

Numeracy and adaptive problem-solving skills among professionals in Finland and the Baltic countries: An analysis of PIAAC Cycle 2 data

Nordic-Baltic PIAAC Conference 2026

Mareks Niklass

University of Latvia

mareks.niklass@lu.lv

Aim and structure of the presentation

Aim

Examine cross-country differences in professionals' numeracy and adaptive problem-solving skills

Skill gaps

Compare professionals' numeracy and APS scores across Finland, Estonia, Latvia, and Lithuania

Characteristics of professionals

Describe education, employment, and contract stability in the four countries

Explanatory factors

Assess demographic and work-practice factors

Conclusions

Main findings and tentative policy proposals

How are professionals defined?

- Professionals expand, apply, and communicate advanced knowledge through research, practice, teaching, and creative work.
- They apply specialist knowledge in science, engineering, health, the social sciences, the humanities, and technology.
- They teach at different educational levels.
- They provide business, legal, social, cultural, and spiritual services.
- They create artistic works and prepare scientific papers and reports.
- They may supervise other workers.

Source:

ISPO. (2025). International Standard Classification of Occupations.
<https://www.ispoint.org/resource/international-standard-classification-of-occupations/>

Major subgroups

- 21 Science and Engineering Professionals
- 22 Health Professionals
- 23 Teaching Professionals
- 24 Business and Administration Professionals
- 25 Information and Communications Technology Professionals

Example

Requirements for general care nurses in Latvia:

Nurses must be registered in the Register of Medical Practitioners to practise legally.

Registration is valid for five years and must be renewed through re-registration.

Applicants must provide evidence of continuing professional development completed during the registration period.

Applicants must complete at least 100 academic hours of approved continuing education.

Source: Veselības inspekcija. (2026, 30. aprīlis). Ārstniecības personu un ārstniecības atbalsta personu pārreģistrācija.

<https://www.vi.gov.lv/lv/arstniecibas-personu-un-arstniecibas-atbalsta-personu-parregistracija>

Methodological notes

Data source: PIAAC public-use files (PUFs)

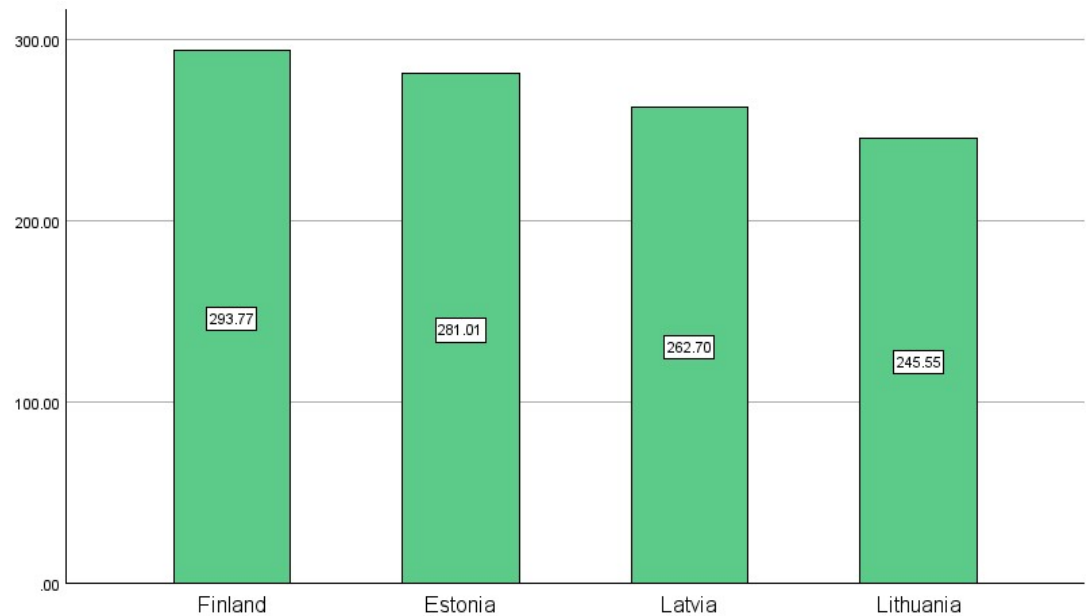
Data processing: IDB Analyzer using final full-sample weights

Finland and Estonia: registry countries

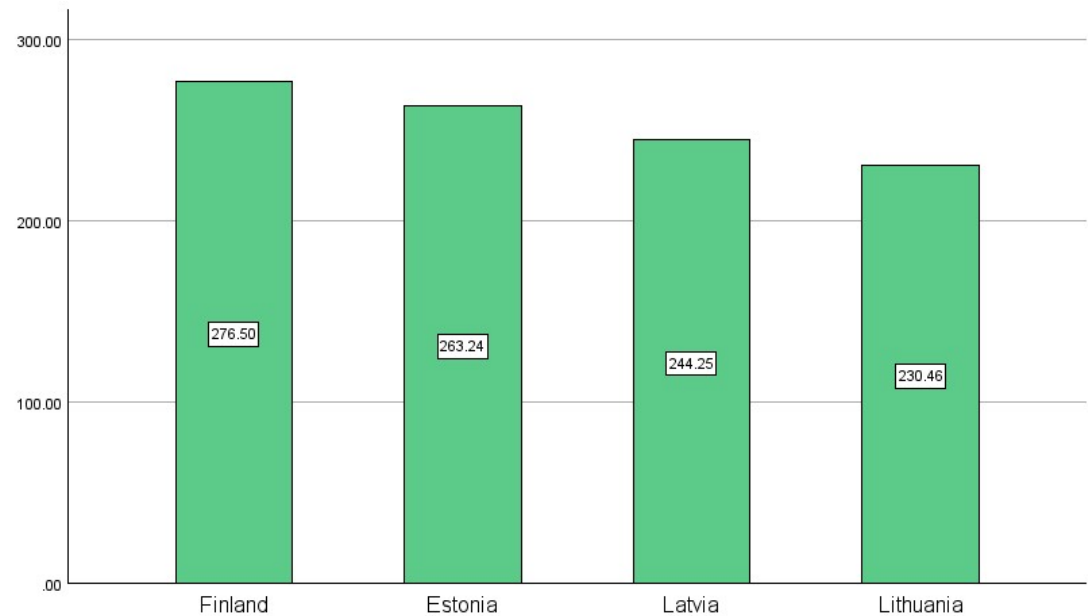
Latvia and Lithuania: screener countries

