Measuring Digital Self-Efficacy in International Large-Scale Assessments: An International Comparison Between ICILS and PISA

Daniel Miranda, Ismael Aguayo, Juan Carlos Castillo, Nicolas Tobar y Tomás Urzúa

University of Chile y Millennium Nucleus on Digital Inequalities and Opportunities.

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NUDOS

La digitalización abre oportunidades y presenta desafíos

evidencia + diálogo = mejores políticas

More information: nudos.cl

INVALSI

nudos

núcleo milenio de
desigualdades y **oportunidades digitales**

Líneas de investigación:

Ámbito social

Los antecedentes y consecuencias de las tecnologías digitales en la formación de redes sociales, de apoyo y ciudadanía digital en distintos sistemas sociales como escuelas, comunidades rurales u organizaciones de migrantes.

Ámbito político

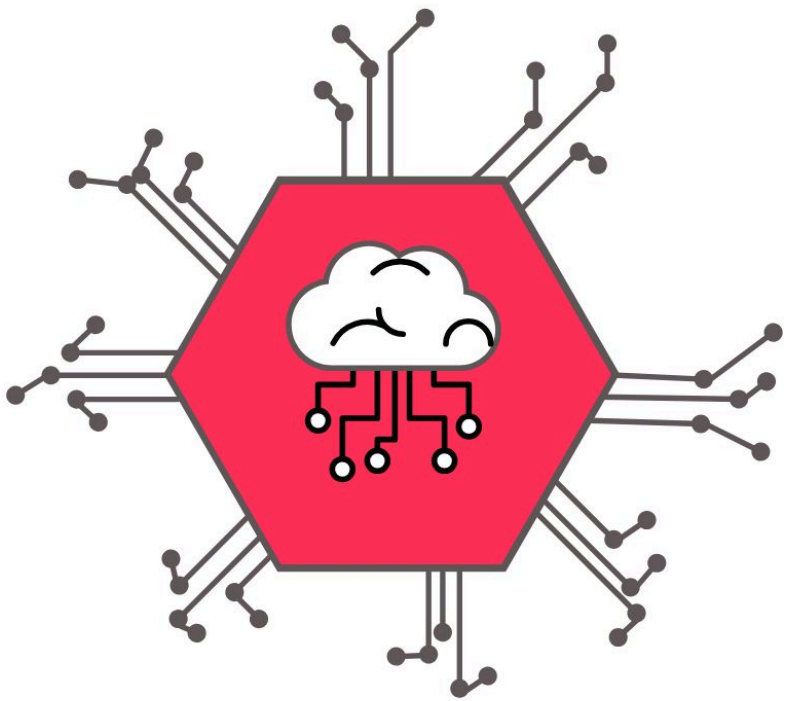
Las motivaciones, actitudes y comportamientos de los ciudadanos en su relación con el gobierno, las instituciones políticas y el sistema democrático en general.

Ámbito informativo

La producción y difusión de conocimientos relativos a los asuntos públicos, la información de actualidad y la ciencia.

