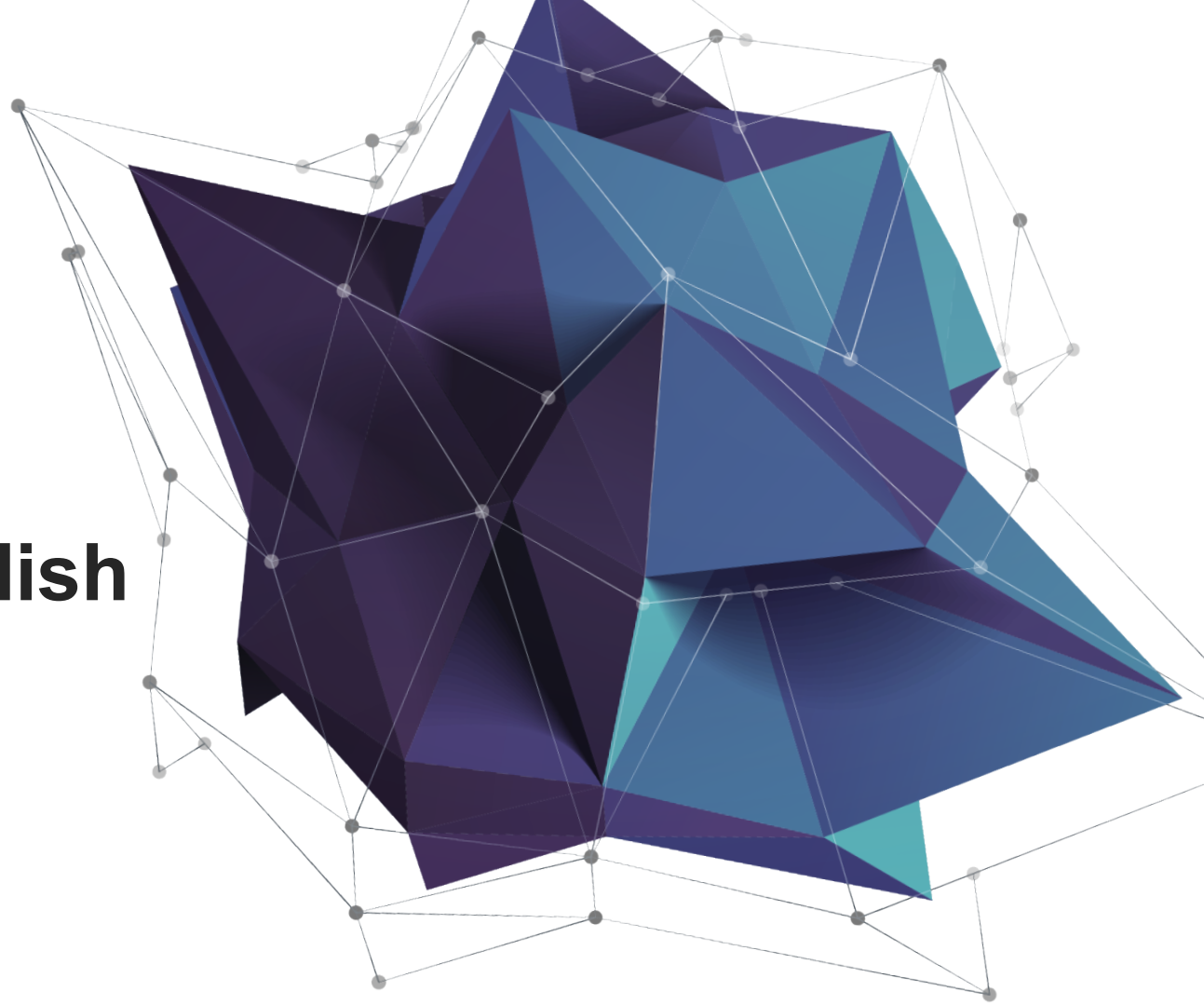

Situating spatial ability development in the Craft and Technology curricula of Swedish compulsory education