Response rates range from 28% in Latvia to 50% in Estonia

Numeracy scores for Finland and Baltic countries (mean values)



Adaptive
problem-
solving scores
in Finland and
the Baltic
countries
(mean values)



Numeracy scores for professionals

	n	Mean	SEM	SD	SE _{SD}
Estonia	1331	312.47	1.29	45.27	1.04
Finland	1008	328.21	1.62	42.37	1.44
Latvia	1125	289.34	2.38	49.86	2.20
Lithuania	981	268.41	2.16	43.42	1.36

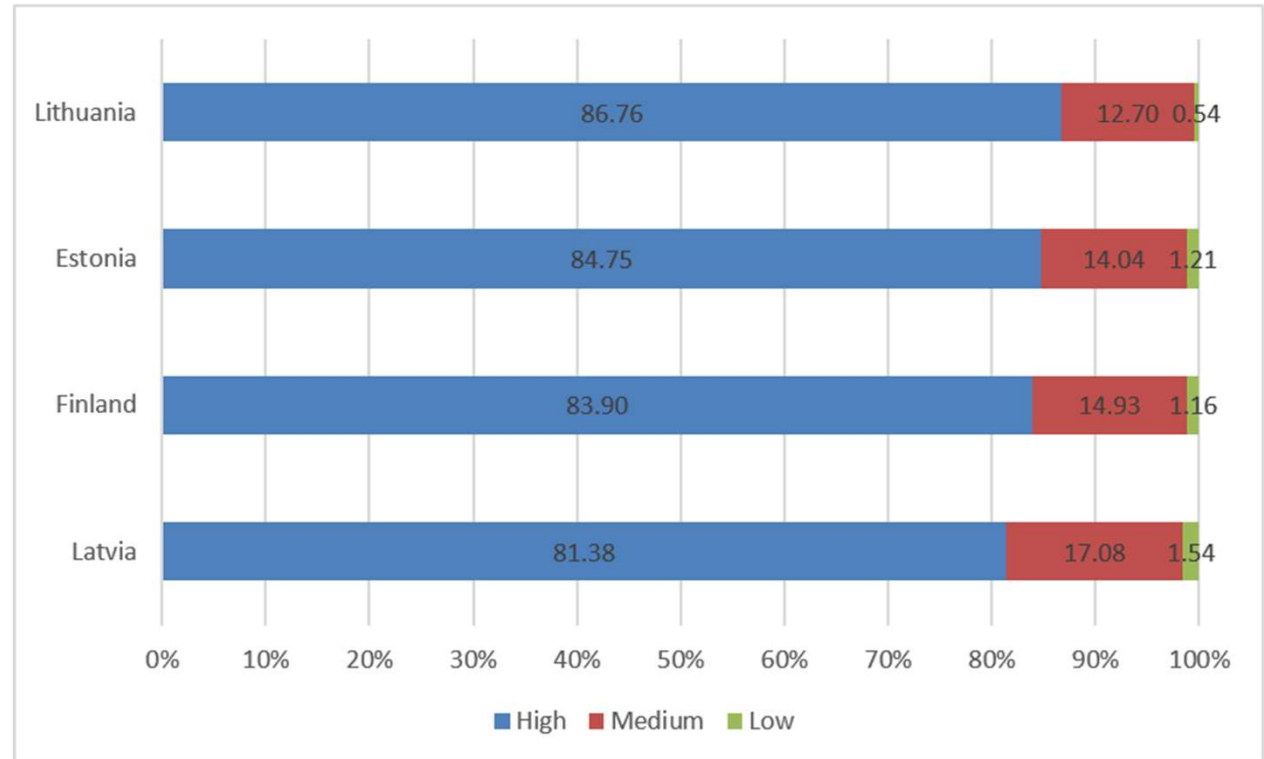
Finnish professionals tend to score higher, with less variation in their test results.

Adaptive problem- solving scores among professionals

	n	Mean	SEM	SD	SE _{SD}
Estonia	1331	288.02	1.08	38.27	0.83
Finland	1008	300.77	1.45	35.39	1.22
Latvia	1125	266.64	2.04	43.86	1.41
Lithuania	981	244.35	1.73	36.53	1.29