Starting point

The digital dimension

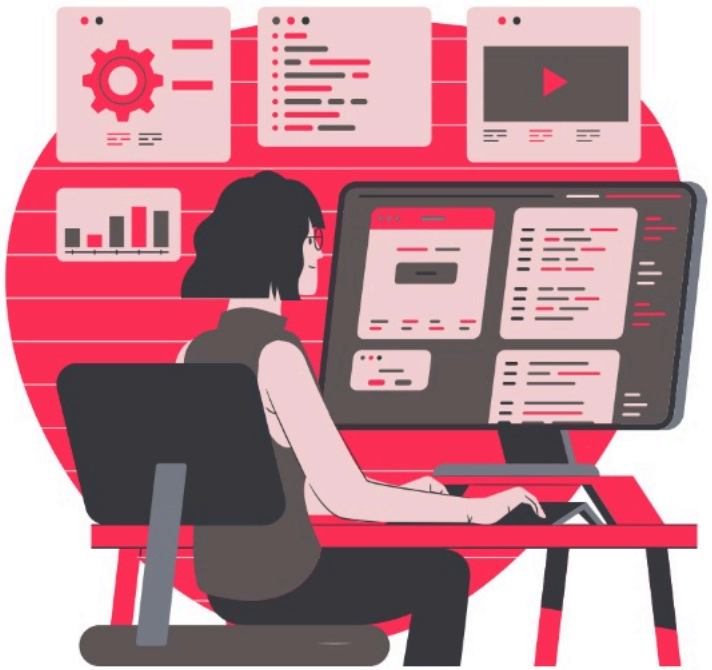


Multidimensional phenomenon

Digital divides

Digital self-efficacy and gender

"… *expectations about one's capabilities to learn and accomplish tasks in digital technologies and digital environments*, is one of the principal components to promote the formation of digital competences" (Ulffert-Blank & Schmidt, 2022).



Bidimensional digital self-efficacy?

- A changing concept: Computacional -> Internet -> TICs -> Digital (DigComp)
- In the last years it has been proposed a distinction between two types of self-efficacy: general and specialized.
- Cross-country studies operationalize digital self-efficacy in a one-dimensional and two-dimensional manner

Country differences?

Structural conditions

Digital diversity

It is possible to identify two dimensions on PISA Digital Self-efficacy measurement?

Is the bidimensional model of Digital Self-efficacy equivalent by gender and across countries?

Which gender differences exist on Digital Self-efficacy across countries?

Data

- Programme for International Student Assessment 2022 (n≈183.000).
- International Computer and Information Literacy Study 2023 (n≈90.000).
- 22 shared countries.

Baterías de Autoeficacia digital

PISA: ¿To what extent *are you able to do* the following tasks when using ?

ICILS: How well you can do…?

General Self_Efficacy

PISA: 8 ítems, ICILS: 10 ítems

- Search for and evaluate information online.
- Share content online.
- Write or edit text.
- Create or edit images.

Specialized Self-Efficacy

PISA: 6 ítems, ICILS: 3 ítems

- Website development.
- Programming.
- Computational reasoning.

Methods

- Conformatory Factor Analizes and re-specification
- Stability among countries and gender (Multigroup CFA)
- Country and gender differences

Results

1. Measurement model
2. Invariance testing
3. Mean distributions across countries
4. Gender differences across countries

Original model: pooled

PISA 2022

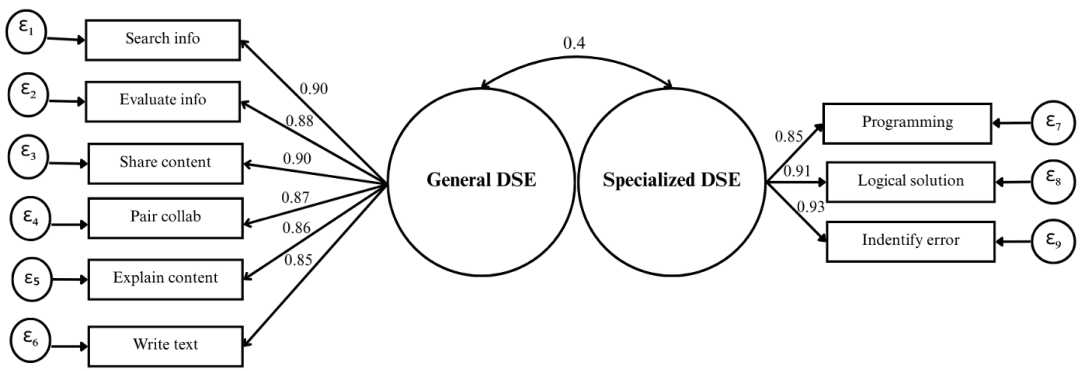
CFI = 0.98; TLI = 0.97; RMSEA = 0.15, exceeding the maximum acceptable RMSEA threshold of 0.08

ICILS 2023

CFI = 0.97; TLI = 0.96; RMSEA = 0.10, exceeding the maximum acceptable RMSEA threshold of 0.08

