

## Latvian citizens' math education needs

NGO Education Innovations Transfer Centre (Latvia)

### Citizens survey results

388 Latvian citizens participated in the survey. 292 of them are full of answers that are used as a research base. The characteristic of the survey sample is presented in Table 1.

Table 1. **Characteristic of the survey sample**

Gender	<i>Female</i>				<i>Male</i>		
	267				97		
Age	<i>Younger than 18</i>	<i>18-25</i>	<i>26-30</i>	<i>31-40</i>	<i>41-50</i>	<i>51-60</i>	<i>61 and older</i>
	5	93	45	72	75	54	21
Place of residence	<i>Rural</i>		<i>Small town</i>		<i>Medium</i>		<i>City</i>
	79		58		98		130
<i>When did you graduate from the last education institution?</i>	<i>1-5 years ago</i>		<i>5-10 years ago</i>		<i>10-20 years ago</i>		<i>More than 20 years ago</i>
	146		84		68		67
<i>Which one of the following best describes you?</i>	<i>Company / department manager</i>	<i>Employer</i>	<i>Employee</i>	<i>Self-employed</i>	<i>Unemployed</i>	<i>Student</i>	<i>Housewife etc.</i>
	55	31	157	33	1	84	4
Educational level	<i>Basic</i>	<i>Secondary</i>	<i>Professional</i>	<i>Higher</i>	<i>Mg degree</i>	<i>PhD</i>	
	6	87	27	99	71	19	

The sample in Latvia was formed:

- Sending written request with the address of the webpage, where the electronic version of the questionnaire is placed to enterprises and to NGO in Zemgale region/Latvia

- Using social networks Draugi, Facebook ...

The citizens' survey was divided in two parts by educational level: basic, secondary, and professional (120 full answers) and higher education, Mg or PhD degree (189 full answers). The characteristics of the respondents with basic, secondary or professional education are given in Table 2, with higher education, Mg or PhD degree – in Table 3.

**Table 2. Respondents with basic, secondary or professional education**

Gender	Female				Male		
	81						
Age	Younger than 18	18-25	26-30	31-40	41-50	51-60	61 and older
	3	78	9	10	13	3	4
When did you graduate from the last education institution?	1-5 years ago		5-10 years ago		10-20 years ago		More than 20 years ago
	87		11		6		16

**Table 3. Respondents with higher education, Mg or PhD degree**

Gender	Female				Male		
	154						
Age	Younger than 18	18-25	26-30	31-40	41-50	51-60	61 and older
	2	13	25	48	43	45	13
When did you graduate from the last education institution?	1-5 years ago		5-10 years ago		10-20 years ago		More than 20 years ago
	45		55		51		31

The respondents were asked to mark what knowledge of mathematics needed for the specialists of specific professional field. In Table 4 given answers by respondents with basic, secondary or professional education.

**Table 4. Math knowledge needed for specialists**

	Excel usage in the different calculations	Grouping of the data	Tasks on the calculation of %, averages and/ or errors	Estimation of statistical relations	Statistical methods of the data analysis	Graphical representation of the data and etc	Market analysis - a demand and supply balance etc.	The calculation of area and volume	Approximate calculation	Probability theory	I don't know	Other
Crafts	3	2	2	0	0	1	2	2	1	0	0	0
Carpentry	1	0	1	0	1	1	1	1	1	1	0	0
Tourism	1	1	1	0	1	0	2	0	1	0	0	0
Agriculture	4	2	1	0	0	2	0	2	1	0	0	0
Information technology	3	4	2	2	2	3	2	2	2	2	0	0
Culture	3	2	2	0	1	3	2	1	1	2	2	0
Health and health protection	1	0	0	0	1	1	0	0	1	0	0	0
Food, household and guest service tag	11	6	1	4	6	7	5	3	2	1	2	0
Transport services	3	2	3	2	3	2	2	3	2	2	0	0
Seller	3	1	3	0	0	0	1	0	0	0	3	0
..... services	38	32	37	27	27	32	31	4	4	12	4	1

In Figure 1 showed math knowledge needed for people with basic, secondary or professional education in total.