Ting Jun Lin

KTH Royal Institute of Technology, Sweden

Jeffrey Buckley

Technological University of the Shannon, Ireland

Lena Gumaelius

KTH Royal Institute of Technology, Sweden

Ernest Ampadu

KTH Royal Institute of Technology, Sweden

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Situati[illegible]ial ability development

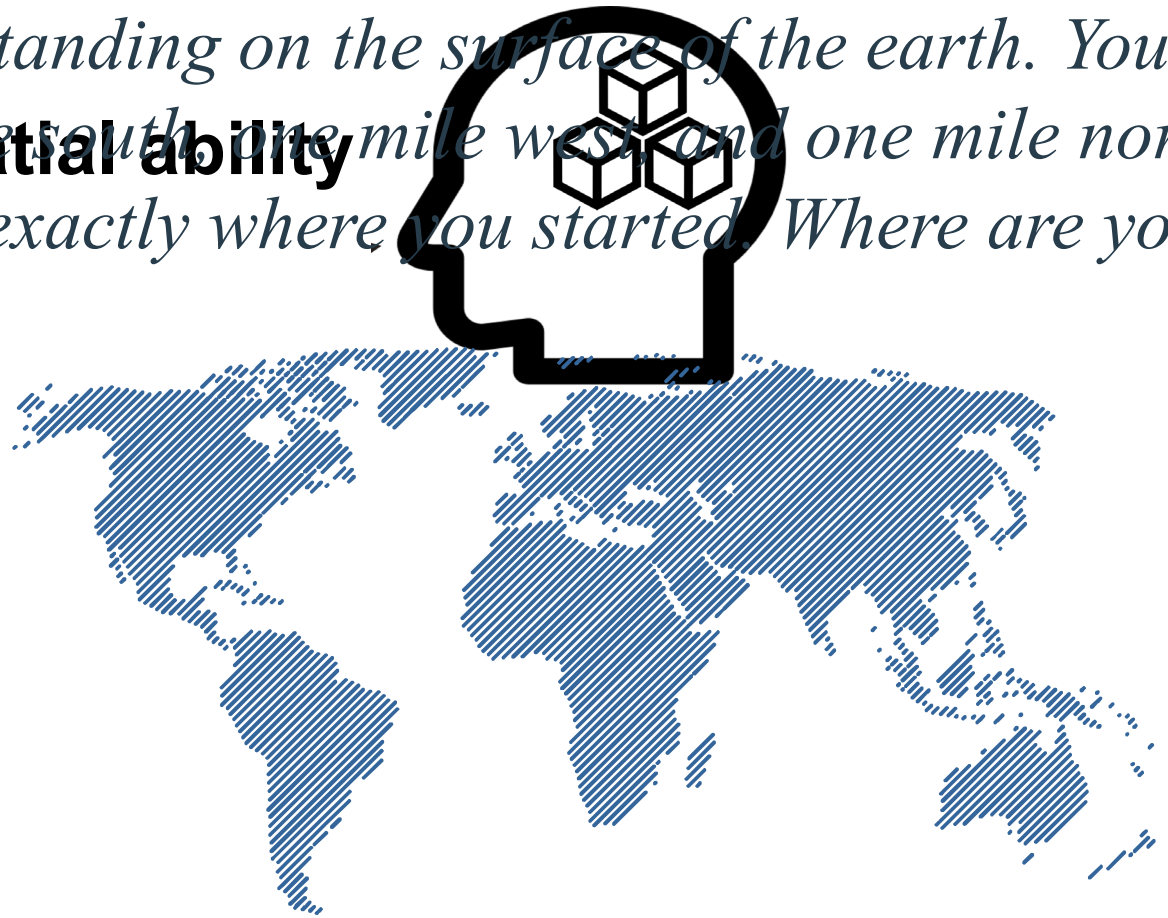
[illegible] the Craft and Tec[illegible]ology curricula of

Swedish compulsory [illegible]ucation

01 Introduction and Literature review

You're standing on the surface of the earth. You walk one mile south, one mile west, and one mile north. You end up exactly where you started. Where are you?