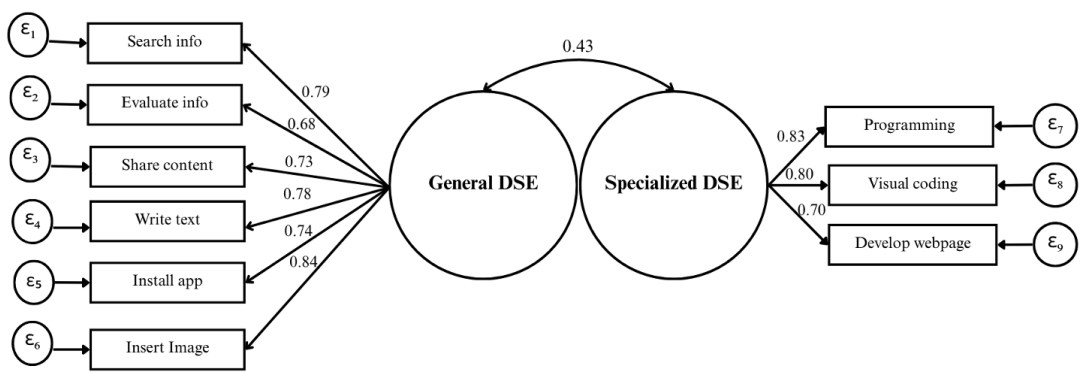
Adjusted Modelo: pooled

PISA 2022



$$CFI = 0.997, TLI = 0.996, RMSEA = 0.067, \chi^2 = 17757.739, df$$

ICILS 2023



$$CFI = 0.986, TLI = 0.980, RMSEA = 0.079, \chi^2 = 13667.347, df = 2$$

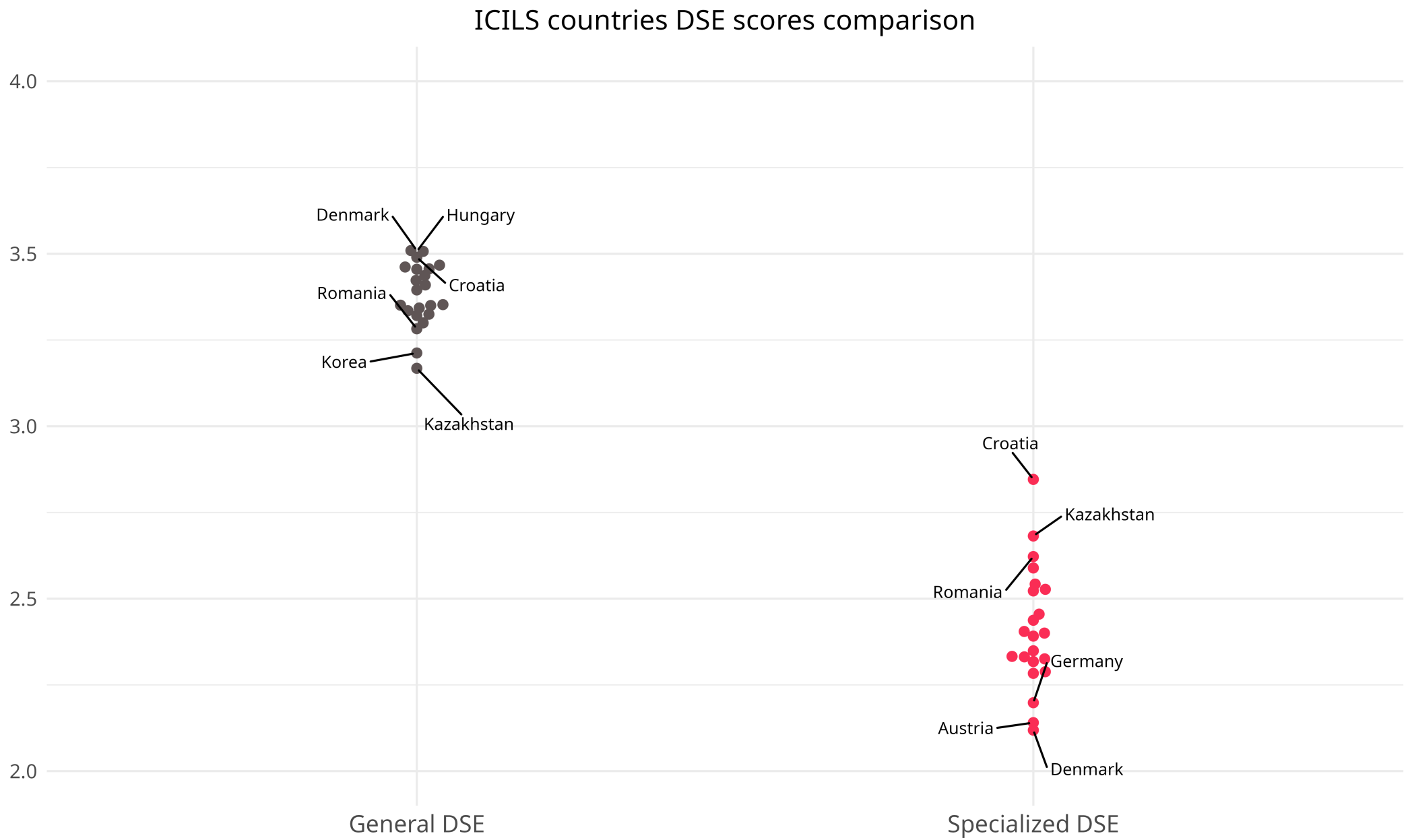
AFC and Invariance

Across countries

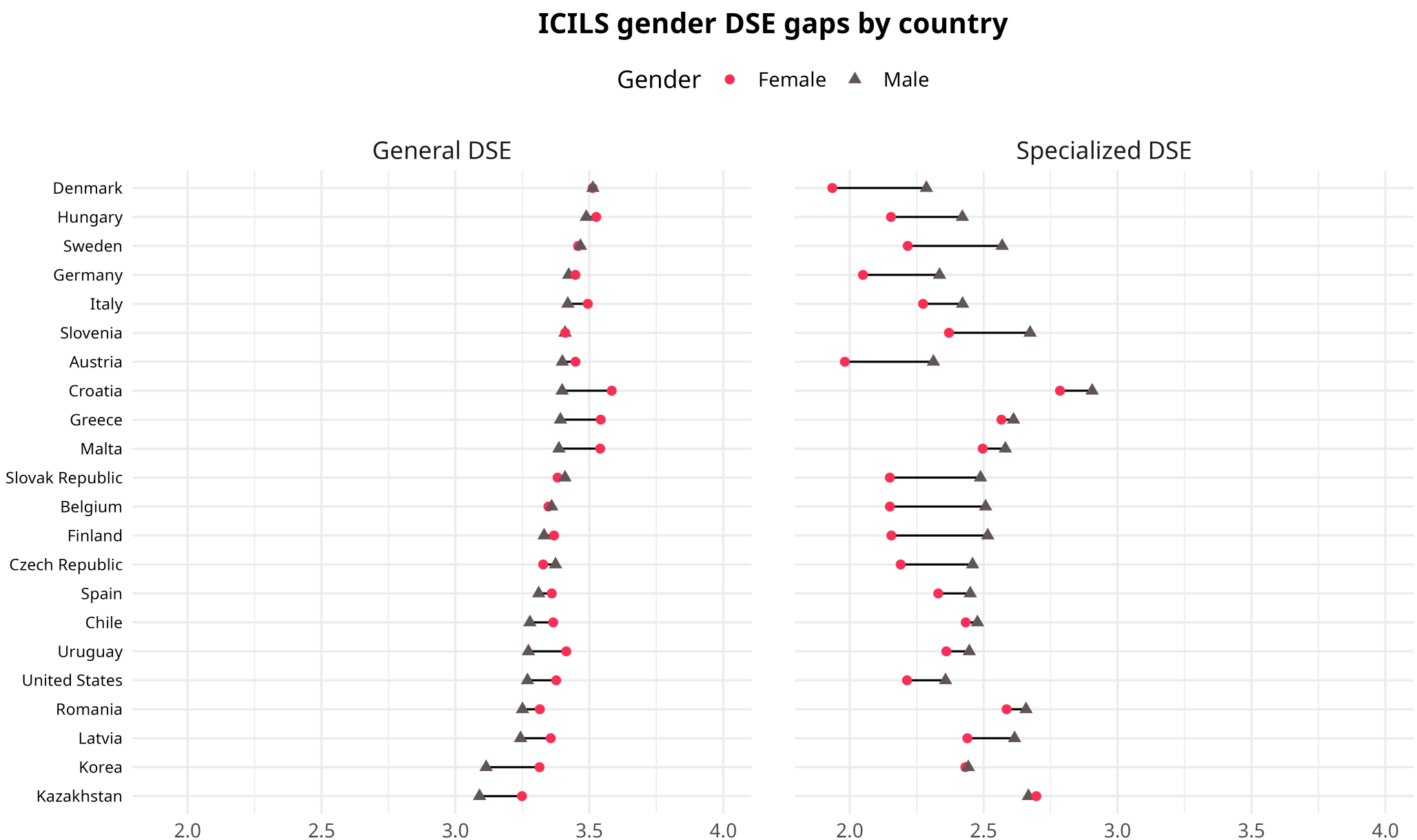
Study	Model	χ^2	df	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	ΔRMSEA	p	Decision
PISA	1. Configural	14,965	572	0.998	0.997	0.067	0.045						
PISA	2. Metric	16,696	719	0.998	0.998	0.063	0.046	1,731	147	< -0.004	< 0.05	< 0.01	Yes
PISA	3. Scalar	19,817	1,055	0.998	0.998	0.056	0.045	3,121	336	< -0.004	< 0.01	< 0.01	Yes
ICILS	1. Configural	15,273	572	0.987	0.982	0.086	0.066						
ICILS	2. Metric	17,690	719	0.985	0.983	0.082	0.069	2,417	147	< -0.004	< 0.05	< 0.01	Yes
ICILS	3. Scalar	26,254	1,055	0.977	0.983	0.083	0.067	8,564	336	-0.007	< 0.01	< 0.01	**No**