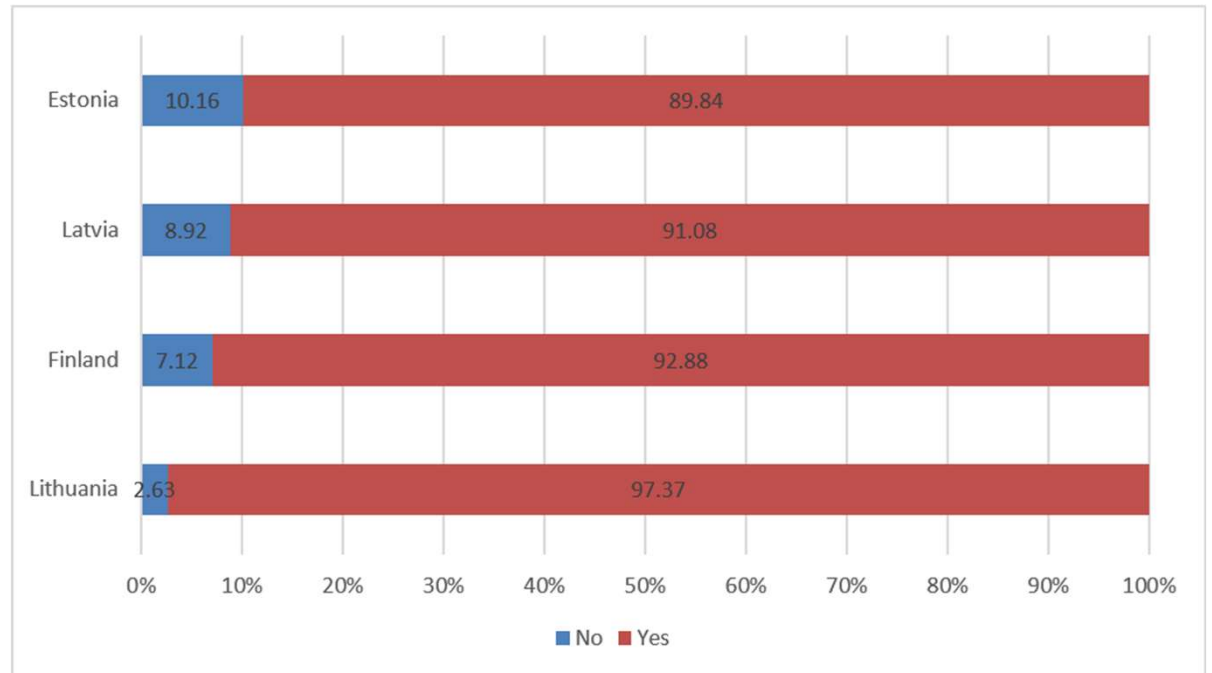
APS scores are lower than numeracy scores in all four countries. However, Finnish professionals perform substantially better in solving problems in ICT environments.

Educational attainment among professionals in Finland and the Baltic countries



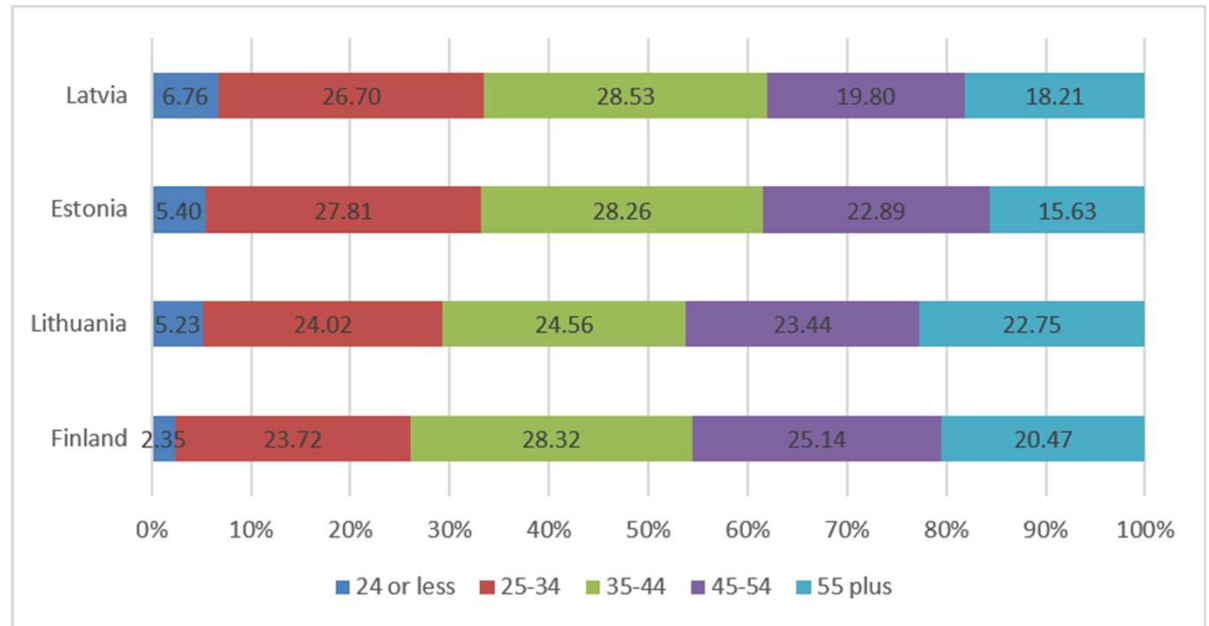
Most professionals have at least a college degree.