Spatial ability



01 Introduction and Literature review

…the ability to **generate, retain, and manipulate** abstract visual images. (Lohman, 1979, p. 126)

…the ability to make use of simulated mental imagery to solve problems—**perceiving, discriminating, manipulating, and recalling** nonlinguistic images in the "mind's eye.

(Schneider and McGrew, 2018, p. 125)

…innate ability to **visualise** that a person has before any formal training has occurred.

(Sorby, 1999, p. 21)

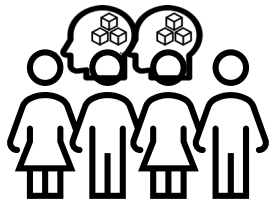
…the performance on tasks that require: (a) the mental rotation of objects; (b) the ability to understand how objects appear in different **positions**; and (c) the ability to conceptualise how objects **relate to each other in space**.

(Sutton & Allen, 2011, p. 5)

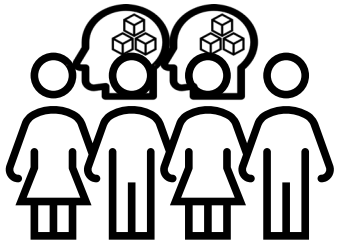
…the ability to **visualise, manipulate and interrelate** real or imaginary configurations in space. (Gaughran, 2002, p. 3)

01 Introduction and Literature review

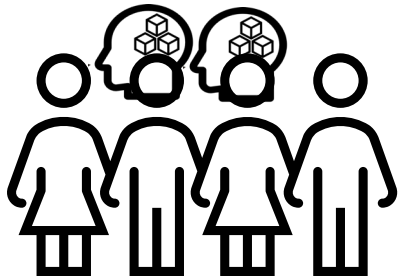
Shea et al. (2001)



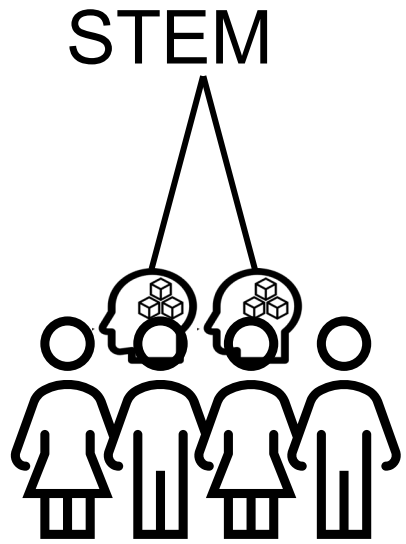
13 years old



18 years old



23 years old



33 years old

N=563

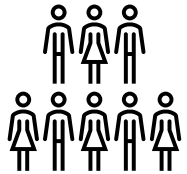
Scholastic Aptitude Test (SAT),

Differential Aptitude Test (DAT),

and spatial ability tests.

01 Introduction and Literature review

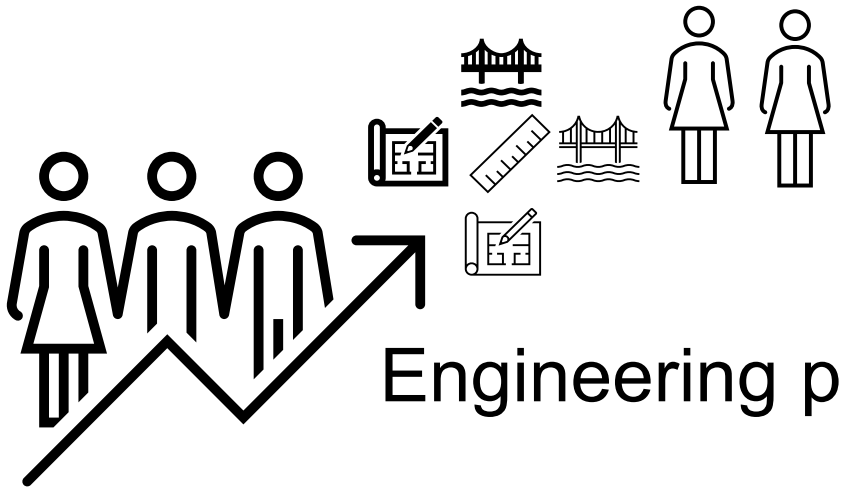
Sorby et al. (2018)



