



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

## ***Seminar: Theorising and Practicing Core Competences***

# Senior Citizens as Volunteers: New Resources for Exploration of Analytical Competence as Core Competence through Mathematics Learning and Identity

**Andra Fernate, Dalia Staniulevičienė\*, Lena Lindenskov\*\***

**University of Latvia, Latvia,**

**\*Vytautas Magnus University, Lithuania**

**\*\*Aarhus University, Denmark**

ASEM Forum on Lifelong Learning: “Learning Unlimited”  
Network 5: “ASEM LLL Core Competences”  
29-30 May 2012, Copenhagen

**[www.dpu.dk/asem](http://www.dpu.dk/asem)**



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

**To respect the unlimited perspective of lifelong learning, we wish to focus both on the development of analytical competence in compulsory school and on the senior citizens' life experiences.**

**[www.dpu.dk/asem](http://www.dpu.dk/asem)**



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# The goal of the study

**To make an investigation into the relationship between pensioners' performances in mathematics and their beliefs and positioning as doers of mathematics.**

[www.dpu.dk/asem](http://www.dpu.dk/asem)



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# The research questions:

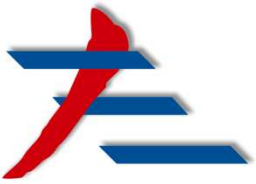
- 1. What is the relationship between pensioners' beliefs and positioning as doers of mathematics related to the information gathered about their voluntary work?*
- 2. What is the relationship between pensioners' beliefs and positioning as doers of mathematics and performances in mathematics?*
- 3. What is the relationship between pensioners' beliefs and their positioning as doers of mathematics the pensioners' education and working life?*



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Theoretical framework

- **Beliefs** as a *phenomenon* or as a *situated process and action* (Schoenfeld 1985 and 1992; Goldin 2002; Goldin et al. 2009; Leder et al. 2002; Kislenko et al 2007; Maass and Schlöglmann 2009; Perrenet & Taconis 2009);
- Concept of **positioning** (Davies & Harré 1990) as a *basic component* in the understanding, describing and planning of *classroom activities and interactions* (Wagner & Herbel-Eisenmann 2009).



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Theoretical framework

- ‘**Analytical competence**’ refers to *being a doer of mathematics* (Cobb, Gressalfi & Hodge 2009);
- Analytical competence can be defined as an ability to combine the old and the new in a common vision, an ability to comprehend a wide spectrum of specific information as well as perform the most effective and appropriate activities.



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

# Research methodology

[www.dpu.dk/asem](http://www.dpu.dk/asem)

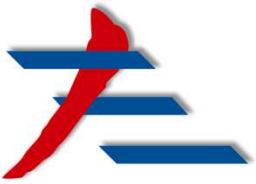


Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Informants

- Voluntary participants:
  - pensioners involved in voluntary work – 10;
  - pensioners involved in work – 10;
  - pensioners – 10.





Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# ***Project design on the national level:***

- Semi- structured interview:
  - *1) What is mathematics?*
  - *2) What is mathematical thinking?*
  - *3) How to solve a mathematical problem?*
- *2 pensioners (two from each level group) were interviewed by the researchers;*
- Interviews were transcribed;
- Analysis of written responses and interviews;
- Performance of external assessment.
- Beliefs and positioning of collected data were related with the marks received on mathematical performances.



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

## ***Project design on the national level:***

**The pensioners were asked to describe to the researcher some facts about their voluntary work, which include:**

- Type of voluntary work and name of organization.**
- Work duration (when they started doing voluntary work – when they started this particular voluntary work – how many hours per month they were working).**
- Work purpose (give reason for doing this type of voluntary work).**



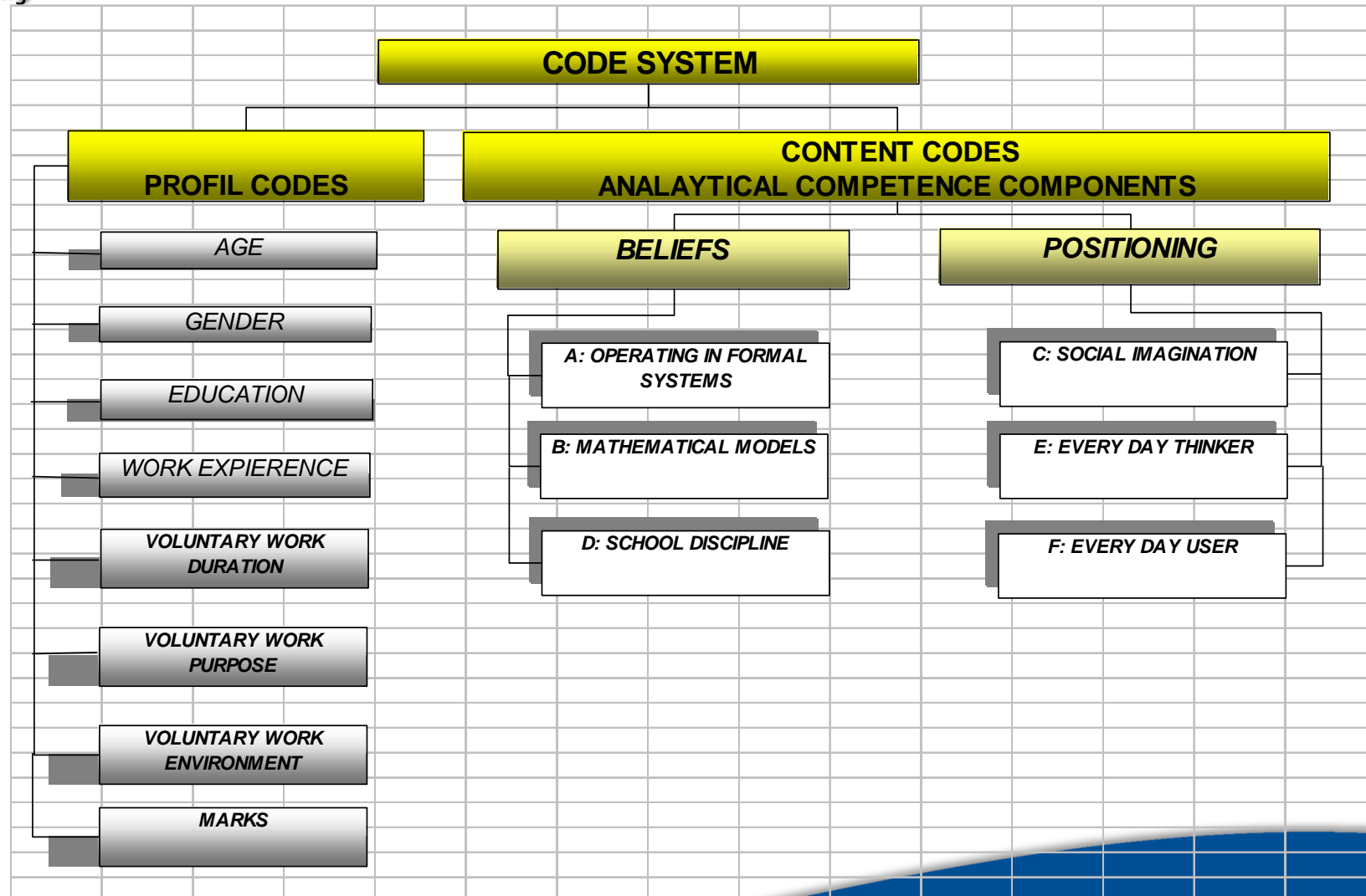
Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Research stages

- A semi-structured interview for qualitative and the performance assesment of mathematics for quantitative data collection – autumn, 2011;
- Primary and secondary qualitative and quantitative data processing - winter, 2011-12;
- Data analysis and interpretation -spring, 2012



# The statements were coded according to the structural components of analytical competence:

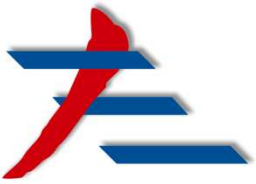




Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Quantitative data processing (SPSS 18.0)

- **Primary data analysis** was done implementing **descriptive statistics** (analysis of frequencies, central tendency, variability, crosstabs).
- **Secondary data processing** was done taking into account the exact sample, **non-parametric statistical methods** were used (Spearman's rank correlation coefficient, Kolmogorov-Smirnov Z test), etc.