Professionals born in the survey country



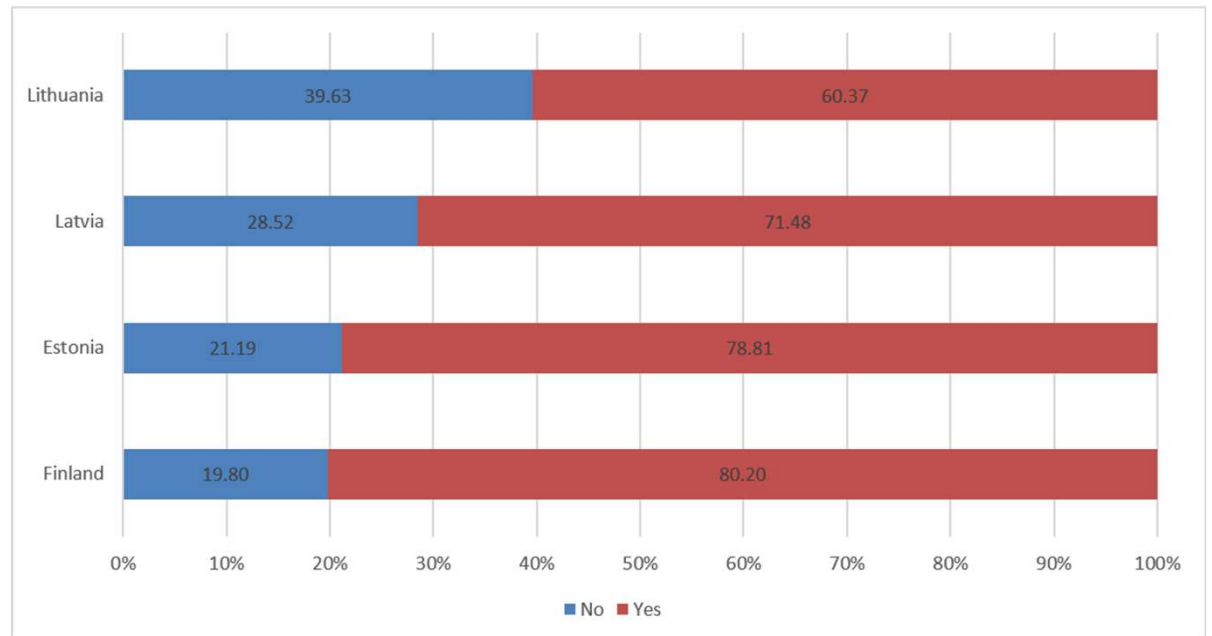
Latvia and Estonia have a notable minority of foreign-born professionals.

Age distribution of professionals



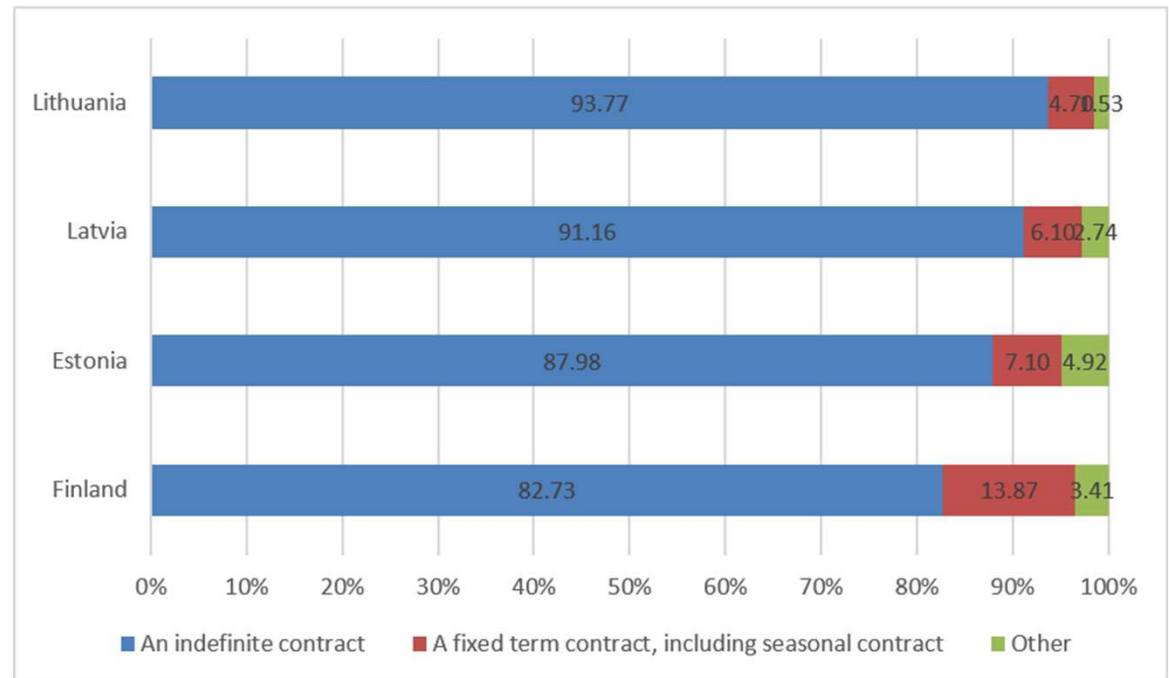
Latvian and Estonian professionals tend to be younger.

