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Teachers' perceptions of the STEM educational model

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ETEN
European Teacher Education Network

1 State of art

State of art

STEM

- It is an **educational model** where the boundaries between the four disciplines are blurred (Pitt, 2018).

- Students' interest in and motivation for **STEM** subjects and careers is low.

STEM education

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Challenges (National Research Council, 2011)

01

To **increase the number of students** pursuing higher education and careers in **STEM fields**.

02

To **broaden and extend participation in STEM** fields.

03

To **ensure STEM literacy** for all students.

MORE STUDENTS

STEM EXTENSION

STEM LITERACY

Why is it so important?

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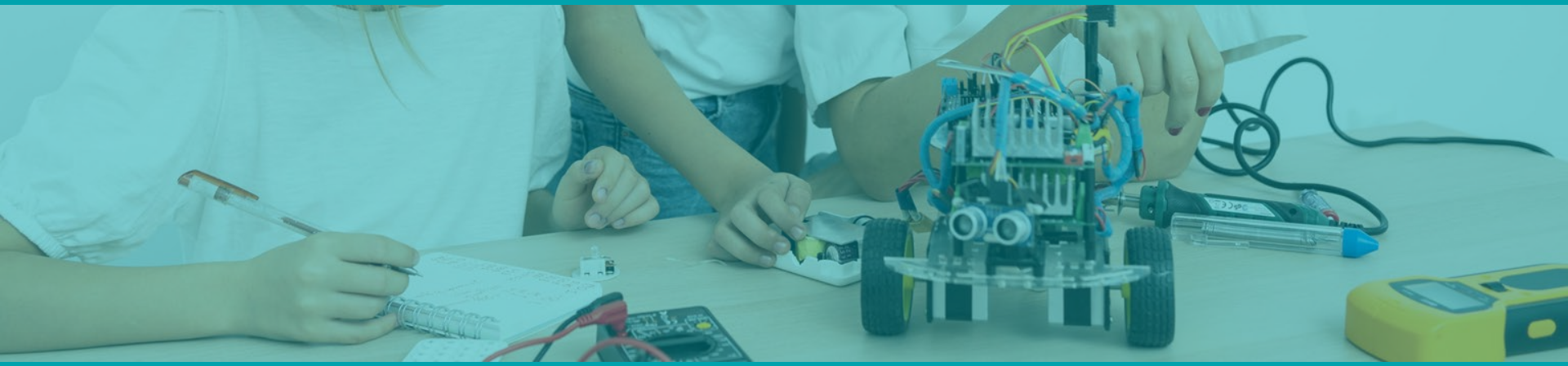
According to Couso (2017) to be STEM literate is to

> "… be able to identify and apply, in an integrated or less integrated way, essential knowledge about science, engineering and mathematics, in order to understand, decide and/or act on a complex problems and achieve creative and innovative solutions, taking advantage of the personal and technological synergies available, and in a critical, reflective and courageous manner".



Why is it so important?

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- The labor **market** needs **STEM workers**.
- It is necessary to awaken **professional vocations in STEM** areas (Eusko Jaurlaritza, 2018).

MARKET NEEDS

STEM WORKERS

Why is it so important?
Leaky pipeline

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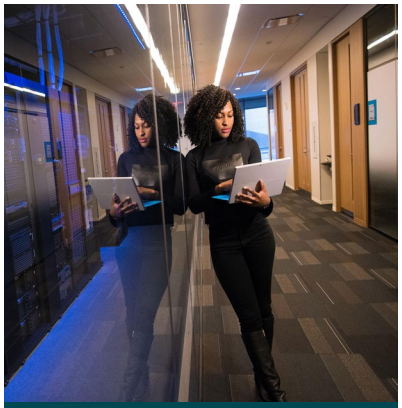
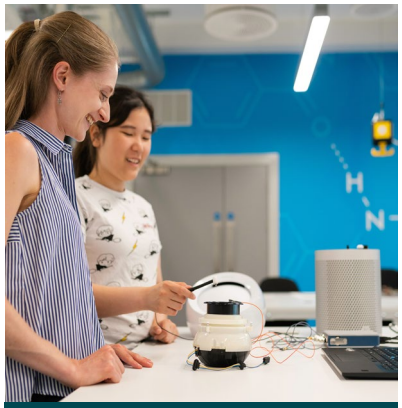
- The number of **women pursuing STEM** studies and careers is **far lower than that of men** (EUSTAT, 2019).

