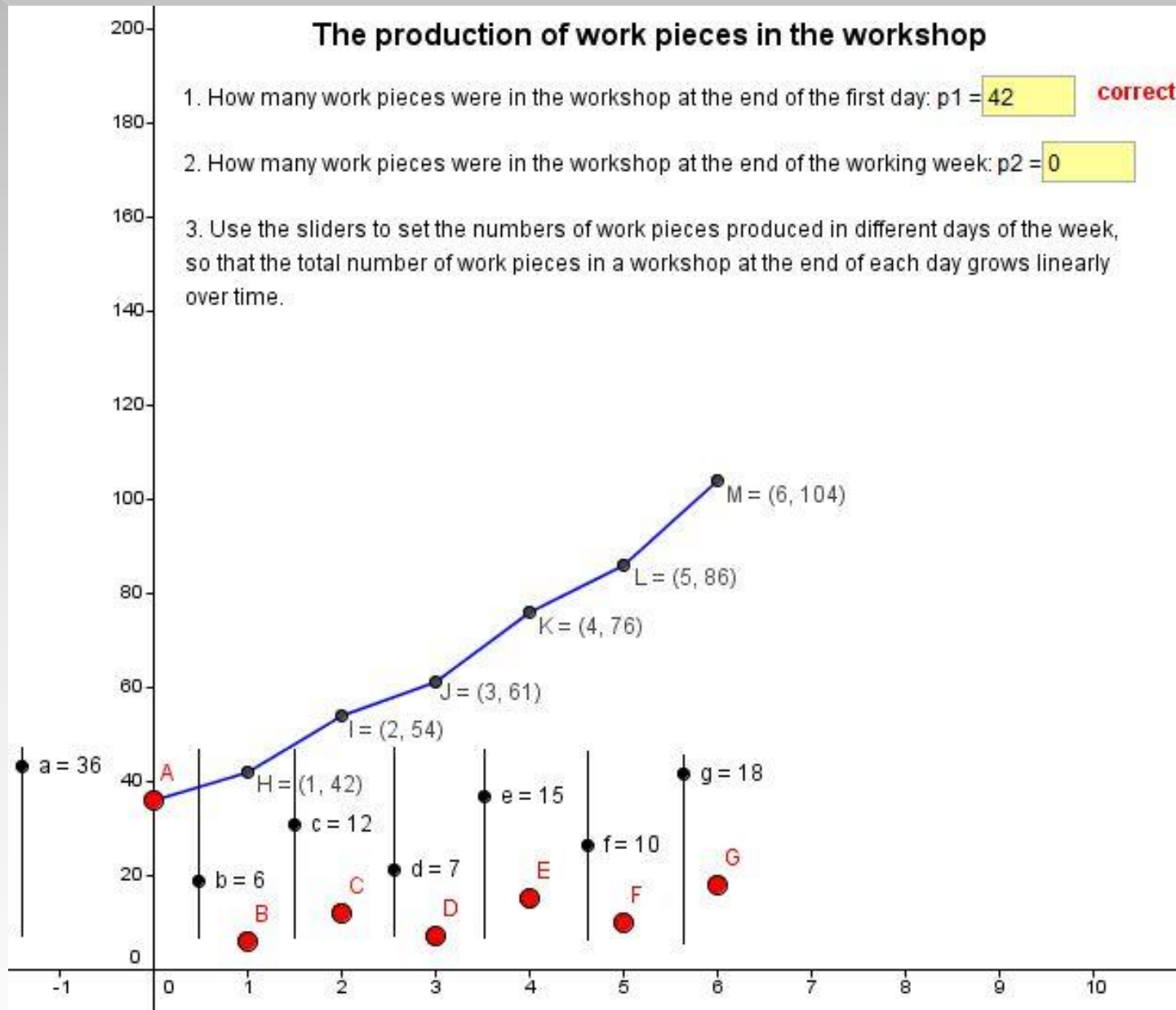
Innovative lessons plans and teaching materials

- ◉ experimental teaching in the first and second year of secondary school,
- ◉ selected topics of divisibility, plane geometry, functions,
- ◉ motivation tasks, worksheets, interactive learning activities,
- ◉ tools for formative assessment.

Uniform linear motion



Investigation of linear dependence



The graph of linear function

- How does the graph of a linear function change if we decrease the value of the coefficient a to 0.5; -0.5; -1; ...?
- What is a relative position of graphs of linear functions $f: y = 2x - 5$ and $g: y = 5x + 3$?
- Determine the coordinates of the intersection point of graphs of all linear functions given by the formula $y = ax - 2$, where a is any real number different from 0.
- Is there a linear function whose graph is perpendicular to the x axis?

Finding symbolic representation of a linear function

Input

2

Formula for the calculation of the function value

$y=8-3x$

Check

2

x	-1	0	1	2
f(x)	11	8	5	2

Microsoft Excel

Correct

OK

Discussion

- ◉ questionnaires to express initial experience and opinions of teachers,
- ◉ use of arithmetic and dynamic graphical models,
- ◉ students' problems with the formulation and generalization of discovered findings,
- ◉ teachers should also require explanation of students' conclusions and finding adequate arguments for their justification,
- ◉ teachers' evaluation of the first version of pre-test.

THANK YOU FOR YOUR ATTENTION

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