Training in the last year



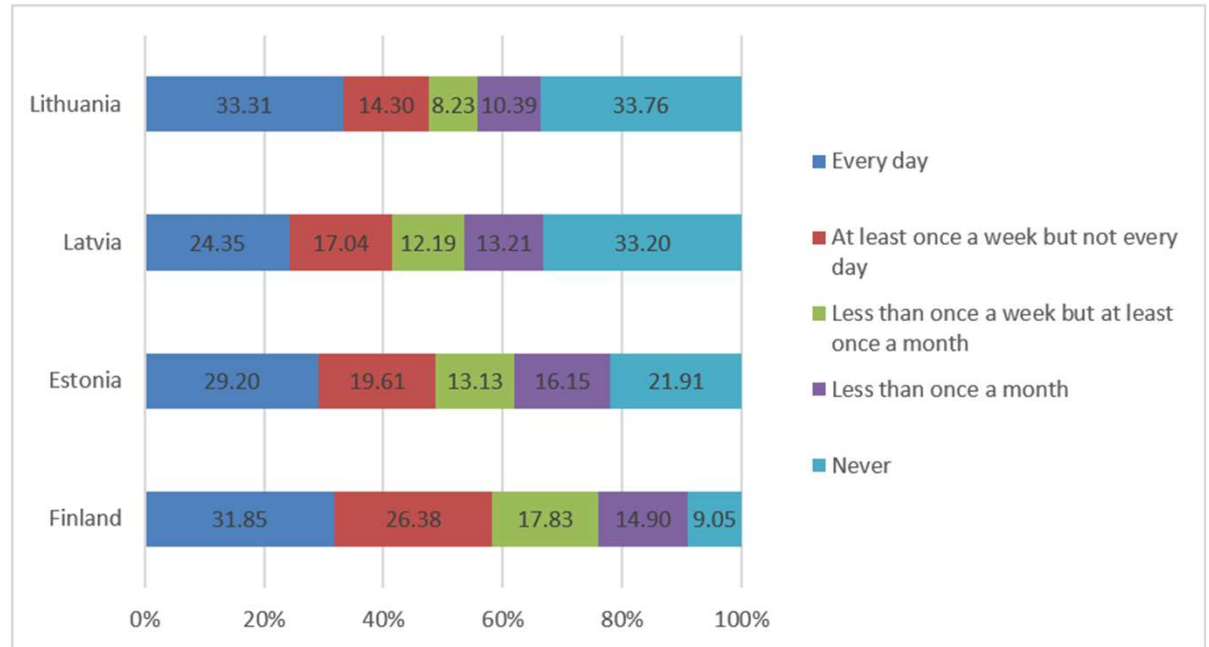
Most professionals participated in training during the previous year. However, about 40% of Lithuanian professionals did not participate in any training.

Type of contract



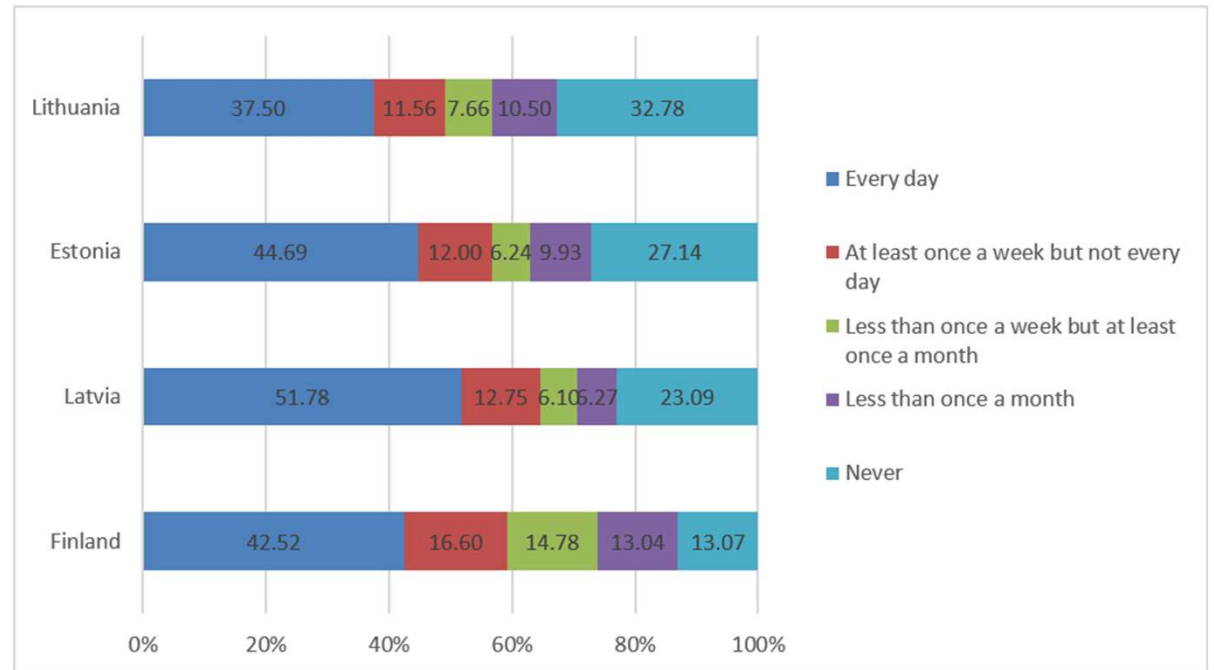
Professionals in all four countries are overwhelmingly employed on indefinite contracts.

Frequency of performing calculations at work



Finnish professionals frequently perform calculations at work.