- **4 factors** influence women's performance in **STEM** education (UNESCO, 2017).

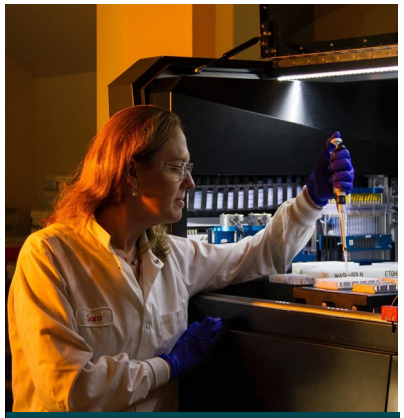


PERSONAL FACTOR



FAMILY AND PEER FACTOR

SCHOOL FACTOR



SOCIAL FACTOR

Interest loss in STEM

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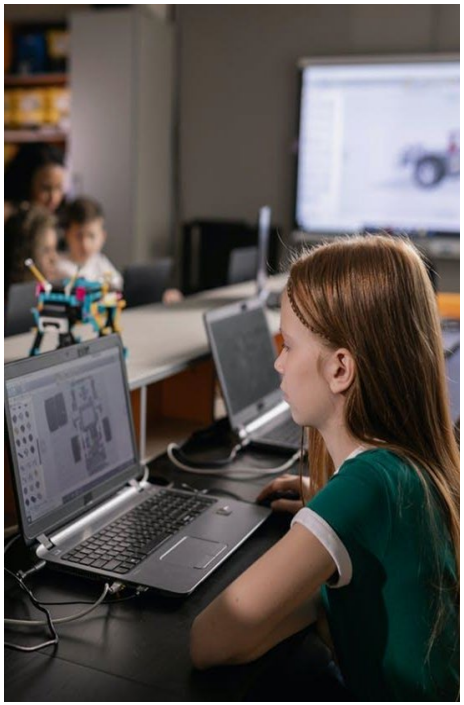
Why do students lose interest and motivation towards STEM?



- The choice of **pathways changes as students grow older** (Valero-Matas & Coca-Jiménez, 2021).
- The **interest progressively decreases** as they progress to higher levels (Hernández-Serrano & Muñoz-Rodríguez, 2020).

Interest loss in STEM

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FACTORS CREATING LOSS OF INTEREST

1. **The traditional approach** and the use of expository strategies (Hernández-Serrano & Muñoz-Rodríguez, 2020).

2. The instruction in these subjects, organized toward **more complex topics** (Rosenzweig & Wigfield, 2020).

POSSIBLE SOLUTION

1. **The greater the practicality, the greater the interest in these disciplines** (Valero Matas & Coca Jiménez, 2021).

FACTORS

SOLUTIONS

Teacher's perception

Margot and Kettler (2019)

- Six barriers that frustrate STEM education: **curricula, pedagogy, assessment, faculty, student body, and structural systems.**

Ejiwale (2013) and Hsu and Fang, (2019)

- **Poor teacher training, lack of teacher professional development, teacher shortages, poor integration of interdisciplinary content, poor student motivation, inadequate facilities, and inadequate assessments.**

Wahono and Chang (2019)

- Three main obstacles: **poor knowledge, difficulty in applying STEM in some subject areas, and difficulty in relating STEM subjects.**