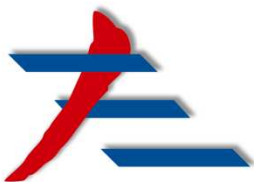


**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

# Informants

**Cases of the pensioners involved in  
voluntary work in Latvia, Denmark and  
Lithuania.**

[www.dpu.dk/asem](http://www.dpu.dk/asem)

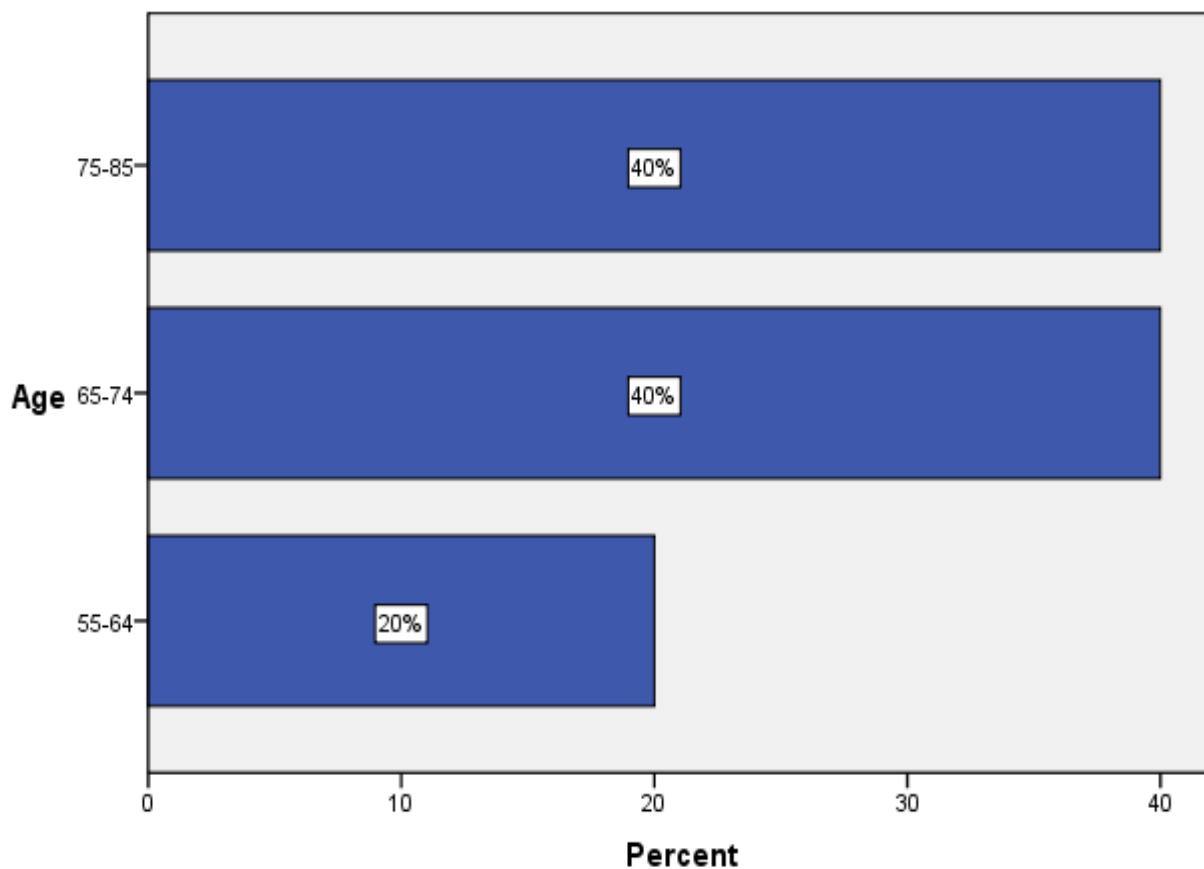


Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

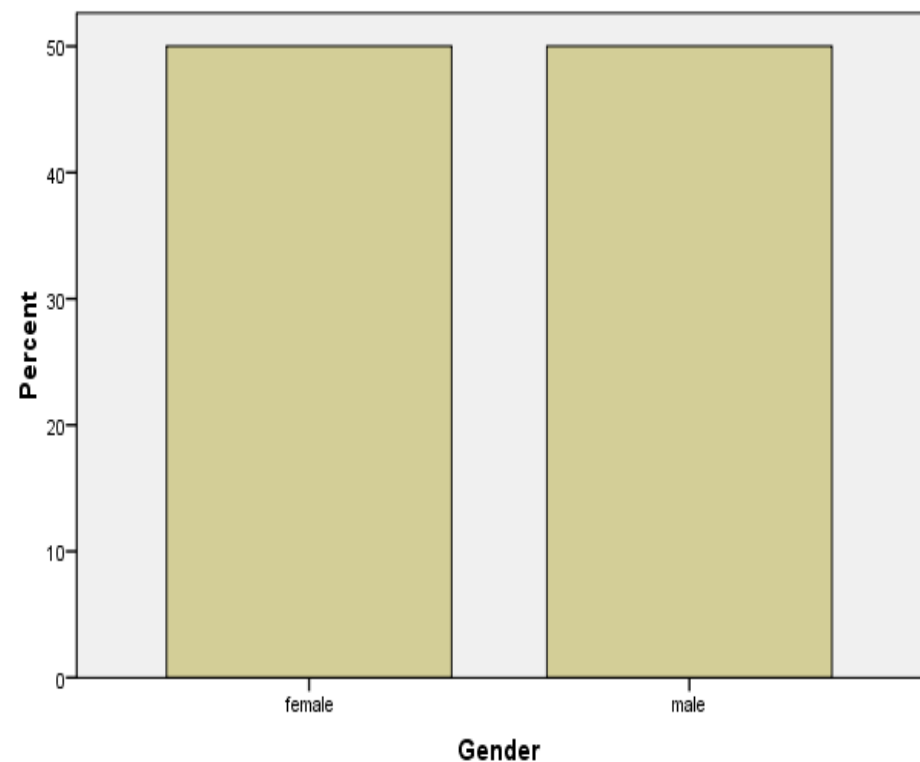
# Results from Latvia

*(n=10 volunteers/pensioners)*

## AGE



## GENDER



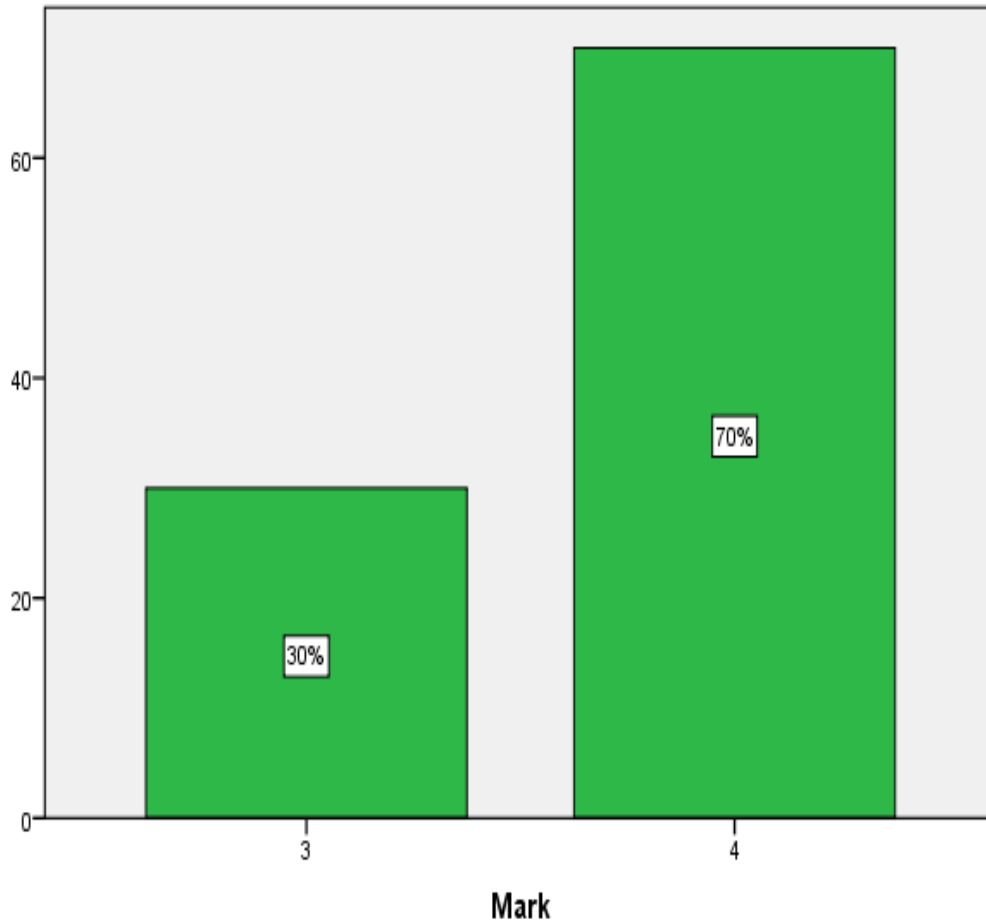


Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Results from Latvia

