

APEC-TSUKUBA International Conference XVI

Online Workshops for Lesson Study 2.0: Artificial Intelligence (AI)
and Data Science for Education in APEC Economies

10.45-11:10hrs

Scaffolding Maths and socio-emotional preschool teaching using Lesson Study for a Web course (Case 1)

Keynote 3
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Childhood educators preparation

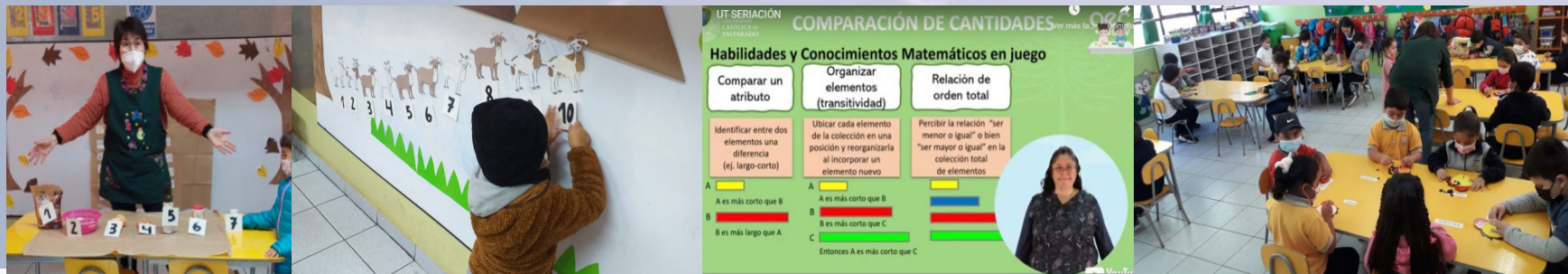
I will talk about a project that addresses to the **weak preparation of early childhood educators in Chile to promote the development of children's mathematical thinking in harmony with socio-emotional skills.**

Scaffolding using a Web based Course

The solution is the provision of a **scaffolding system with technology, monitoring and peer support** for the development of the **capacities of early childhood educators** that impacts the opportunities to develop mathematical thinking and social and emotional skills in preschoolers.

The Objective of the project to provide an effective b-learning Web based Course

- **Project aims:** To develop and to validate a Scaffolding System in the classroom that provides knowledge and practical experiences to Early Childhood Educators
 - so that they can effectively manage the teaching of mathematics, favoring the development of mathematical thinking along with social and emotional skills in children



The innovation (R+D project)