Frequency of using specialized software at work

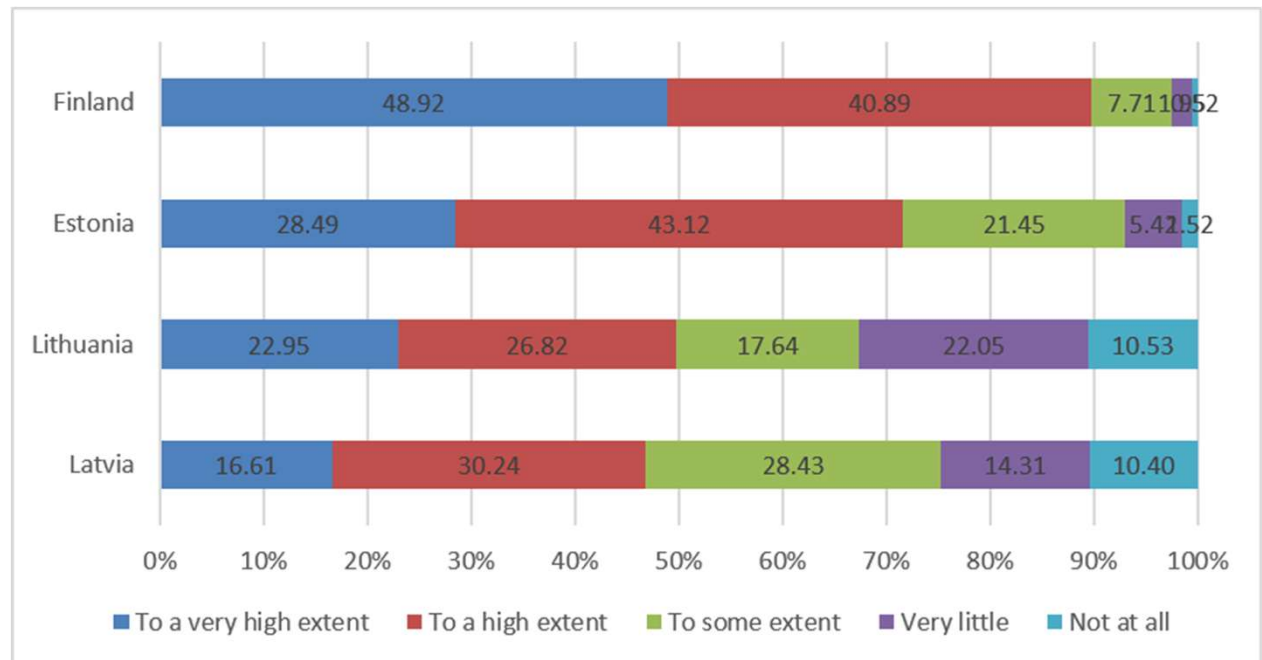


A majority of Latvian professionals use specialized software every day. However, about one-third of Lithuanian professionals do not use it at all.

Work flexibility among professionals

*To what extent can you choose or
change how you do your work?*

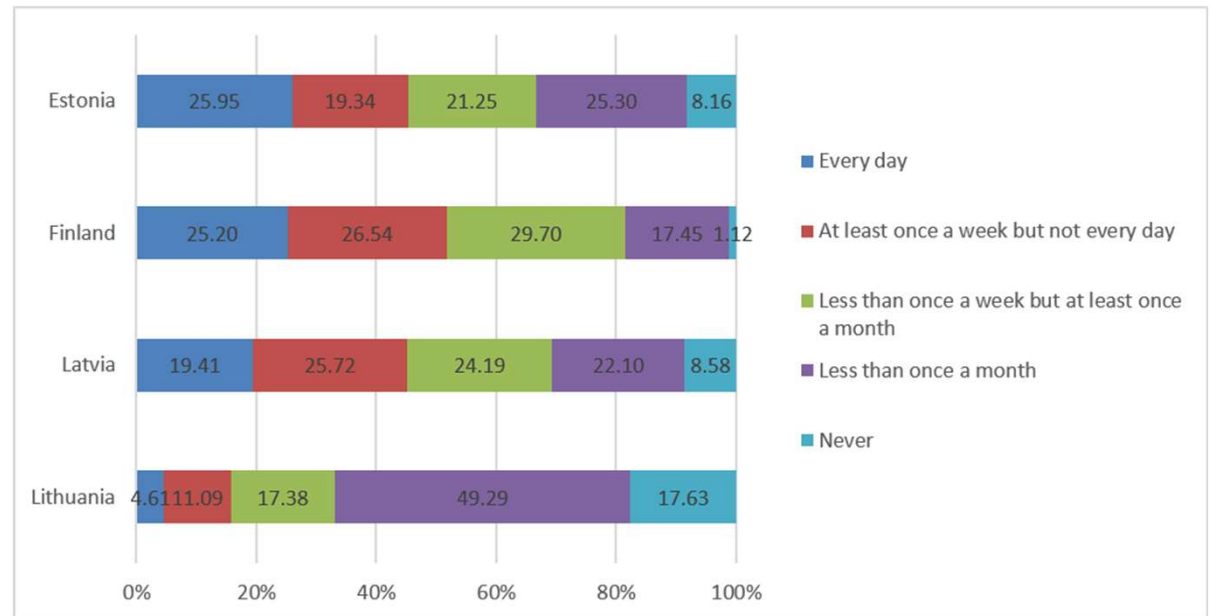
*Task discretion at work index



Finnish professionals have considerable discretion in deciding what work they do and how they do it.

Learning at work: How often do professionals keep their knowledge and skills up to date?