## Grading system (prior to 1991)

### MARKS



Marks	Description	Grade
5	<b>Excellent:</b> very good or Excellent, equal to highest distinction (best possible grade)	A
4	<b>Good:</b> represents a good knowledge of a subject (above average)	B
3	<b>Satisfactory:</b> sometimes translated into English as Fair (lowest passing grade)	C
2	<b>Unsatisfactory:</b> hardly any knowledge, below average, represents the first level of failing	F
1	<b>Poor:</b> represents complete failure and is the lowest possible grade, very rarely used	F

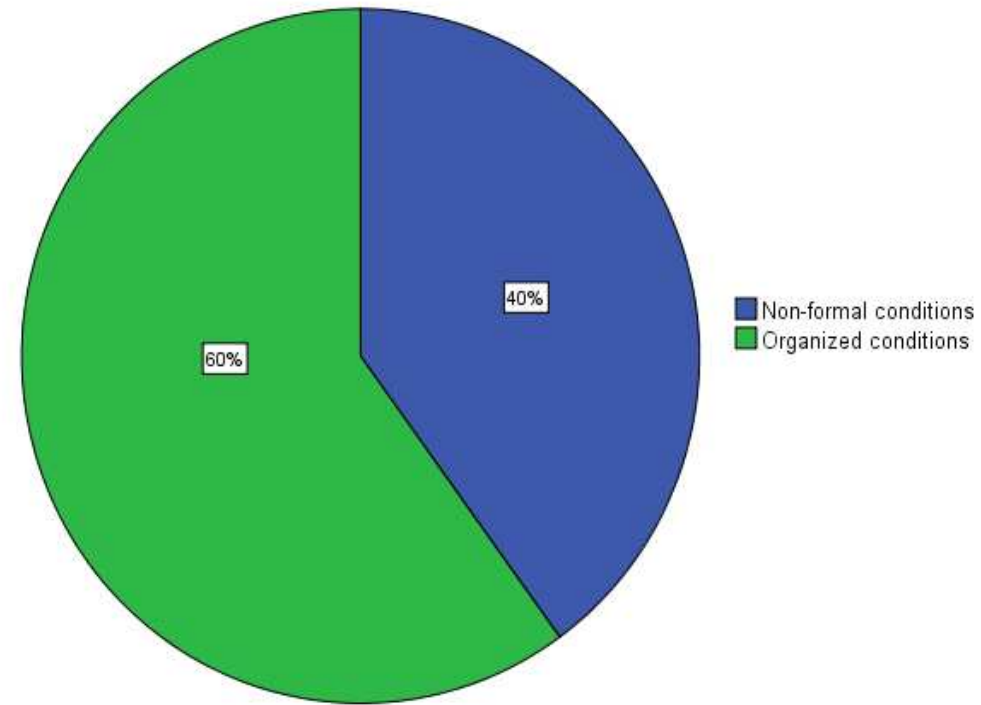
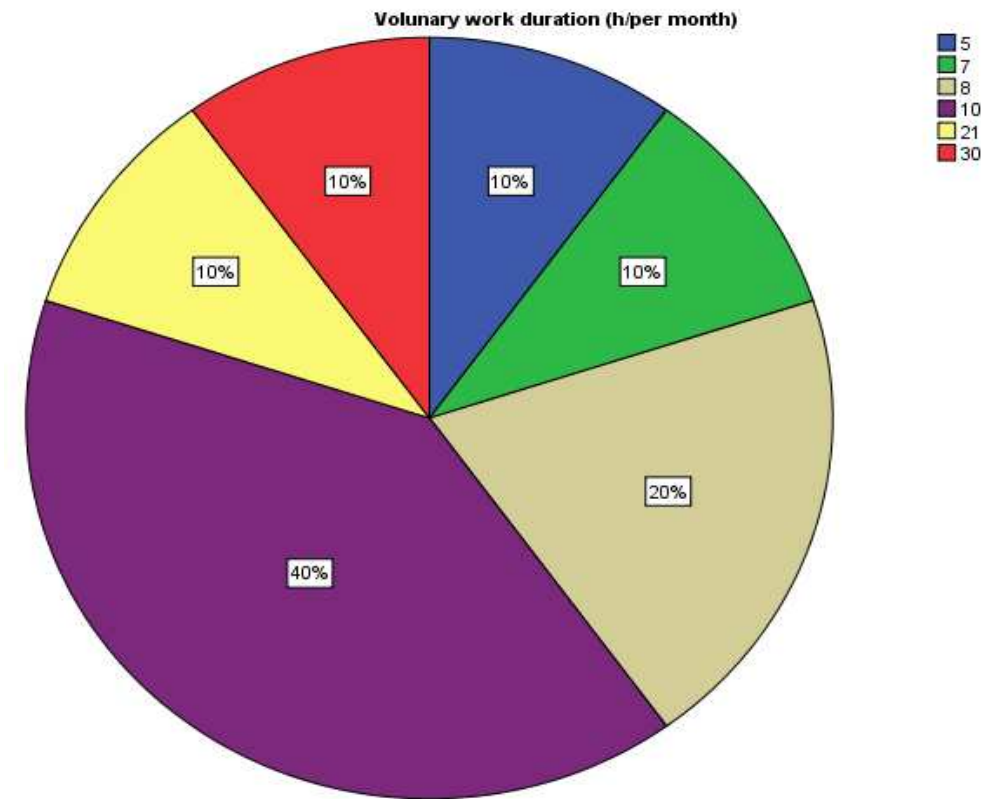