Results show that for specialists with basic, secondary or professional education the most significant skills are Excel usage in the different calculations, grouping of the data and calculation of %, averages and / or errors. The graphical representation of the data is also much needed skill. The study also showed that in the services sector for analyzing the market is needed knowledge in statistics and statistical methods of the data analysis.

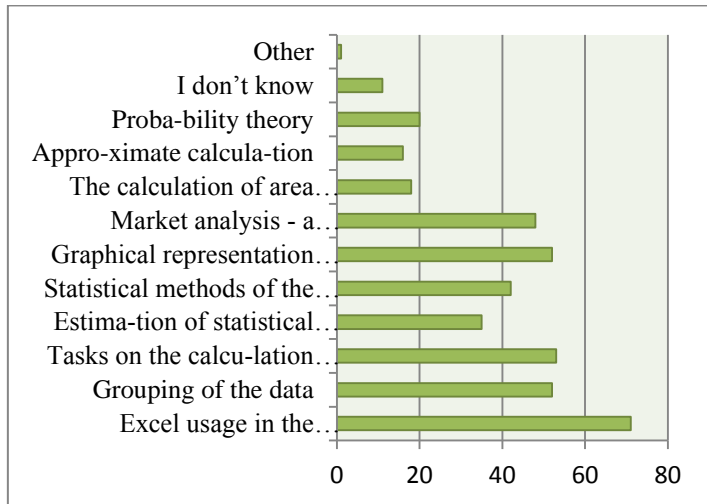


Figure 1. **Math knowledge needed for people with basic, secondary or professional education**

The same question was asked to people with higher education and Mg or PhD degree providing several specific areas / topics of mathematics what might be necessary for different expertise field's specialists. The answers are collected in Figure 2.

Results show that for people with higher education the most significant math knowledge are operations research, linear and nonlinear programming as well as net planning It determined by daily practical issues to be addressed: the description of a situation, the tasks of productivity, recourse administration, logistics, transport, the tasks solutions of the integrated jobs planning and etc.

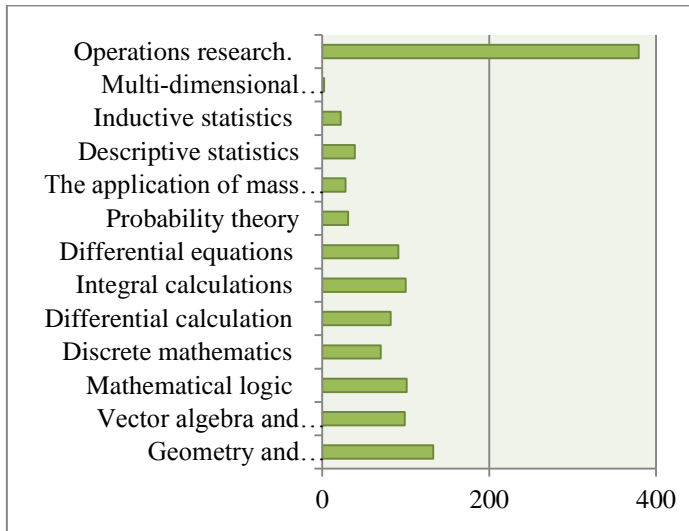


Figure 2. **Math knowledge needed for people with high education, Mg or PhD degree**

No human action is possible without motivation. It is motivation that makes us move, guides our actions and maintains our behaviour through time. Motivation is determined by several factors. In the questionnaire where given three factors: better paid work / career opportunities at work / other occupation area, entrepreneurship and personal development. Of course, respondents could write also other if they have. Motivation to improve math skills by educational level analysed in Figure 4.

Results show that mathematics has high status – most of respondents answered that the motivation to improve math skill is personal development.