2 Method

STEMotiv

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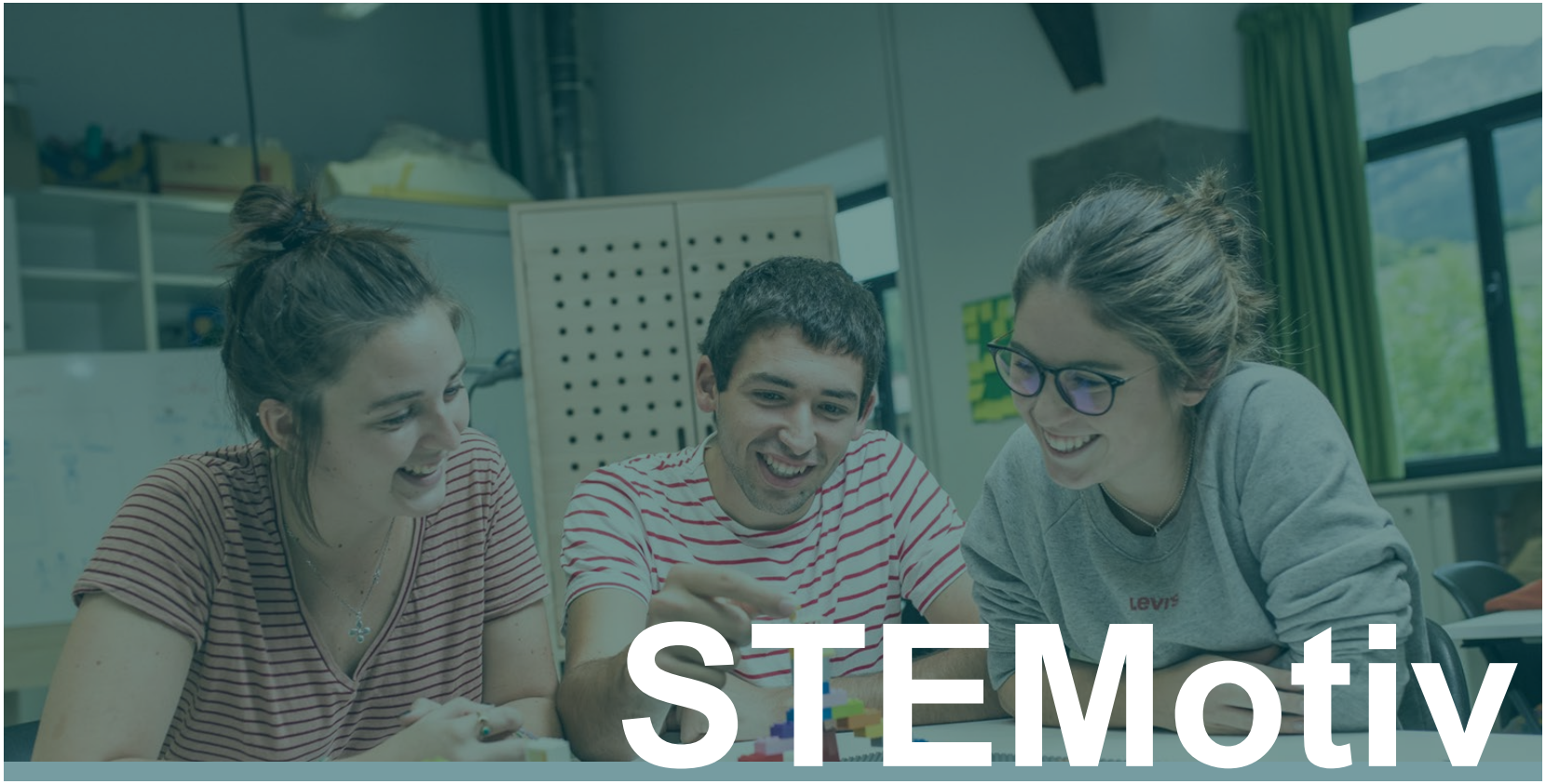

A project to **stimulate STEM vocations** among **students in Gipuzkoa**, paying special attention to female students

Second work package

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OBJECTIVES AND STEPS TO FULFILL THEM

OBJECTIVES

- To **analyze the teachers' perception towards STEM educational model**

STEPS

01 **MEASUREMENT OF INITIAL PERCEPTION**

Analyze the perception towards STEM using a questionnaire

02 **TEACHER TRAINING**

3 training sessions on STEM: general framework, contrast of a project and final evaluation

03 **FOCUS-GROUP**

Analyze the final perception towards STEM

Sample

HOW DID WE FULFILL THE RESEARCH?