First-year college students

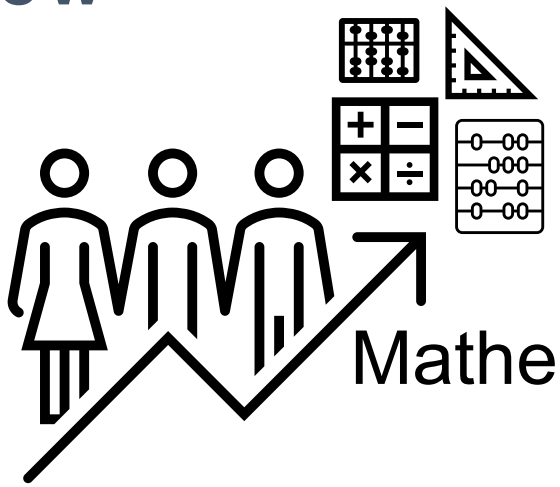
N= 3,948

Spatial ability training

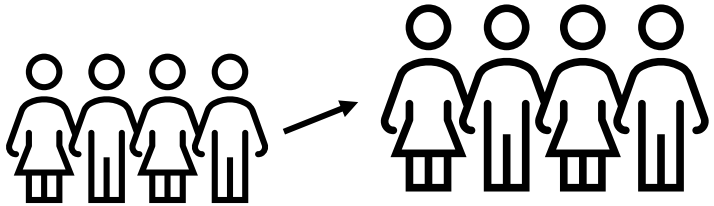


Engineering problem solving

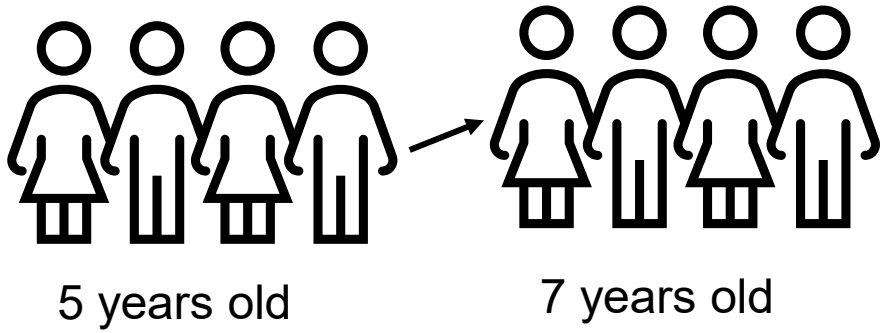
01 Introduction and Literature review



Mathematical problem solving



Verdine et al. (2014; 2017)