# Results from Latvia

## VOLUNTARY WORK DURATION

## VOLUNTARY WORK ENVIRONMENT



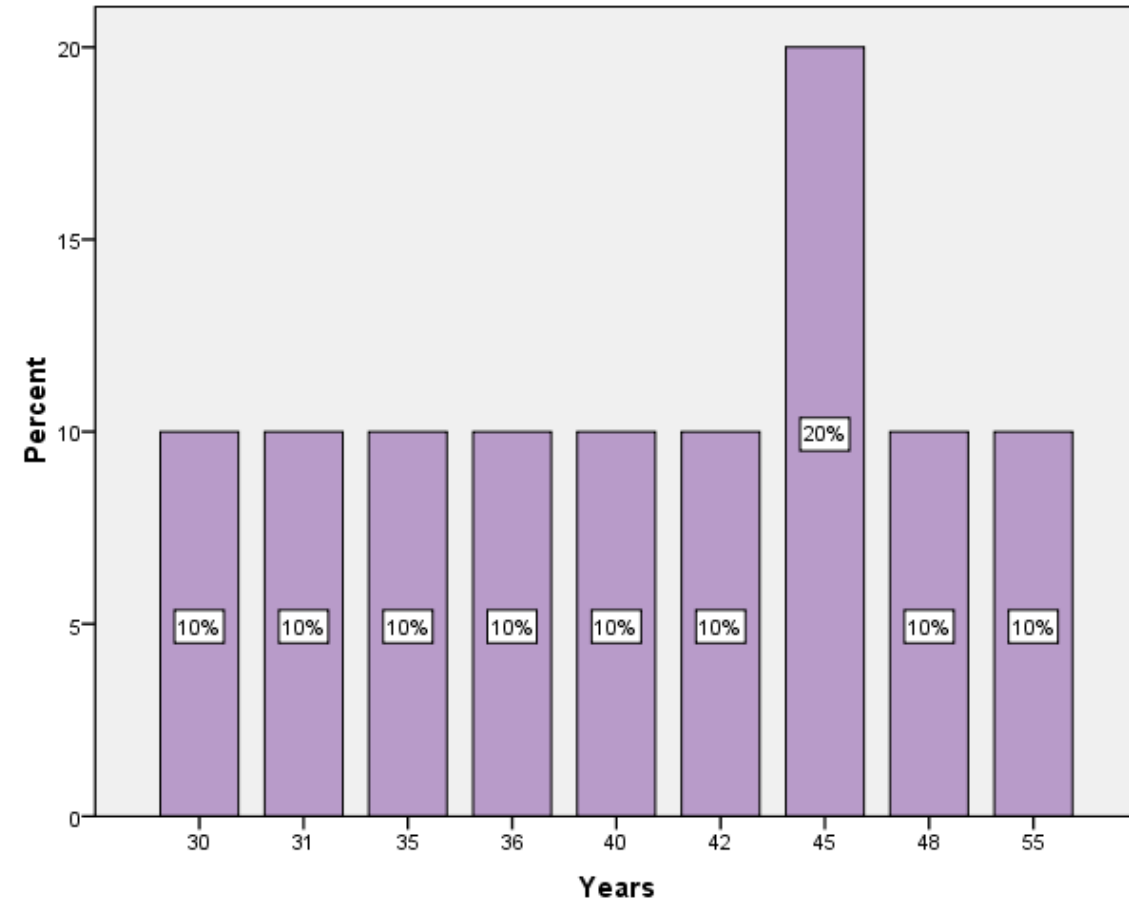
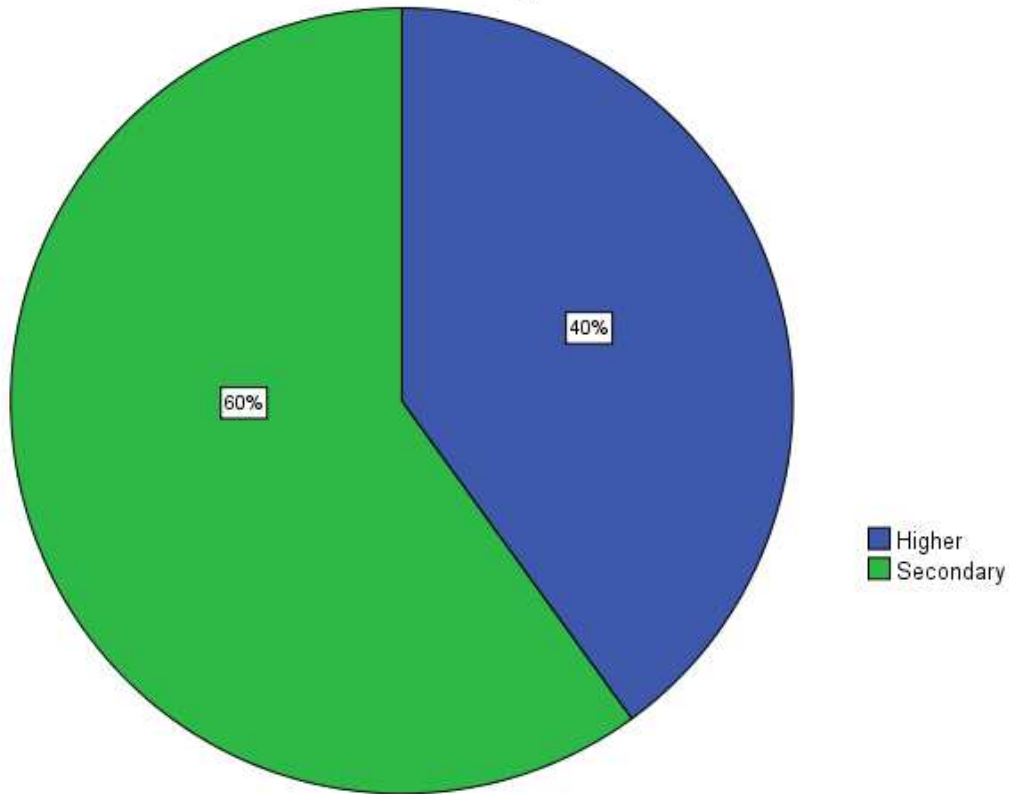


Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Results from Latvia

## WORK EXPERIENCE

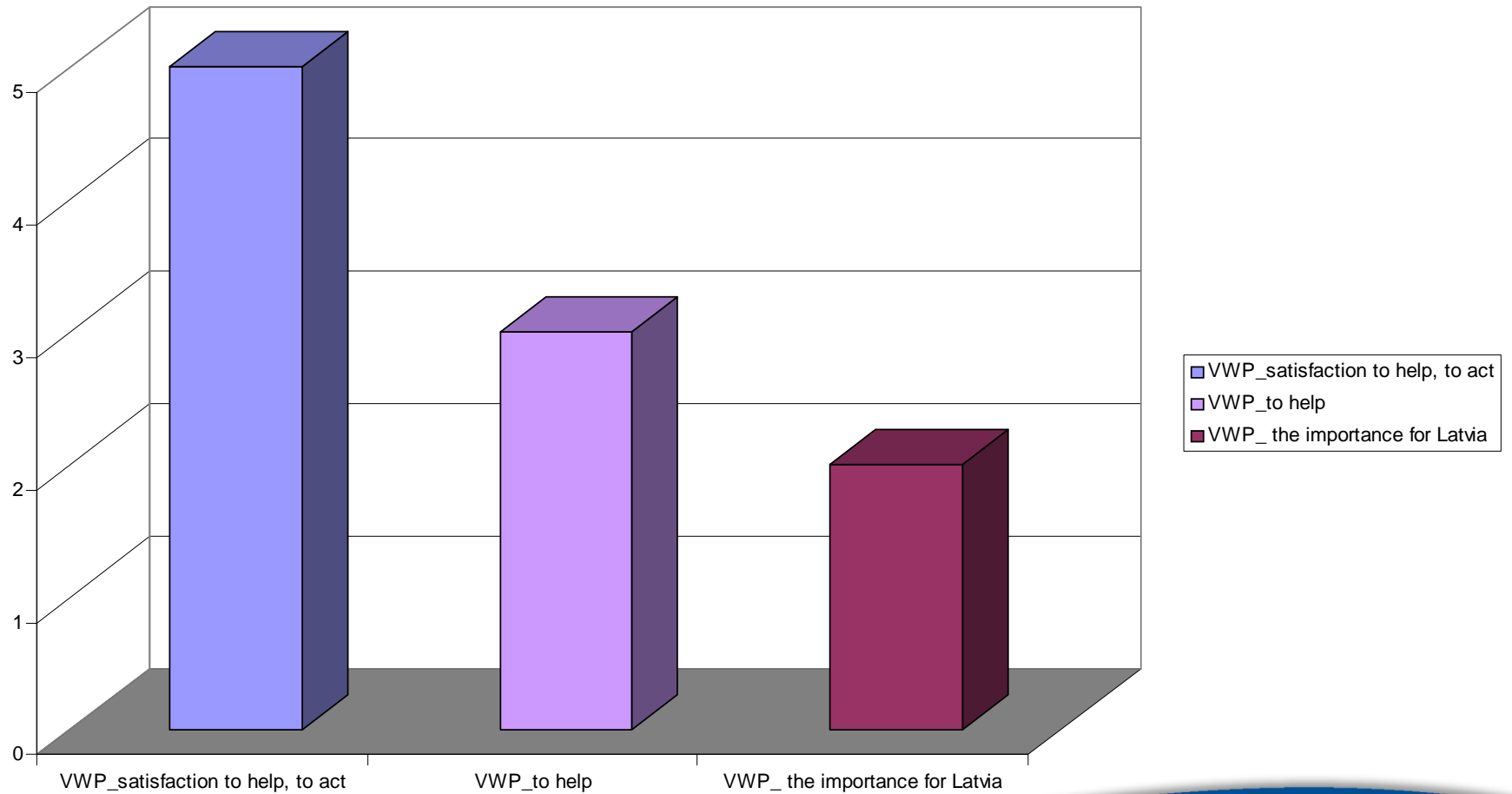
### EDUCATION





# Results from Latvia

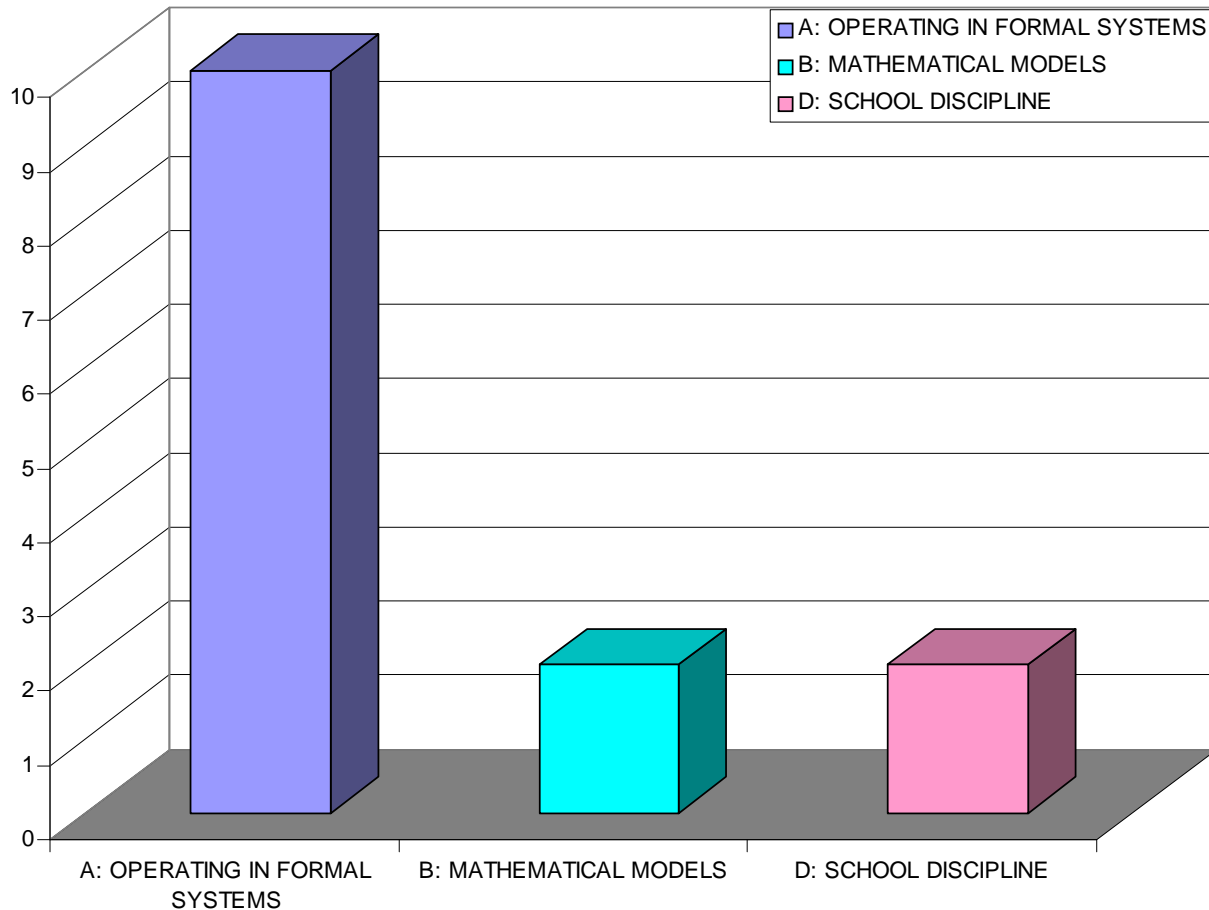
## VOLUNTARY WORK PURPOSE





# Results from Latvia

## BELIEFS



### Statements:

**A: OPERATING IN FORMAL SYSTEMS**

*...Precise calculation of a solution...*

**B: MATHEMATICAL MODELS**

*...Rethinking all pros and cons, as well as to test the result ...*

**D: SCHOOL DISCIPLINE**

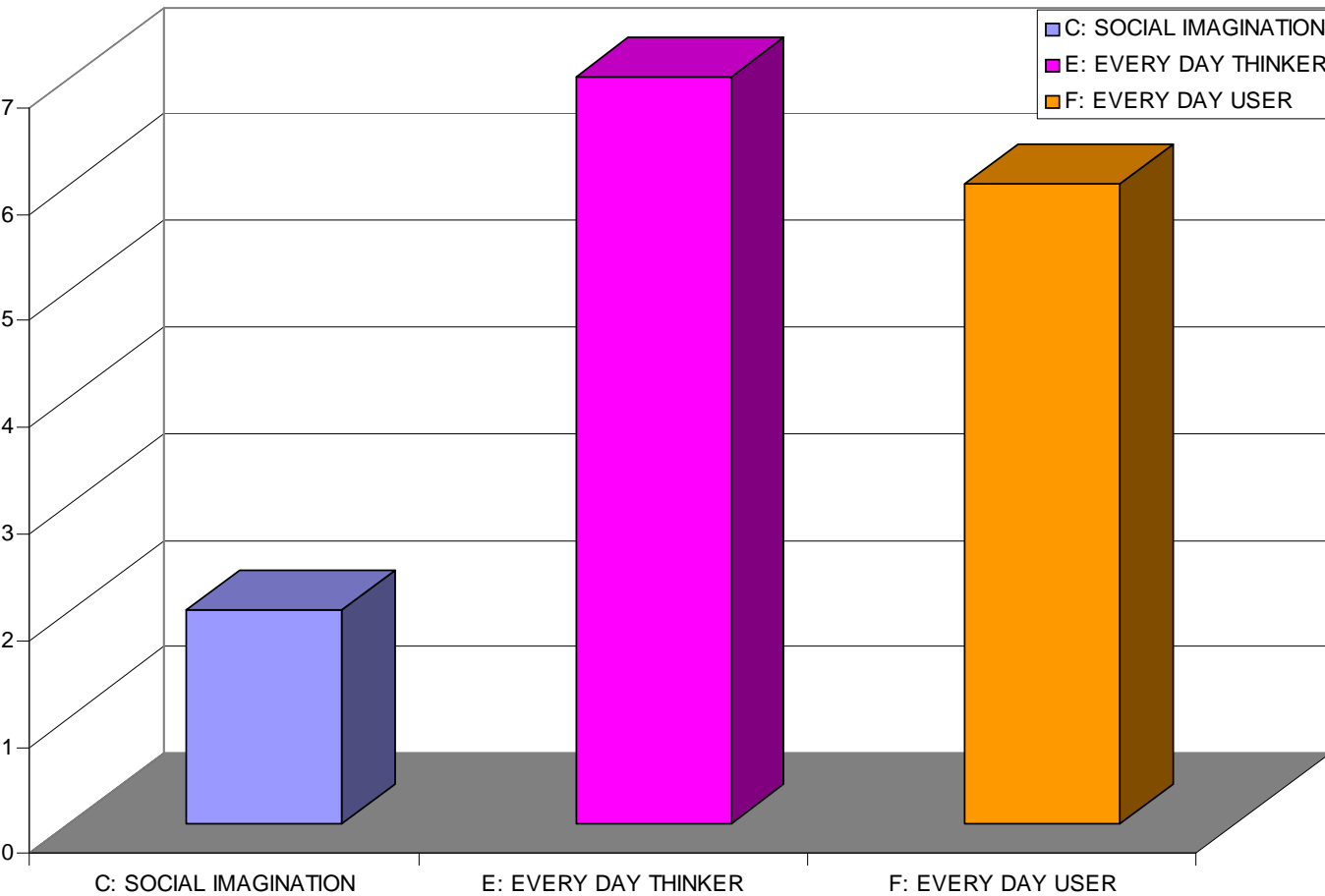
*...Mathematics is a subject about numbers...*



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Results from Latvia

## POSITIONING



### Statements:

**C: SOCIAL IMAGINATION**

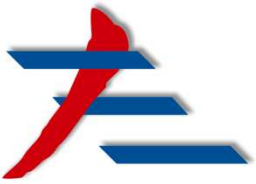
*...Mathematics should be linked with everyday life then it can be perceived more easily....*

**E: EVERY DAY THINKER**

*...It is abstract thinking....*

**F: EVERY DAY USER**

*...Mathematics is around us. We cannot do without it...*



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Results from Latvia?

*Is there a relationship between pensioners' beliefs and their voluntary work duration?*