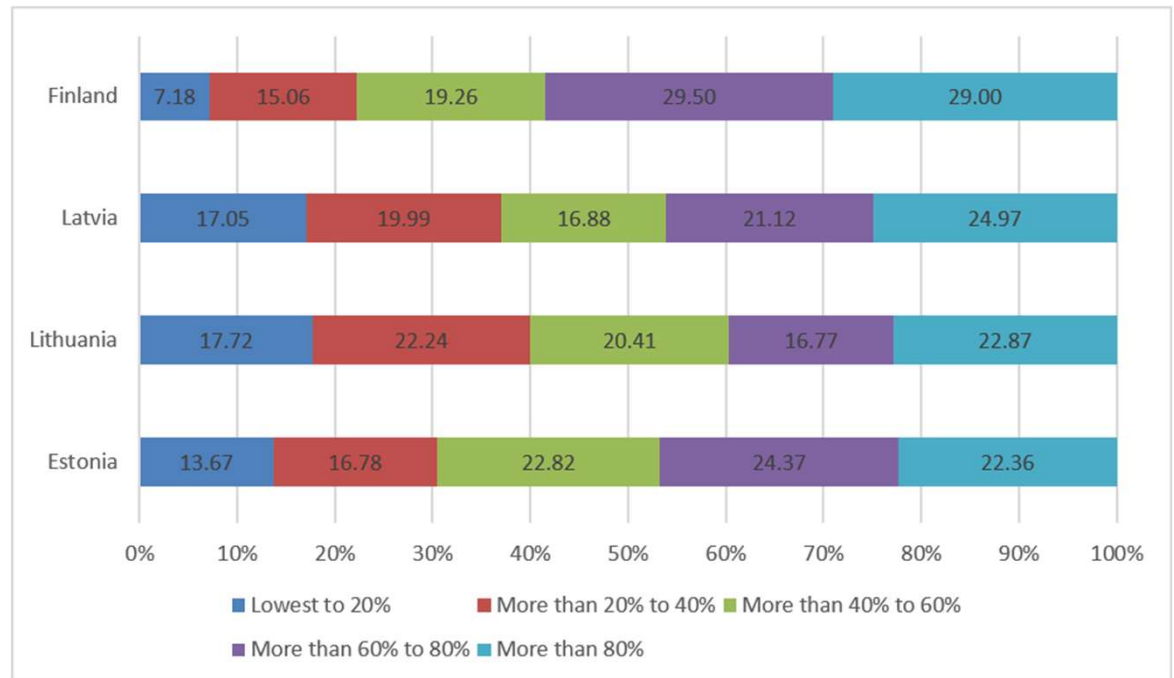
*Learning at work index



Estonian and Finnish professionals regularly keep their knowledge and skills up to date.

Numeracy-at-work index (WLE categories)

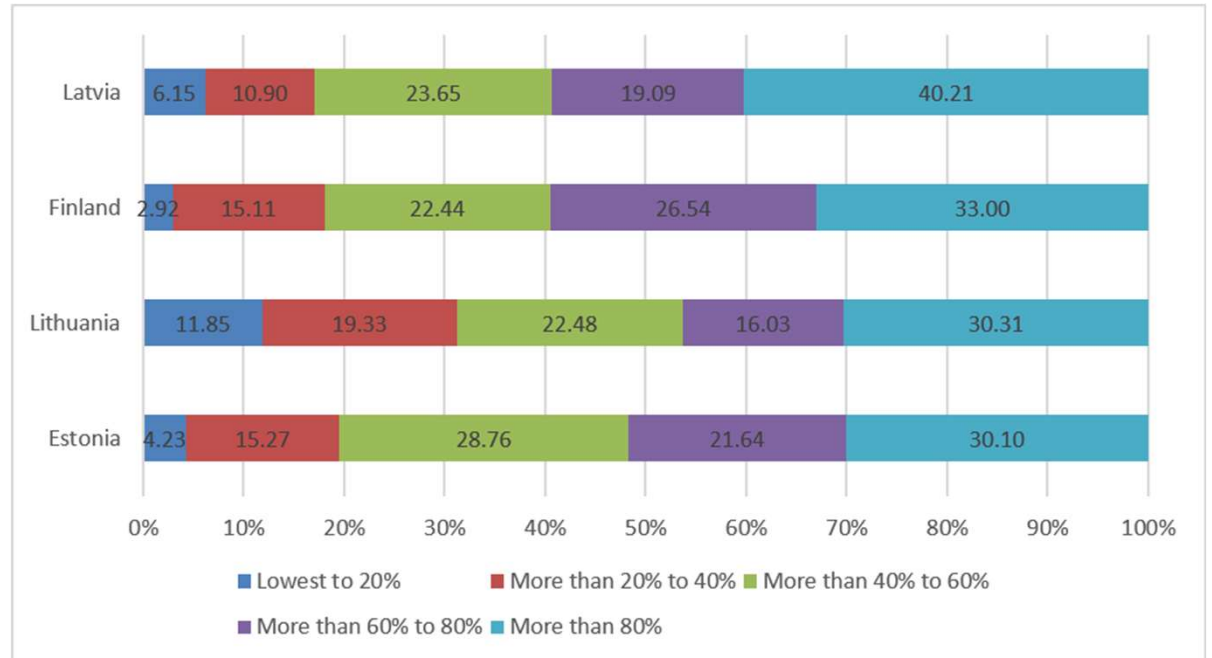
*Weighted Maximum Likelihood Estimates



Finnish professionals use their numeracy skills very frequently at work.

The constructed indices are then scaled using a standardized method, where the mean is set to 2 and the standard deviation to 1. This normalization enables meaningful cross-national comparisons and helps interpret the data within a consistent framework. Source: Central Statistics Office. (2025, August 25). Programme for the International Assessment of Adult Competencies (PIAAC) 2023: Skills use and social outcomes: Background notes.

Index of the use of ICT skills at work (WLE categories)



Latvian professionals make intensive use of ICT skills at work.

Predictors of numeracy scores among professionals

Predictor	Estonia	Finland	Latvia	Lithuania
Sociodemographic variables				
Age (10-year intervals)	-.21***	-.28***	-.14**	-.03
Education level (1 = low; 2 = medium; 3 = high)	.15***	.21***	.10*	.10*
Gender (0 = male; 1 = female)	-.23***	-.18***	-.21***	-.13**
Children in household (0 = yes; 1 = no)	.04	-.04	.09	.05
Type of contract (0 = other; 1 = fixed)	.04	.00	.05	-.01
Training in previous year (0 = yes; 1 = no)	.02	-.01	-.08*	-.10*
Born in country (0 = yes; 1 = no)	-.03	.00	.05	-.01
Economic sector (0 = private or NGO; 1 = public)	-.08*	-.09*	-.14**	-.10*
Work-related indices				
Learning-at-work index	-.08**	-.08*	-.03	.11*
Numeracy-at-work index	.24***	.13***	.12***	.13**
Task-discretion-at-work index	.03	.03	.10*	.17**
Adjusted R²	.26	.19	.22	.18
N	1,171	915	1,020	880

* p < .05. ** p < .01. *** p < .001.