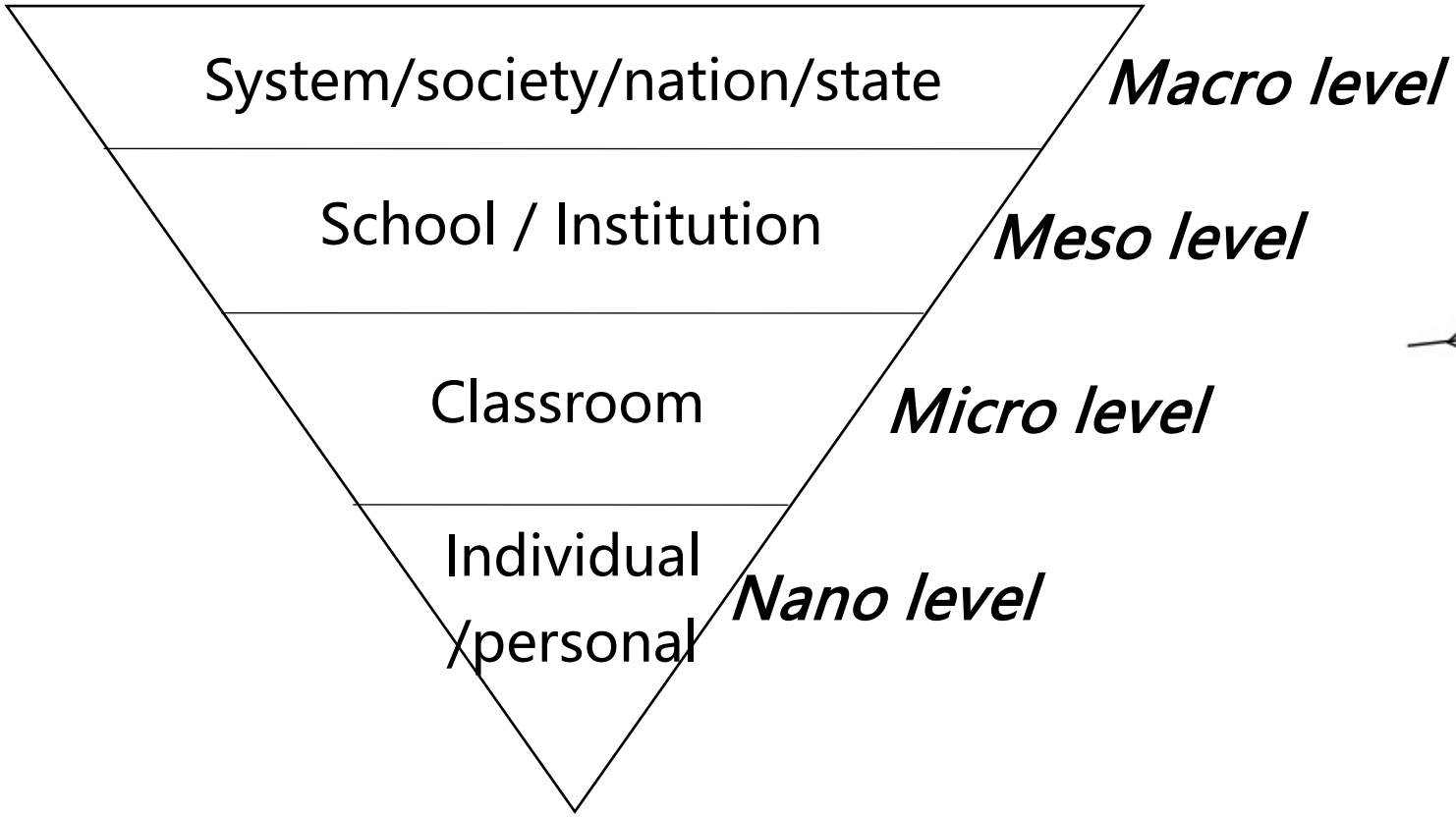
Gilligan et al. (2017)