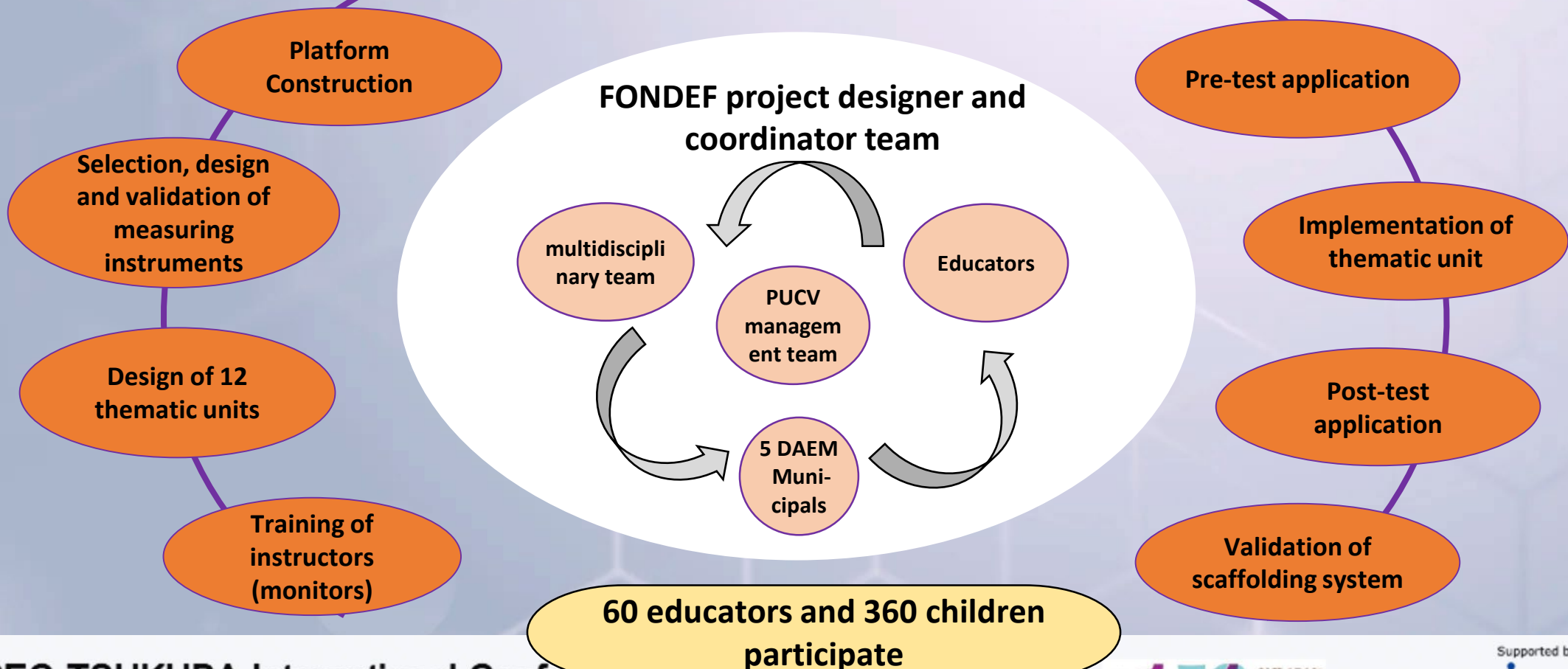
- **Scaffolding operates** in the context of **educators** carrying out their work, increasing involvement and the likelihood of **effectiveness** on educators development **and impact** on child development.

Design and validation of a scaffolding system in mathematics for early childhood educators in action