20 secondary education STEM teachers from 3 schools of Gipuzkoa

Teachers' experience

1st table: Years teachers have worked in education.

	1-5	6-10	11-20	21-30	31-40
Years	4	5	2	6	3
Percentage	20%	25%	10%	30%	15%

2nd table: Teachers' subjects.

	Ma	Tec	Sci	Eus	Eng	Fis	Che	Sp	Geo	Bio	Geo	Plas	ICT	Des
Amount	5	5	2	1	1	2	2	1	1	3	3	2	2	1
Perceptage	25%	25%	10%	5%	5%	10%	10%	5%	5%	15%	15%	10%	10%	5%

Instruments

A QUESTIONNAIRE WAS ELABORATED TO MEASURE TEACHERS' PERCEPTIONS TOWARDS STEM EDUCATIONAL MODEL

9 **CATEGORIES**

1) General data
2) Understanding of the STEM educational framework
3) Implementation of STEM teaching-learning processes
4) Teacher training
5) Educational community
6) Center infrastructure
7) Coeducation
8) Projects
9) TOWS table (Threats, Opportunities, Weaknesses and Strengths)

3

Data analysis

General STEM framework

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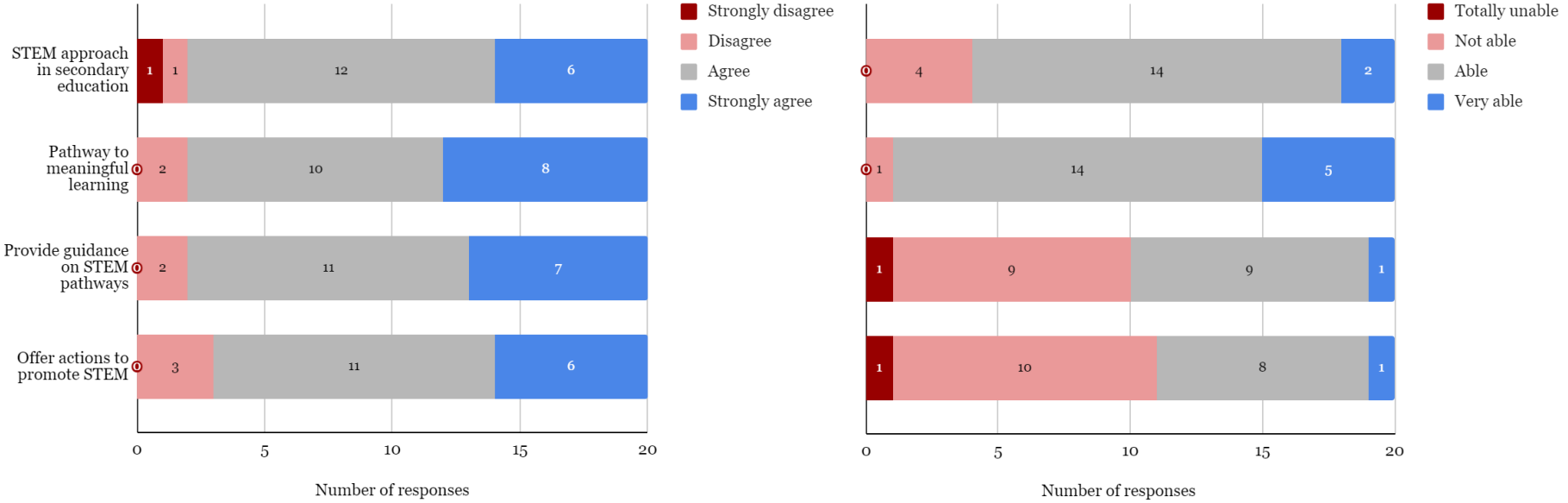

1st graphic: General STEM framework.