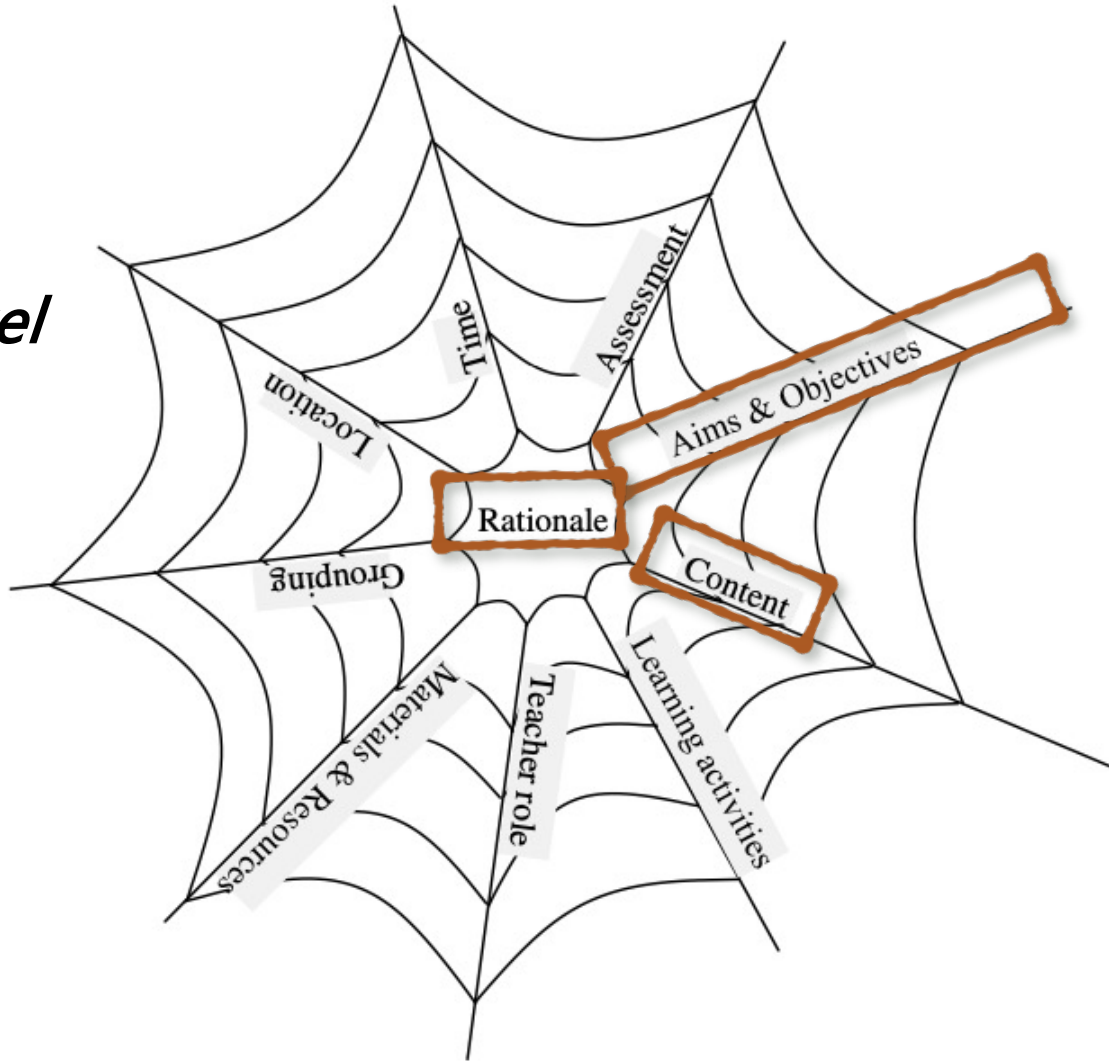
01 Introduction and Literature review

Craft and Technology curricula

Finland Slovenia Estonia Iceland Ireland Sweden UK…

01 Introduction and Literature review





(Akker, 2004)

Methodology

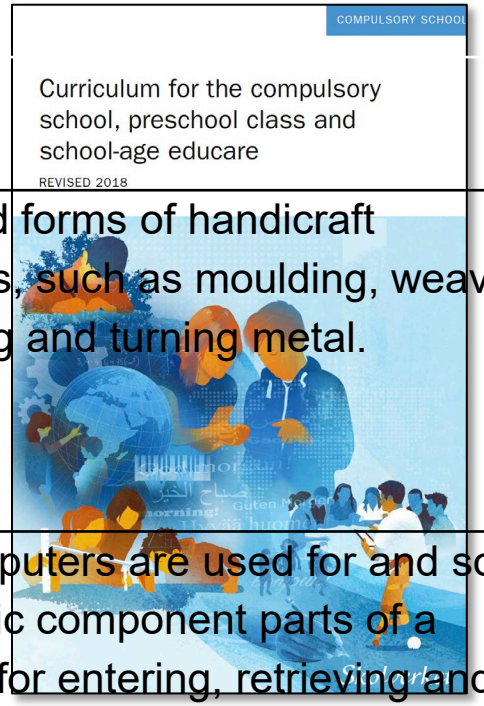
02 Methodology

Context Compulsory education (≈7-16 years old).