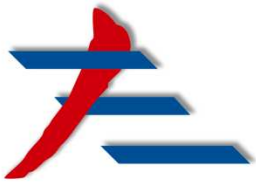
*Is there a relationship between pensioners' voluntary work duration and type of voluntary work?*



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Results from Latvia?

*Is there a relationship between pensioners' type of voluntary work - consisting museums, movies or websites, voluntary work purpose and performances in mathematics?*

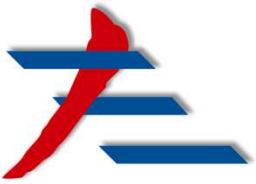


**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

# Results from Latvia?

**Is the difference between women's and man's volunteer work?**





**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

# Lithuanian Case

[www.dpu.dk/asem](http://www.dpu.dk/asem)



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# The Participants of this Research

Ten pensioners involved in voluntary  
work in Caritas of Kaunas Archdiocese  
in Lithuania

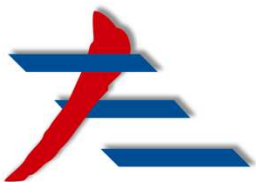
[www.dpu.dk/asem](http://www.dpu.dk/asem)



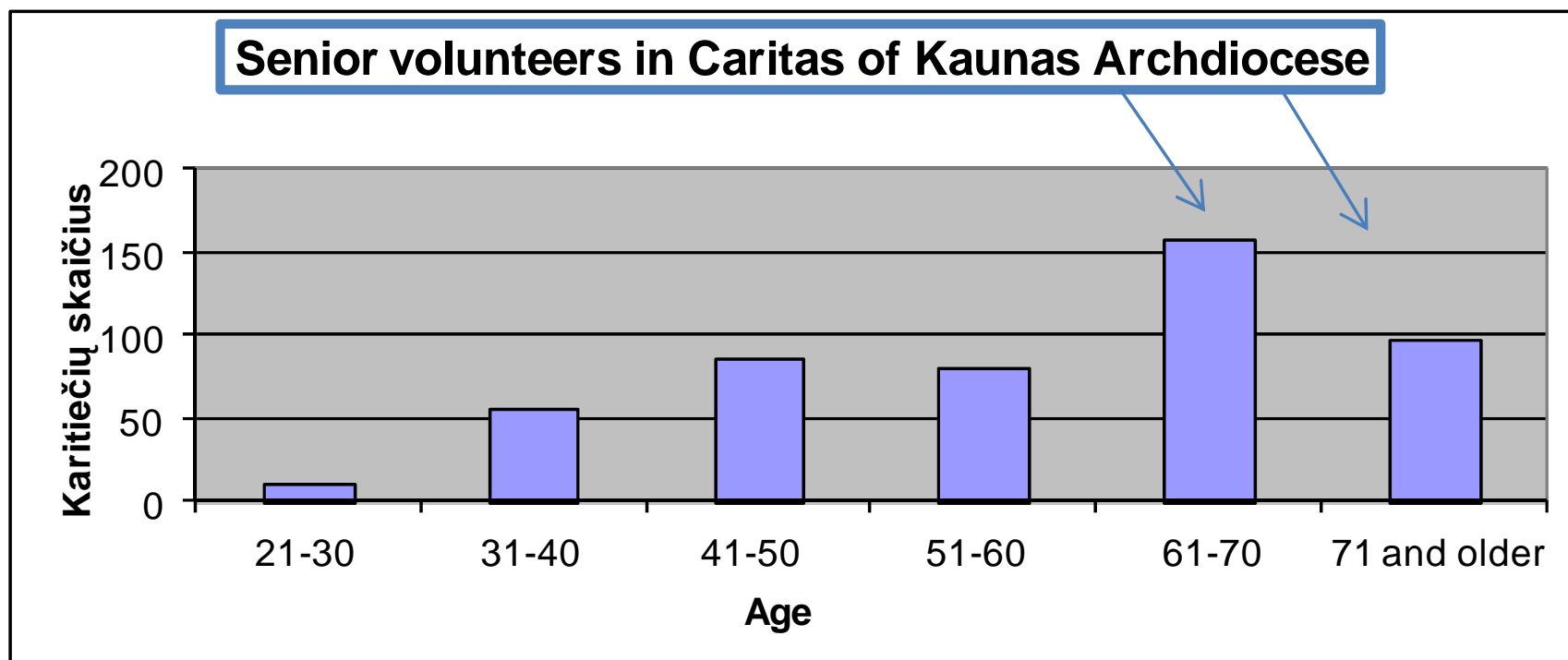
Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# The Situation in Caritas of Kaunas Archdiocese