Characteristics and principles

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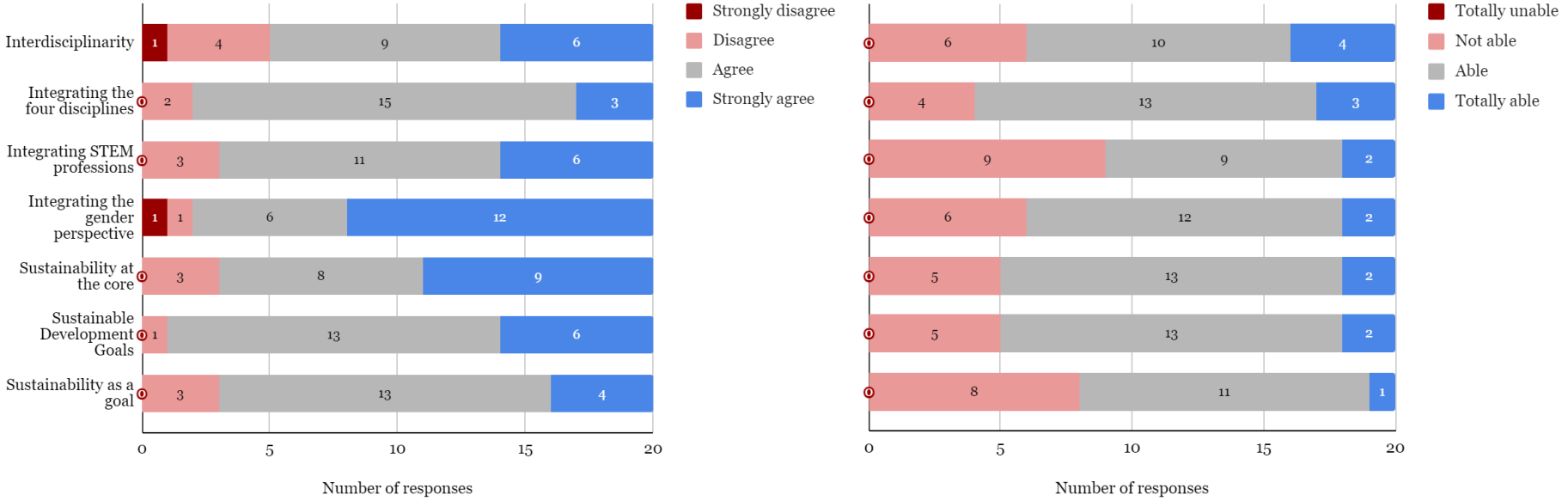

2nd graphic: Characteristics and principles.

Methodology and core idea

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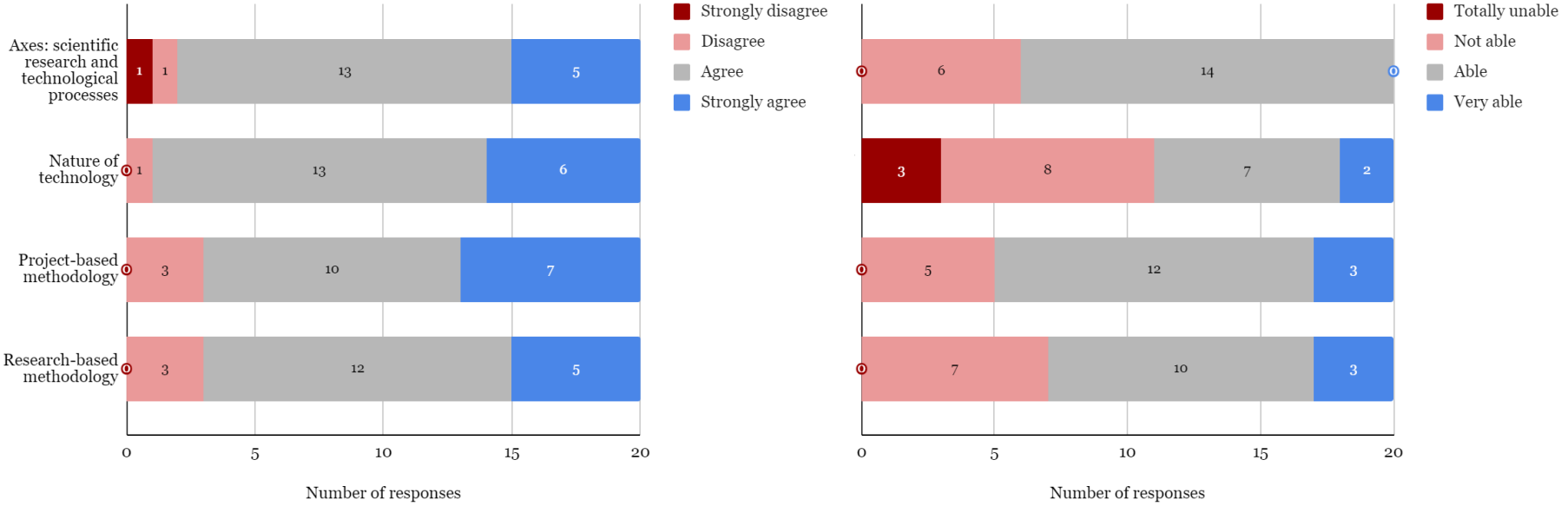