Data collection Curriculum document from the Swedish National Agency for Education

Data analysis Qualitative research method

Identifiy spatial-related content



Content	Subject	Codes	Coding method
Developed forms of handicraft techniques, such as moulding, weaving and cutting and turning metal.	Craft	Handicraft	In-vivo
What computers are used for and some of the basic component parts of a computer for entering, retrieving and storing information, such as keyboards, monitors and hard disks.	Technology	Object structure	Descriptive

02 Methodology

Categories

- Graphical components: “symbol” and “model”.
- Pictorial components: “picture” and “materials”.
- Manufactured components: “handicraft” and “artefacts”.

		Visual dimension		
		Graphical	Pictorial	Manufactured
Epistemic dimension	Conceptual	Graphical-conceptual	Pictorial-conceptual	Manufactured-conceptual
	Procedural	Graphical-procedural	Pictorial-procedural	Manufactured-procedural

- Conceptual knowledge: concepts, principles, facts of an entity.
- Procedural knowledge: applying, carrying out hands-on activities.

02 Methodology

Re-code

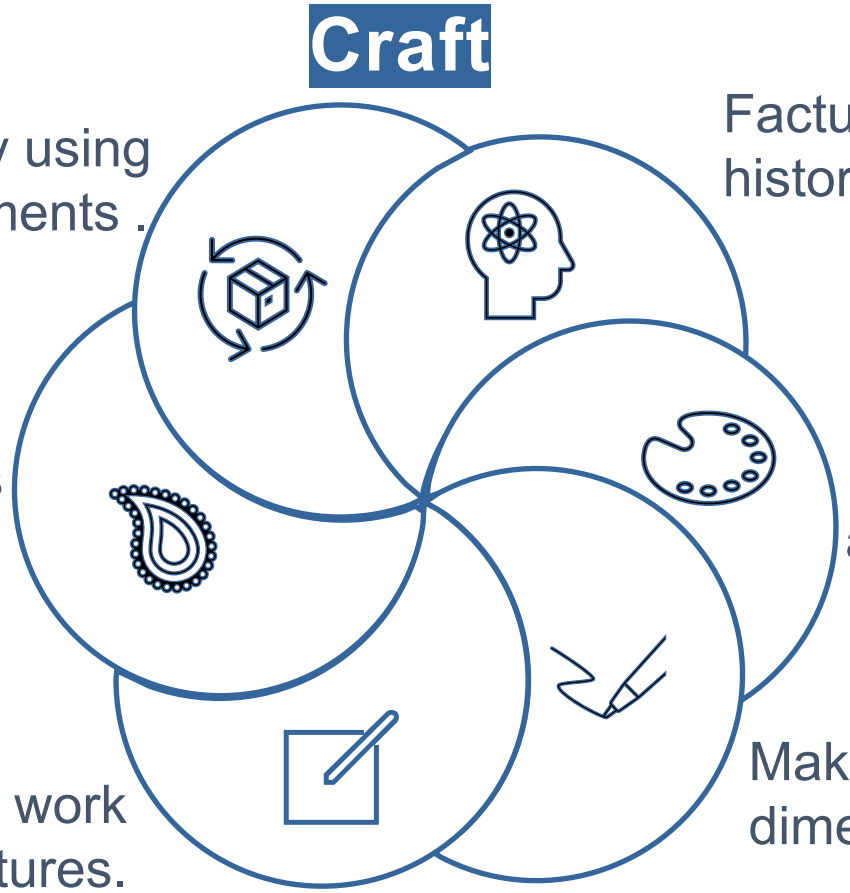
Content	Subject	Codes	Coding method
Developed forms of handicraft techniques, such as moulding, weaving and cutting and turning metal.	Craft	Manufactured, Procedural	Axial
What computers are used for and some of the basic component parts of a computer for entering, retrieving and storing information, such as keyboards, monitors and hard disks.	Technology	Graphic, Conceptual	Axial