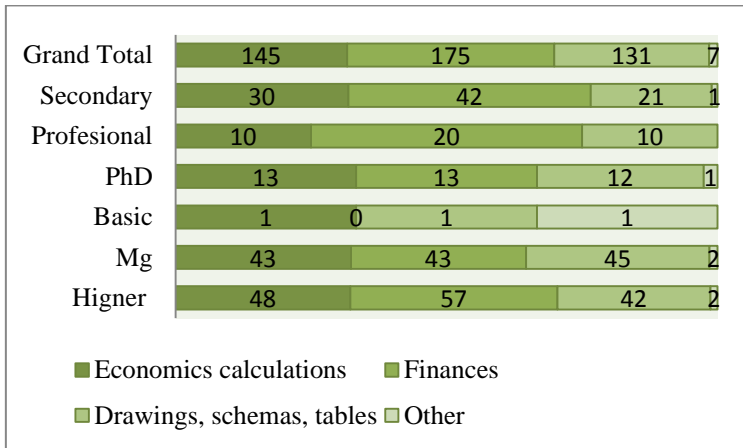


Figure 3. Which mathematics elements do you use at work or home?

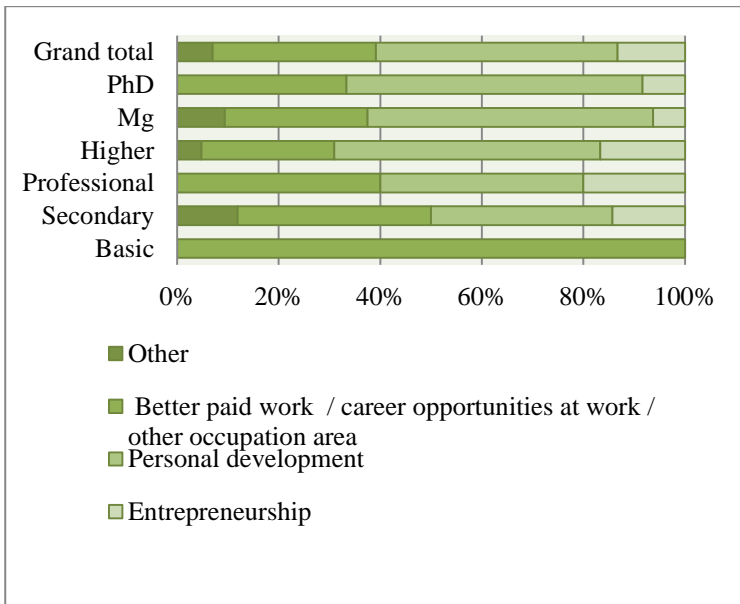
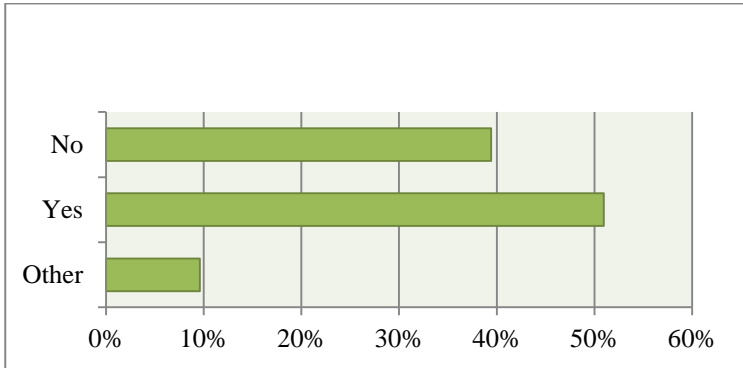
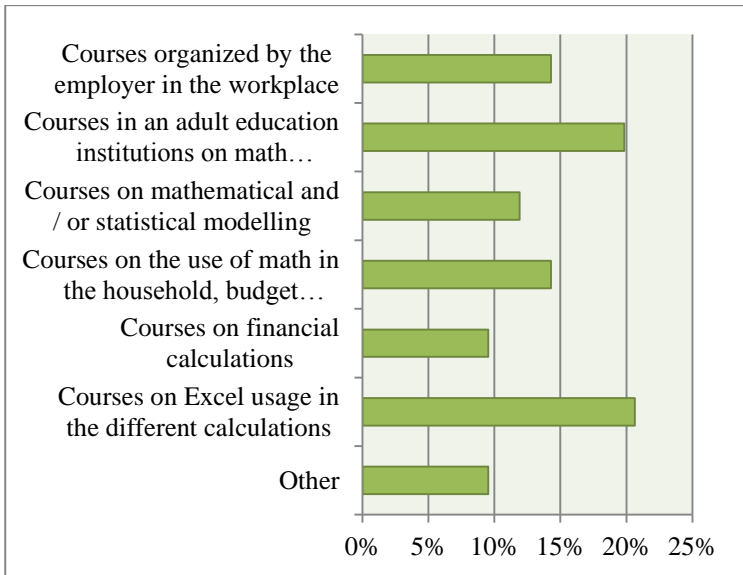