Project stages

Year 1

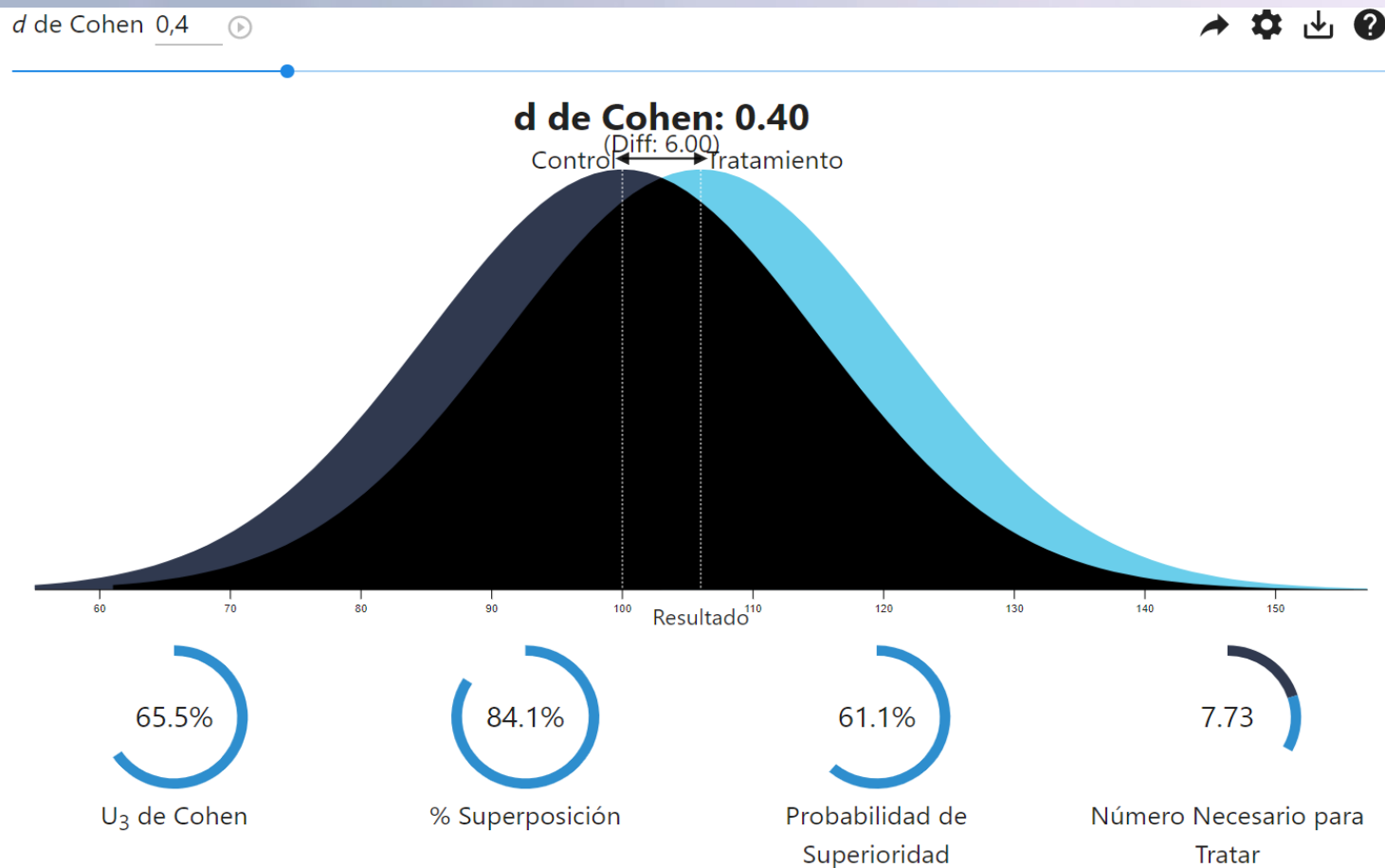
Year 2



Project method

- **The method was to develop the system in year 1**, that is, the platform (Creating content using Lesson Study Groups) , the monitoring system and the community of practice model.
- For **year 2, an experimental design** was implemented with 30 educators in the control group, in which they underwent the scaffolding process between April and October, with pre-post scaffolding measurements in the 3 variables.
 - **Impact measure:** The educators selected 6 preschoolers from their course groups according to the indication "two low level, two medium level and two high level, in relation to mathematical ability or according to age". Pre and post-tests were applied for Maths abilities and for socio-emotional dimension

Testing hypotheses model



The results of 5 evaluations are analyzed:

- Three evaluations to the educators:
 - A test and guideline to observe **CK+PCK**,
 - A guideline for observing PAD
- Two assessments for infants:
 - TADI and
 - TEMA-3

Criterion: Cohen's d coefficient is expected to be > 0.4

Testing hypotheses

- The **three hypotheses** about the **development of the educators** were verified, giving evidence of the effectiveness of the scaffolding. In addition,
- the **hypothesis about the impact on the socio-emotionality** of children was verified,
- and the impact on the development of mathematical thinking was also verified for a sub-sample.
 - The challenge remains to reinforce the scaffolding to care for children with special needs in the context of inclusion.

1 Validation of effectiveness in educators

Practical CK+PCK

Results in the development of the practical CC+CPC of 28 educators from the experimental group and 23 from the control group

	Post	Pre	Dif pre post	Coef
Prom exp	80,29	64,25	16,04	1,06
Prom control	66,61	65,04	1,57	
Desv estándar	13,71			

Use in a combined way the representations of the mathematical notion (concrete and/or pictorial and/or symbolic)

Instrument: Guideline validated with 23 questions on the knowledge of mathematics and its didactics put into play.

Measurement: Observation of implementation of a class/teaching-learning experience.

Conclusion: Cohen's D coefficient is 1.06, greater than 0.4. So the goal was achieved.

2 Validation of effectiveness in educators

Theoretical CK+PCK

Resultados en el desarrollo del **CC+CPC teórico** de 18 educadoras del grupo experimental y 16 del grupo control

	Post	Pre	Dif pre post	Coef
Prom exp	9,00	8,33	0,67	0,52
Prom control	7,56	8,00	-0,44	
Desv estándar	2,14			

An Educator begins the teaching of numbers using cards with numerals and quantity. Do you think this initiation is the right one?

Instrumento: Prueba de 12 o 14 preguntas validada sobre el conocimiento de la matemática y su didáctica para enseñar lógica y números en preescolar.

Medición: Prueba en línea respondida por Google Form.