Results

03 Results

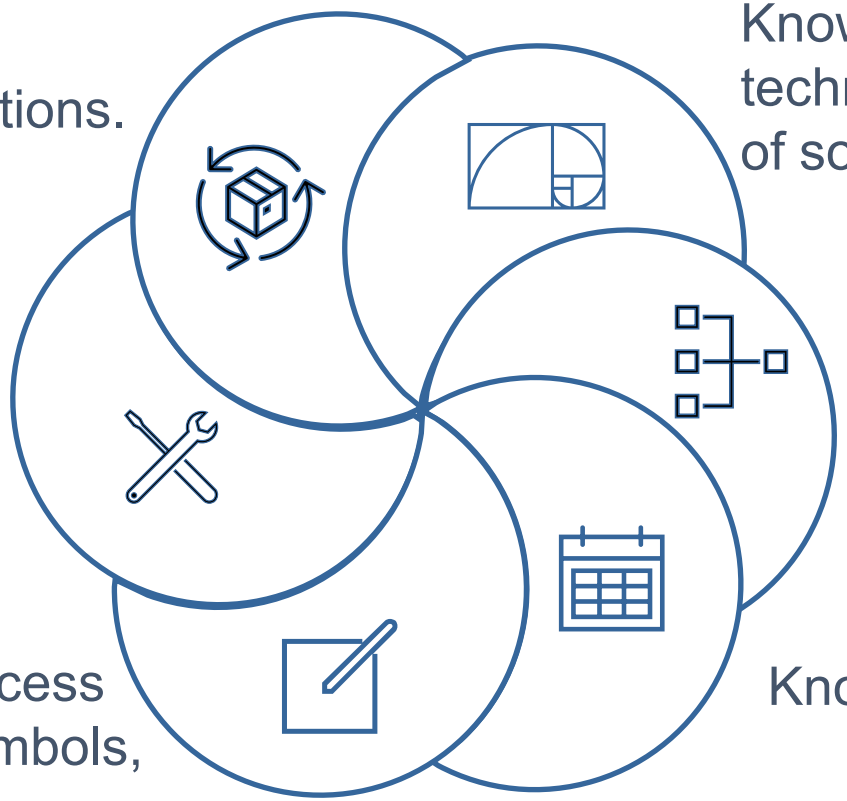
	Craft(58.1%)		Technology (34.4%)	
Codes	Codes frequency	Occupation of codes among the spatial-related (percentage)	Codes frequency	Occupation of codes among the spatial-related (percentage)
Graphic, conceptual	9	14.1%	14	29,17%
Graphic, procedural	2	3.1%	10	20,83%
Pictorial, conceptual	11	17.2%	4	8,33%
Pictorial, procedural	14	21.9%	3	6,25%
Manufactured, conceptual	17	26.6%	7	14,58%
Manufactured, procedural	11	17.2%	10	20,83%
In total	64	100%	48	100,00%

Discussion and Conclusion



Discussion and Conclusion

Technology



Technology solutions.

Knowledge of the structure of a technical or mechanical system of some everyday objects

Construction of technology.

Knowledge of how an individual technical or mechanical system

Document their work process with simple sketches, symbols, and drawing.

Knowledge of daily life objects.

Discussion and Conclusion

04

Discussion and Conclusion

What we did

The manifestation of spatial ability development in Swedish national craft and technology curricula is supported by the conceptualization of spatial ability by researchers.

However,

We cannot draw any simple conclusions about the effects of national curricula on students' performance.

But at least,

Bring up the awareness of how the spatial ability could be developed in the craft and technology curricula.

And we hope,

More qualitative studies in a broader context should be done in the future.

Elon Musk, founder of SpaceX. Photograph: Brendan Smialowski/AFP/Getty Images

You're standing on the surface of the earth. You walk one mile south, one mile west, and one mile north. You end up exactly where you started. Where are you?

North Pole

Where else?

of 1 mile. Any point a mile north of this circle is the solution.

Thank you