Figure 4. Motivation to improve math skills by educational level



**Figure 5. Willingness to improve your mathematics knowledge / skills**



**Figure 6. Training methods preferred by respondents**

Respondents pointed that they would like to attend courses on Excel usage in the different calculations and courses in adult education institutions on mathematics application how to solve the practical problems of my professional field.

## Employers survey results

Employers were asked to evaluate the mathematics knowledge level what is needed for their company / institution's employees (Figure 7) in the scale from 1 to 10, where 1 – is not required and 10 – very high: all processes are based on the mathematical modelling / calculations / etc.

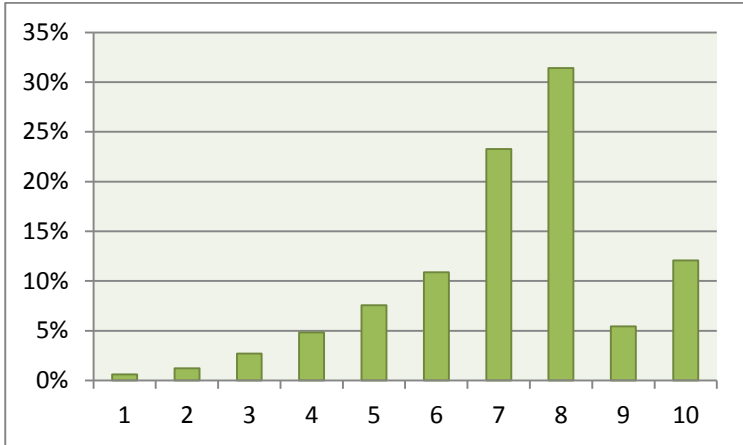
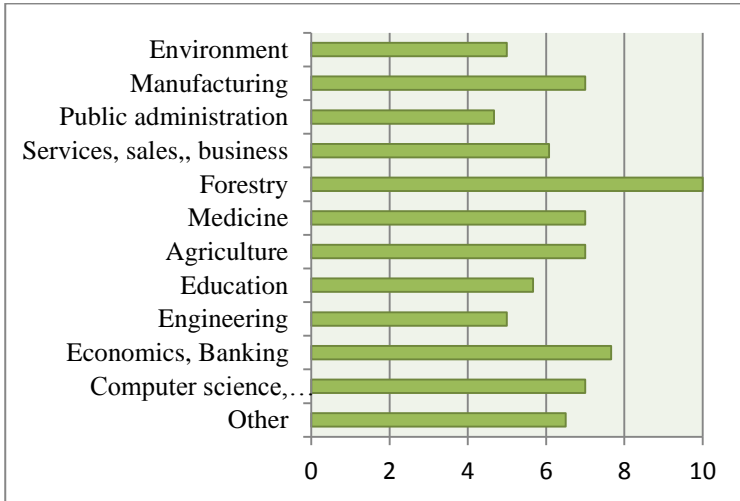