- ✓ One of the main activities in Caritas of Kaunas Archdiocese is voluntary work.
- ✓ Even 95 % personnel, working in Caritas are volunteers.



# The Situation in Caritas of Kaunas Archdiocese

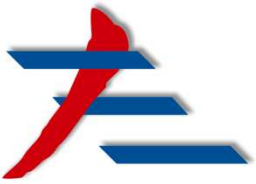




Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# The Participants about Mathematics

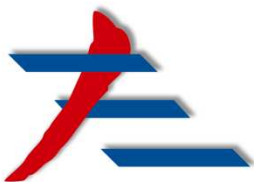
- ✓ Mathematics is the basis of the life.
- ✓ Mathematics is the calculation of the life issues. To look to the future, calculating everything mathematically.



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# The Participants about Mathematics

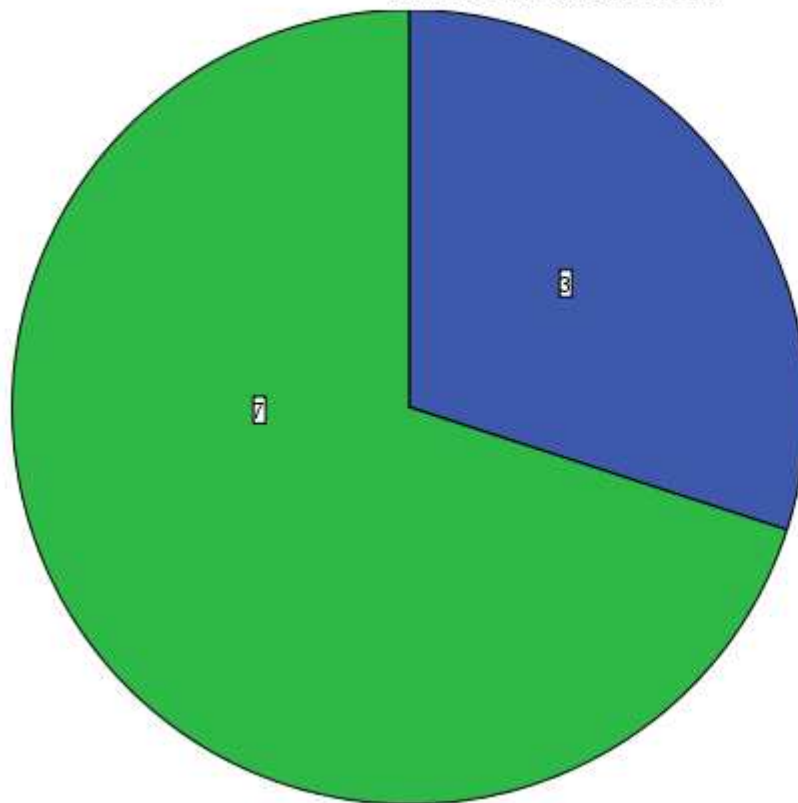
- ✓ The head of all subjects.
- ✓ School subject about numbers.
- ✓ This was difficult subject for me.



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

## Mathematics

What is mathematics?



mathematics is

- about operating in formal-logic systems
- a school discipline, science



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Acknowledgements

Analysis of research data has shown, that discussing about mathematics senior volunteers mentioned two main aspect: mathematics – discipline, science and operating in formal – logic systems.

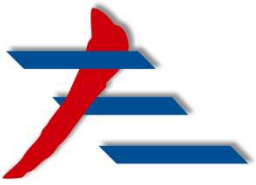




Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# About mathematical thinking

- ✓ When I count, plan and check, control, then the life is excellent.
- ✓ When you are counting in your mind, you try to calculate everything.



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# About mathematical thinking

- ✓ Memorizing of numbers and trying to put them into order.
- ✓ Related to mathematics, strict, exact, precise.



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

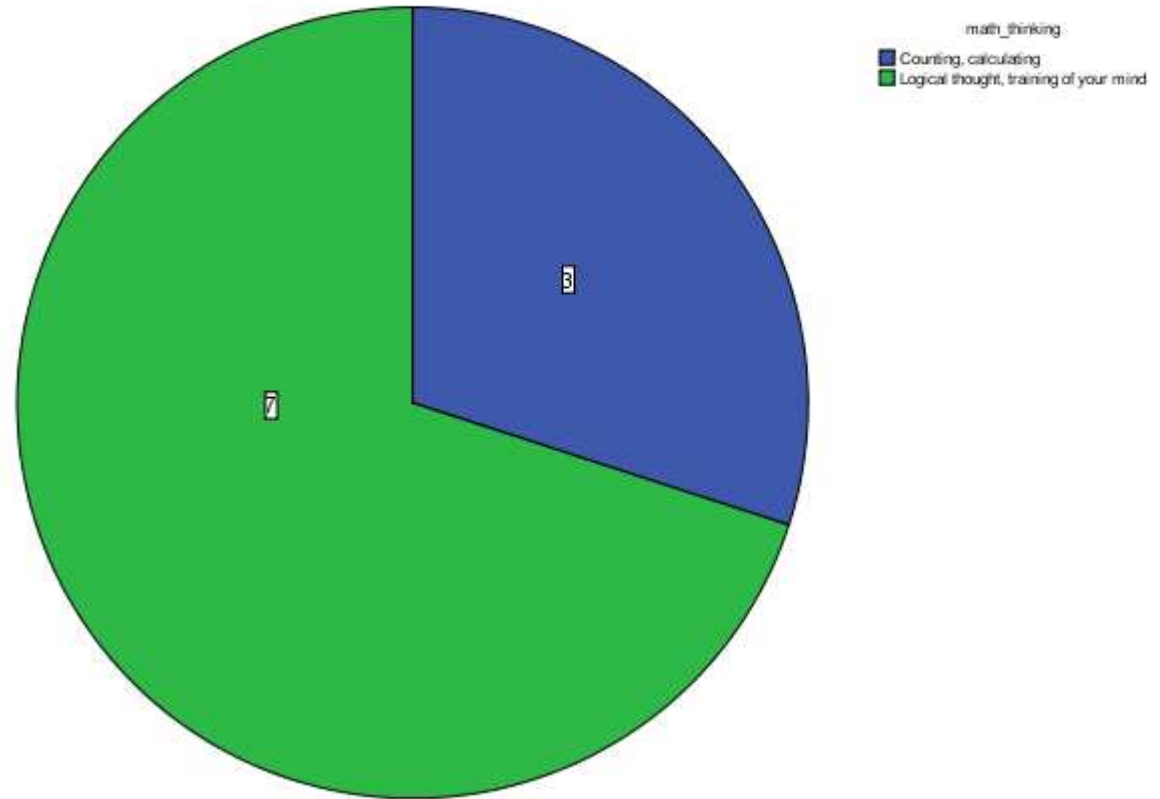
# About mathematical thinking

✓ Thinking, making calculations.  
Mathematical thinking is the  
livelihood. To balance, to live from  
the pension to pension.