3rd graphic: Methodology and core idea.

Teaching-learning psychopedagogical basis

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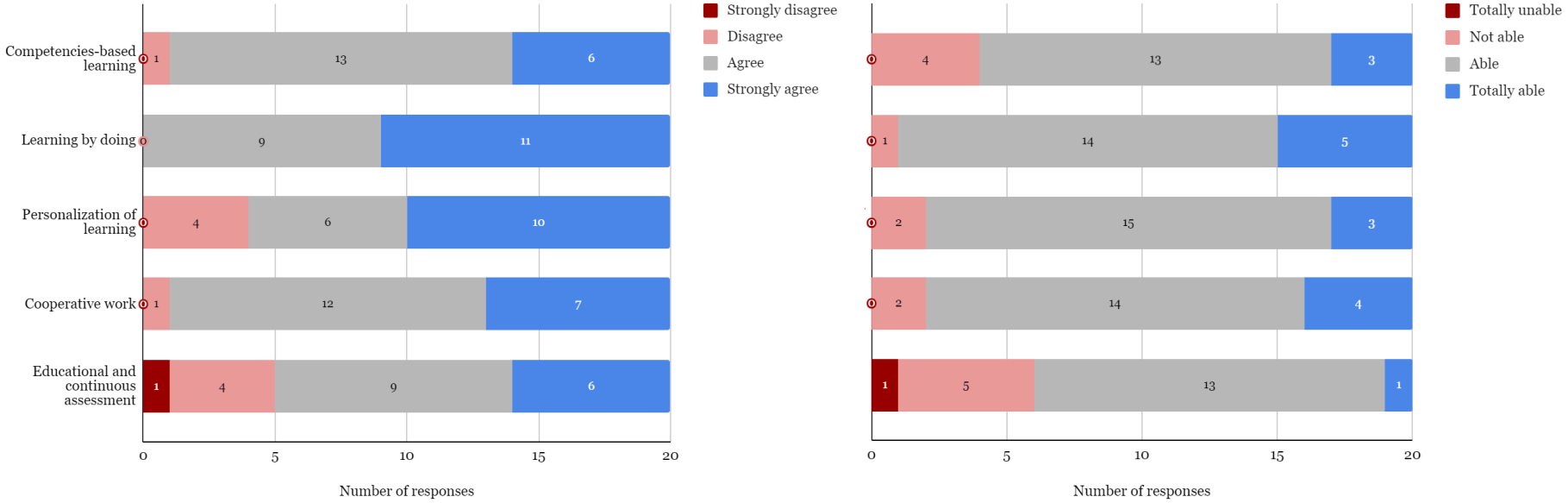

4th graphic: Teaching-learning psychopedagogigal basis.

4 Conclusions

Conclusions

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01 In general, the majority of teachers understand the STEM educational model itself and understand the essential characteristics and conditions of this approach.

02 They point out that they see themselves not only prepared to understand, but also to carry out different items.

03 In summary, these are conclusions that do not correspond to what we have read in the literature.

5 References

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Vielen Dank
Eskerrik asko
Thank you

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