By gender

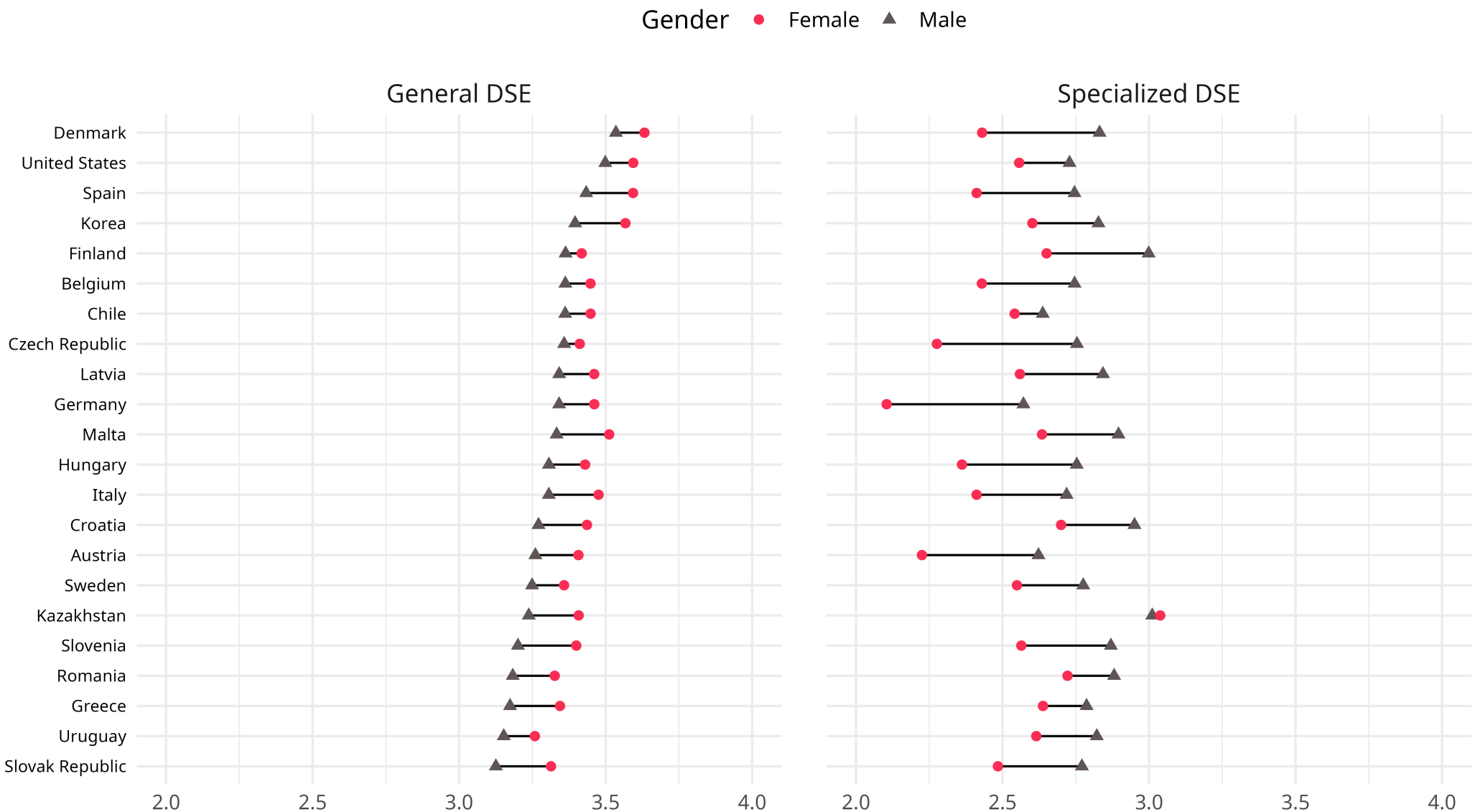
Study	Model	χ^2	df	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	ΔRMSEA	p	Decision
PISA	1. Configural	12,233	52	0.998	0.998	0.061	0.041						
PISA	2. Metric	12,801	59	0.998	0.998	0.059	0.041	568	7	< -0.004	< 0.05	< 0.01	Yes
PISA	3. Scalar	13,225	75	0.998	0.998	0.053	0.041	424	16	< -0.004	< 0.01	< 0.01	Yes
ICILS	1. Configural	12,002	52	0.987	0.982	0.078	0.059						
ICILS	2. Metric	12,739	59	0.986	0.984	0.075	0.060	737	7	< -0.004	< 0.05	< 0.01	Yes
ICILS	3. Scalar	13,741	75	0.985	0.986	0.069	0.059	1,003	16	< -0.004	< 0.01	< 0.01	Yes


ICILS countries DSE scores comparison
4.0
3.5
3.0
2.5
2.0
Denmark
Hungary
Croatia
Romania
Korea
Kazakhstan
Croatia
Kazakhstan
Romania
Germany
Austria
Denmark
General DSE
Specialized DSE

PISA countries DSE scores comparison


ICILS gender DSE gaps by country
Gender
Female
Male
General DSE
Specialized DSE
Denmark
Hungary
Sweden
Germany
Italy
Slovenia
Austria
Croatia
Greece
Malta
Slovak Republic
Belgium
Finland
Czech Republic
Spain
Chile
Uruguay
United States
Romania
Latvia
Korea
Kazakhstan
2.0
2.5
3.0
3.5
4.0

PISA gender DSE gaps by country



Conclusion

- Is it possible to identify two dimensions in PISA and ICILS?
  - Yes, but with fewer items than those proposed by both studies.
- Is the two-dimensional model of digital self-efficacy equivalent across genders and countries?
  - In PISA, yes; in ICILS, only at the metric level.
- What gender differences exist in digital self-efficacy across countries?
  - Women have an advantage in general self-efficacy, and men in specialized self-efficacy.

Discussion

- The evolution of measurements: ICTSE vs. DSE and the DigComp framework
- Are there two or more dimensions?
- The counterintuitive relationship between countries' development and the gender gap

Next steps

- What macro-level factors can explain the differences in digital self-efficacy and the gender gap?
- What is happening in developed/developing countries?

Thank you!

- **Sitio web NUDOS:** www.nudos.cl
- **Repository Github of the proyect:** https://github.com/milenio-nudos/picils_dse

Anex

Eliminated items

- Multimedia manipulation
- Searching for information sources
- Privacy settings
- App selection.