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

## What is mathematical thinking?



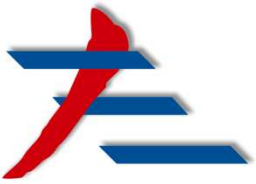


Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Acknowledgements

discussing about mathematical  
thinking senior volunteers  
determined that it is counting,  
calculating and logical thought,  
training of one's mind.

[www.dpu.dk/asem](http://www.dpu.dk/asem)



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# About Problem Solving

- ✓ I am counting: it is worth or not, comparing with the living standards.
- ✓ I like to write on the paper. I write and calculate...



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# About Problem Solving

✓ The mood to solve. I find the known facts, then it is easier to find unknown facts.



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# About Problem Solving

- ✓ To filter through the brain.
- To understand the exercise.
- ✓ First to understand the problem, then to think and to solve it.

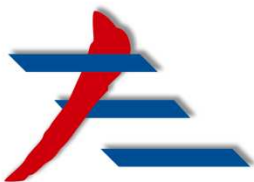




Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

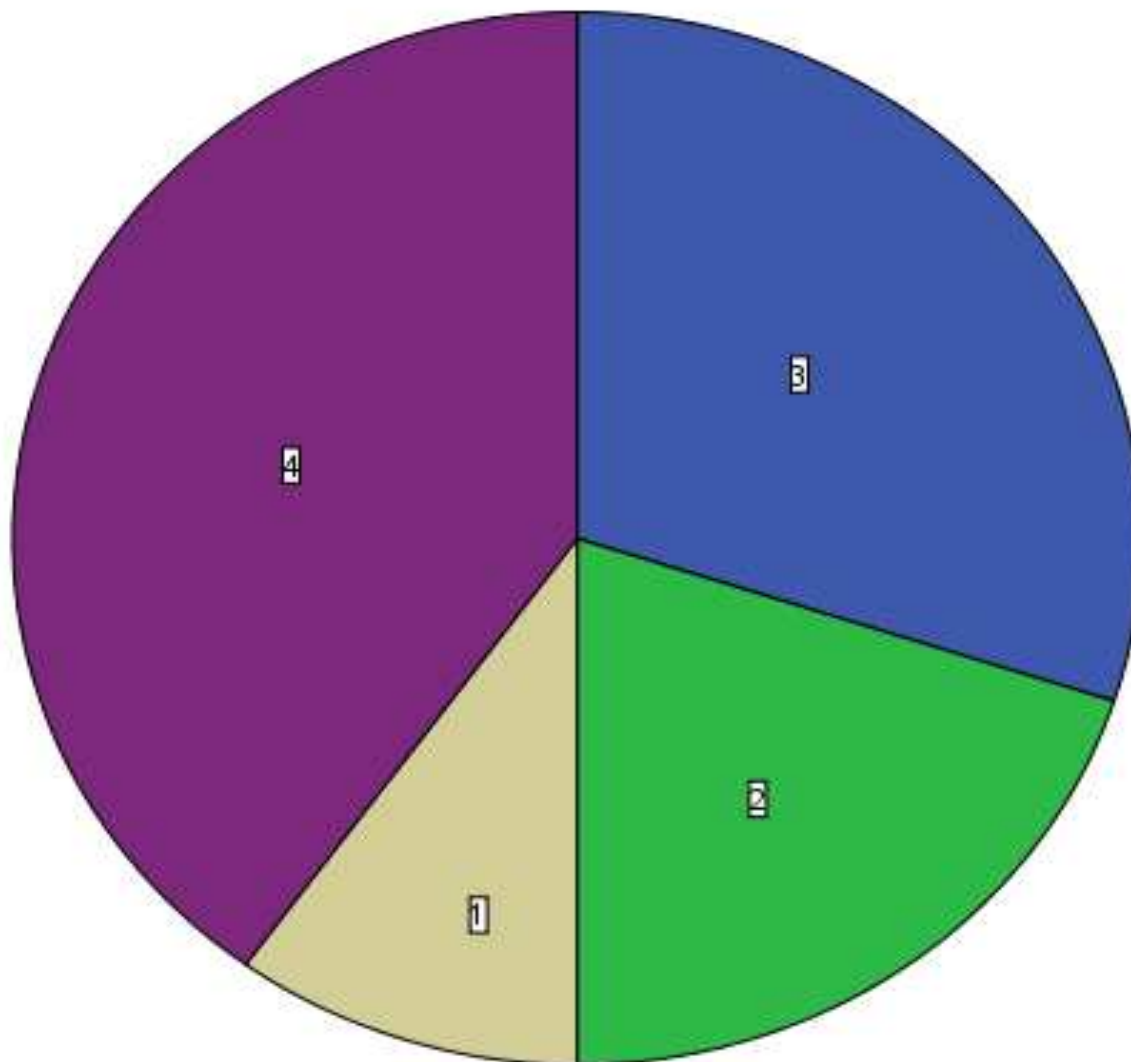
# About Problem Solving

- ✓ To make sure that you are right, you didn't miss anything.
- ✓ Deeply to think, to understand a problem in simple way.



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

## Problem solving



solving\_probl

- To make countings
- To choose specific methods
- Logically thinking and logically doing
- To understand the problem in the simplest way



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Acknowledgements

Discussing about solving mathematical problem, it was mentioned four main aspects:

making counting, choosing specific methods, logically thinking and logically doing, understanding the problem in the simple way.



Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Acknowledgements

The reflection about mathematics, analyzing ideas about mathematical thinking, the way of solving mathematical problems was enjoyable for the participants.

[www.dpu.dk/asem](http://www.dpu.dk/asem)

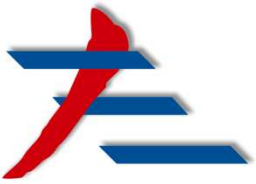


Asia-Europe Meeting  
ASEM Education and Research Hub  
for Lifelong Learning

# Acknowledgements

According to the pensioners, senior volunteers, reflection is important in mathematics as well as in their lives

[www.dpu.dk/asem](http://www.dpu.dk/asem)



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

# **Are Lithuanian volunteers more math- doers than math-thinkers?**

**[www.dpu.dk/asem](http://www.dpu.dk/asem)**



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

- It is our hypothesis for further collaborative research -

**that older volunteers can offer new and unique perspectives to analytical competences development.**

[www.dpu.dk/asem](http://www.dpu.dk/asem)



**Asia-Europe Meeting**  
ASEM Education and Research Hub  
for Lifelong Learning

**Thank you for attention!**

**Institute of Pedagogical Sciences**

<http://www.pzi.lu.lv/>

**Faculty of Education, Psychology and Art, University of Latvia**

[fernate@lanet.lv](mailto:fernate@lanet.lv)

**VytautasMagnus University, Lithuania**

[d.staniuleviciene@bibl.vdu.lt](mailto:d.staniuleviciene@bibl.vdu.lt)

**Aarhus University, Denmark**

[lenali@dpu.dk](mailto:lenali@dpu.dk)

**[www.dpu.dk/asem](http://www.dpu.dk/asem)**