Figure 7. **Math knowledge level needed employees**

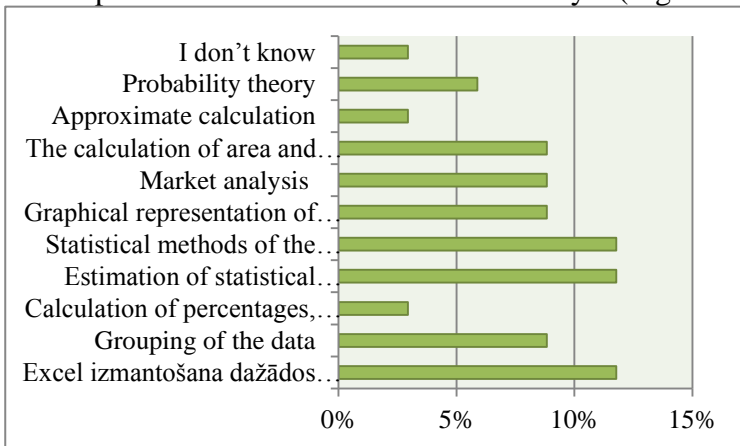
Results show that mathematical knowledge most is used in small (1 -25 employees) and very large companies (more than 100 employees) as well as in private companies. Analysing the need of mathematical knowledge by the company profile, we can see that the highest level of usability is in the service sector, including agriculture and education (Figure 8).





**Figure 8. Evaluate math knowledge level by profile**

Companies / institutions managers were asked to mark those fields of the deeper knowledge of mathematics that are needed for the specialists of your field to accomplish their professional activities successfully (Figure 9).



**Figure 9. Math knowledge in professional activities**

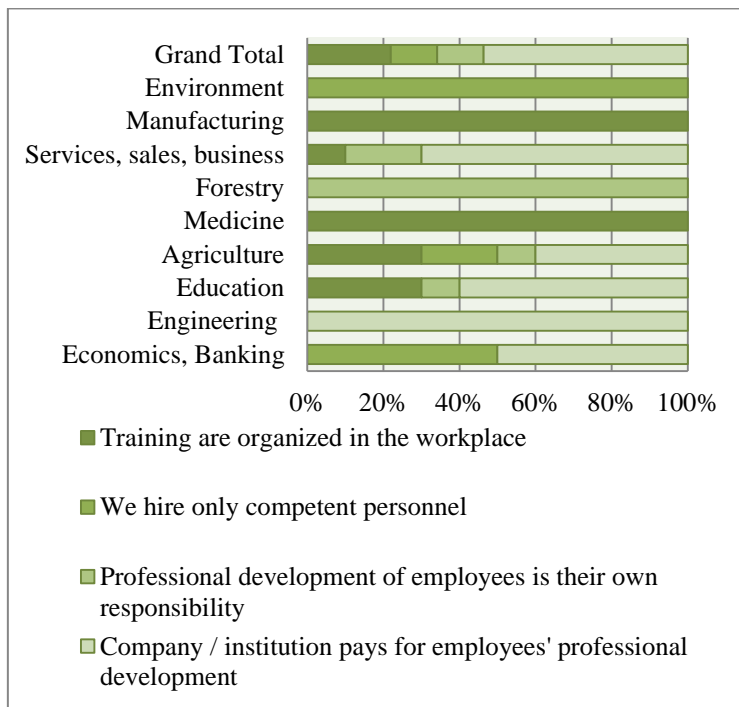
Companies / institutions managers consider that the most important is the statistical knowledge and skills to use Excel.

Managers were asked about improvement of their employees' professional competence (Figure 10) and they opinion, how could be done it.



**Figure 10. Improvement employees' professional competence by company / institution size**

In Latvia more often company / institution pays for employees' professional development, sending staff to the relevant courses, training, etc., especially in medium and large enterprises.



**Figure 11. Improvement employees' professional competence by company / institution profile**

As seen in Figure 11 forest sector employees professional development of employees is their own responsibility, in manufacturing training are organized in the workplace according to the needs of the company / institution, but in engineering - company / institution pays for employees' professional development, sending staff to the relevant courses, training, etc.

Mathematics has a high status in Latvia. Latvian people and managers appreciate potential values of mathematics: problem-solving and thinking developing means, the advantage of mathematics knowledge on the labor market etc.