Conclusión: el coeficiente D de Cohen es 0,52, mayor que 0,4. Por lo que se logró la meta

4 Validation of impact on toddler development

TEMA-3

Validación Impacto en TEMA.-3

PROMEDIO	EXP.	CONT.	NT1 EXP.	NT1 CONT.	NT2 EXP.	NT2 CONT.
PRE	11,734	13,433	8,017	8,385	14,106	17,294
POST	20,868	19,917	16,548	15,476	23,629	24,151
PORCENTAJE DE AVANCE	78%	48%	106%	85%	68%	40%
TAMAÑO DEL EFECTO (D de Cohen)	1,0544	0,787	1,185	1,11	1,187	0,800

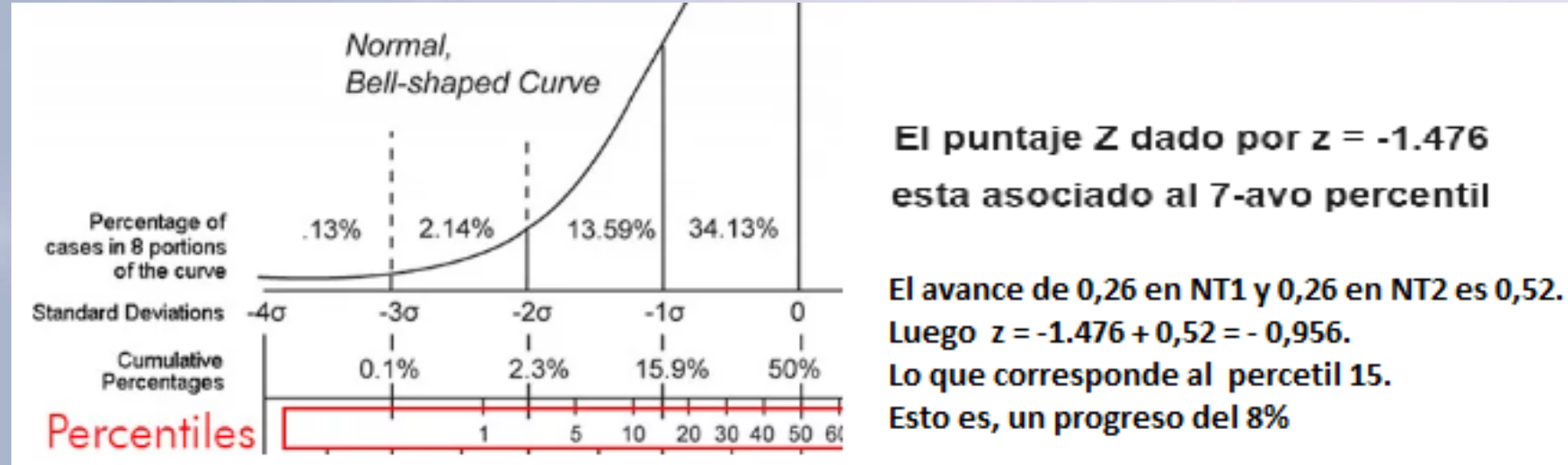
Although in both groups the reported progress is significant, with a large effect size, in the experimental group the effect size is always greater than in the control group. For the average of the overall direct score, the experimental group shows an advance of approximately 1 standard deviation from the initial score. For the average of the direct score NT1 and NT2, the experimental group shows an equivalent effect size of 1.2 standard deviations from the initial score.

In this study, the hypothesis was formulated that the Scaffolding System would lead a group of NT2 infants to exceed the 33 points achieved in Spain with the ABN program. In NT2 the score of 23.6 points was reached, which is lower than the average of 25.03 in Spain. This study achieved 33 points with the sub-sample formed by the toddlers whose scores exceed the median, that is, taking 3 toddlers from each classroom.

The ABN program was carried out exempting infants with special needs. Our project complied with the integration policy in Chile and included in the study children with special needs, even permanent ones. To achieve an average of 33 points with all Chilean toddlers, they should answer correctly on average up to item 33 of the test. However, from item 28 on, the contents of the items refer to the objectives of the Chilean First Basic study program.

Conclusions

- 4 hypotheses were achieved
- The advance referred to the fifth hypothesis is valuable



Thank you for your attention

- Thanks to ANID support, FONDEF ID20i10070
- April 14th, 2023
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