Predictors of adaptive problem-solving (ICT) scores among professionals

Predictor	Estonia	Finland	Latvia	Lithuania
Sociodemographic variables				
Age (10-year intervals)	-.34***	-.38***	-.19***	-.17***
Gender (0 = male; 1 = female)	-.13***	-.10*	-.17***	-.11
Education level (1 = low; 2 = medium; 3 = high)	.14***	.15***	.06	.04
Children in household (0 = yes; 1 = no)	.07*	.01	.14**	.01
Born in country (0 = yes; 1 = no)	-.07*	-.07	.04	-.03
Type of contract (0 = other; 1 = fixed)	.03	.01	.03	-.01
Economic sector (0 = private or NGO; 1 = public)	-.07*	-.03	-.13**	-.07
Training in previous year (0 = yes; 1 = no)	-.01	-.07	-.06	-.06
Work-related indices				
ICT skills at work index	.14***	.11**	.10*	.07
Learning-at-work index	-.07*	-.11**	-.08	.10*
Task-discretion-at-work index	.00	.05	.08	.15**
Adjusted R²	.25	.22	.25	.18
N	1,164	913	1,002	826

* $p < .05$. ** $p < .01$. *** $p < .001$.

Conclusions and policy proposals

- Finnish professionals demonstrate the highest numeracy and adaptive problem-solving skills.
- Educational attainment is high across all four countries.
- Most professionals are employed on permanent contracts.
- Participation in training varies across countries.
- Finnish professionals report more frequent use of numeracy and ICT skills at work.
- Female and older professionals tend to have lower numeracy and APS scores.
- Frequent engagement in numeracy-related tasks at work is one of the strongest predictors of numeracy performance.
- Policies fostering continuous learning and meaningful skill use at work may help sustain high proficiency levels.

Variables to measure ICT use at work

Additional slides illustrating how the indices are constructed

^F2_D05b

	Never <01>	Less than once a month <02>	Less than once a week but at least once a month <03>	At least once a week but not every day <04>	Every day <05>	DK	RF
To communicate with others (e.g. via emails, social networking sites, or internet calls). Exclude normal phone calls using a mobile phone.	F2_Q05a01 ○	F2_Q05a02 ○	F2_Q05a03 ○	F2_Q05a04 ○	F2_Q05a05 ○	F2_Q05aDK ○	F2_Q05aRF ○
To access information (e.g. use a search engine, find information, or read documents).	F2_Q05c01 ○	F2_Q05c02 ○	F2_Q05c03 ○	F2_Q05c04 ○	F2_Q05c05 ○	F2_Q05cDK ○	F2_Q05cRF ○
To create or edit electronic documents, spreadsheets or presentations (using Microsoft Word, Excel, PowerPoint, or similar software).	F2_Q05d01 ○	F2_Q05d02 ○	F2_Q05d03 ○	F2_Q05d04 ○	F2_Q05d05 ○	F2_Q05dDK ○	F2_Q05dRF ○
To use specialized software (e.g. for computer-aided design, the processing or analysis of data, sound and images, or quality control).	F2_Q05e01 ○	F2_Q05e02 ○	F2_Q05e03 ○	F2_Q05e04 ○	F2_Q05e05 ○	F2_Q05eDK ○	F2_Q05eRF ○
To use a programming language to program software (e.g. applications) or websites.	F2_Q05f01 ○	F2_Q05f02 ○	F2_Q05f03 ○	F2_Q05f04 ○	F2_Q05f05 ○	F2_Q05fDK ○	F2_Q05fRF ○

Variables used to measure numeracy skill use at work

	Never <01>	Less than once a month <02>	Less than once a week but at least once a month <03>	At least once a week but not every day <04>	Every day <05>	DK	RF
undertake calculations, such as calculating prices, costs or quantities?	F2_Q03a01 ☐	F2_Q03a02 ☐	F2_Q03a03 ☐	F2_Q03a04 ☐	F2_Q03a05 ☐	F2_Q03aDK ☐	F2_Q03aRF ☐
use maps, plans or GPS for finding directions and locations?	F2_Q03b01 ☐	F2_Q03b02 ☐	F2_Q03b03 ☐	F2_Q03b04 ☐	F2_Q03b05 ☐	F2_Q03bDK ☐	F2_Q03bRF ☐
undertake measurements such as lengths, weights, temperatures, dosages, areas or volumes?	F2_Q03c01 ☐	F2_Q03c02 ☐	F2_Q03c03 ☐	F2_Q03c04 ☐	F2_Q03c05 ☐	F2_Q03cDK ☐	F2_Q03cRF ☐
read and prepare charts, graphs or tables?	F2_Q03d01 ☐	F2_Q03d02 ☐	F2_Q03d03 ☐	F2_Q03d04 ☐	F2_Q03d05 ☐	F2_Q03dDK ☐	F2_Q03dRF ☐
use advanced mathematics or statistics? <i>Examples of advanced mathematics or statistics are calculus, complex algebra, trigonometry or use of regression techniques.</i>	F2_Q03e01 ☐	F2_Q03e02 ☐	F2_Q03e03 ☐	F2_Q03e04 ☐	F2_Q03e05 ☐	F2_Q03eDK ☐	F2_Q03eRF ☐