



TOGETHER WE ARE BETTER 2026 ART AND CULTURE DISABILITY FESTIVAL CYPRUS

Developing Inclusive Activities to Enhance Primary School Students' Control-of-Variables Strategy Skills



Berikou Myrto, Sofianidis Angelos

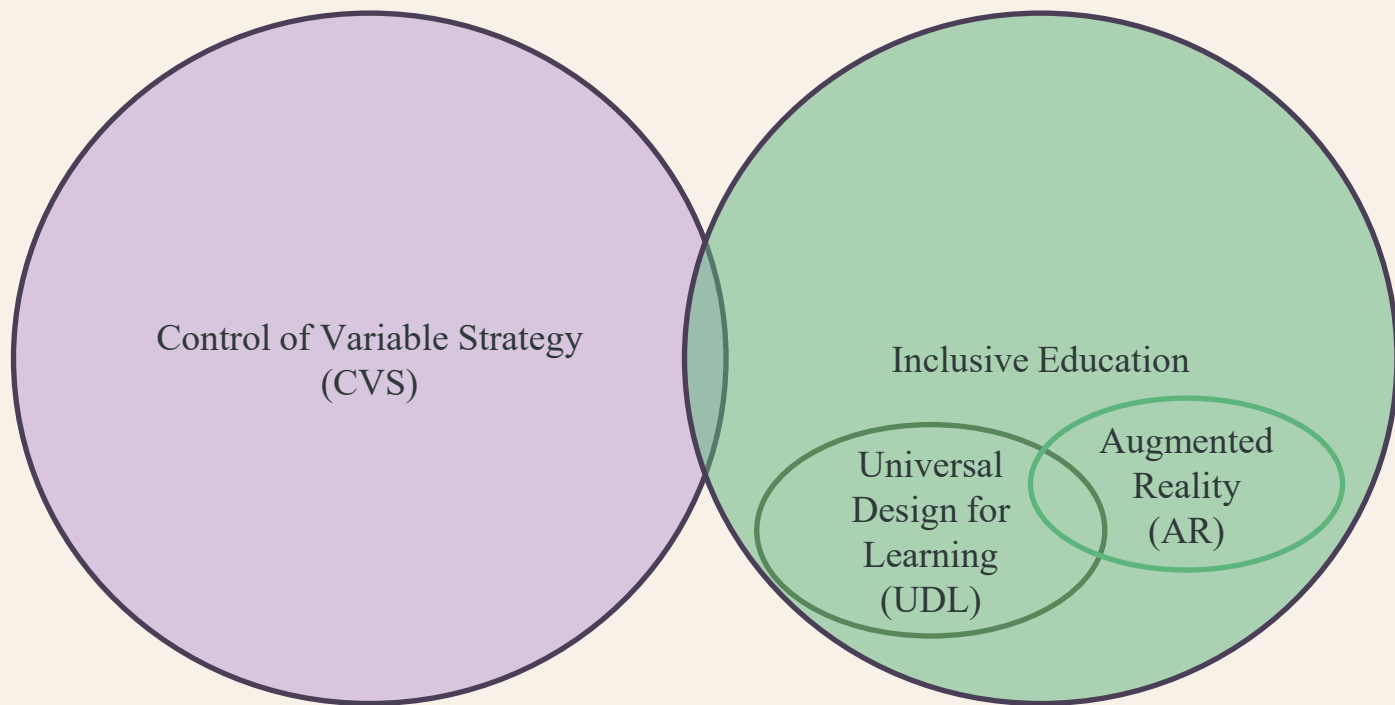
myrtoberikou@gmail.com

angelossofianidis@gmail.com





INTRODUCTION

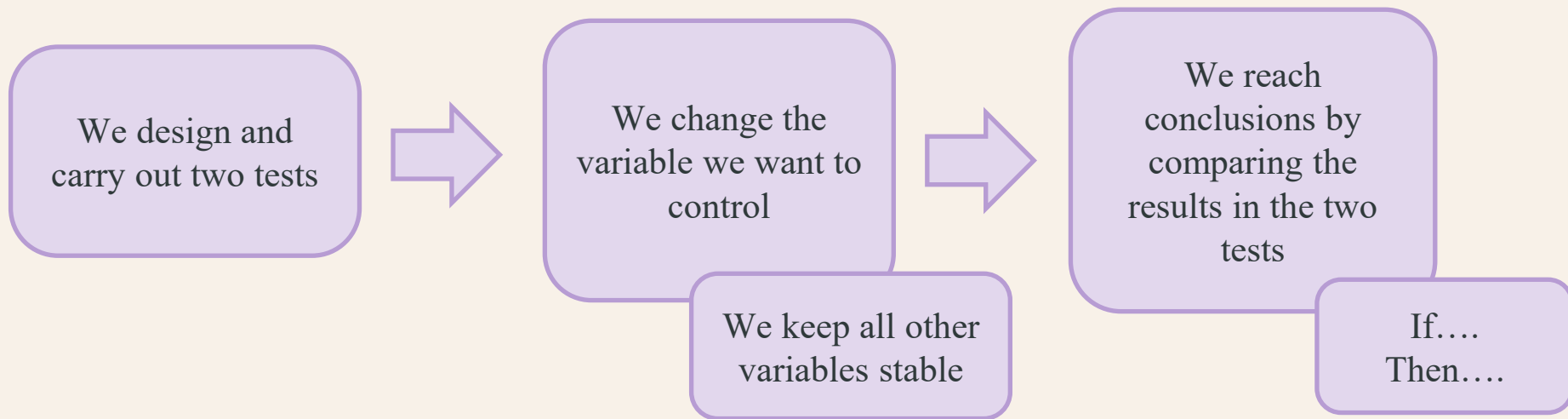




CVS



To test whether a variable influences a phenomenon....





Sub-Skills

PLAN

Designing a valid
experiment



IDENTIFY

Distinguishing a valid
from an invalid
experiment



INTERPRET

Interpretation of a valid
experiment



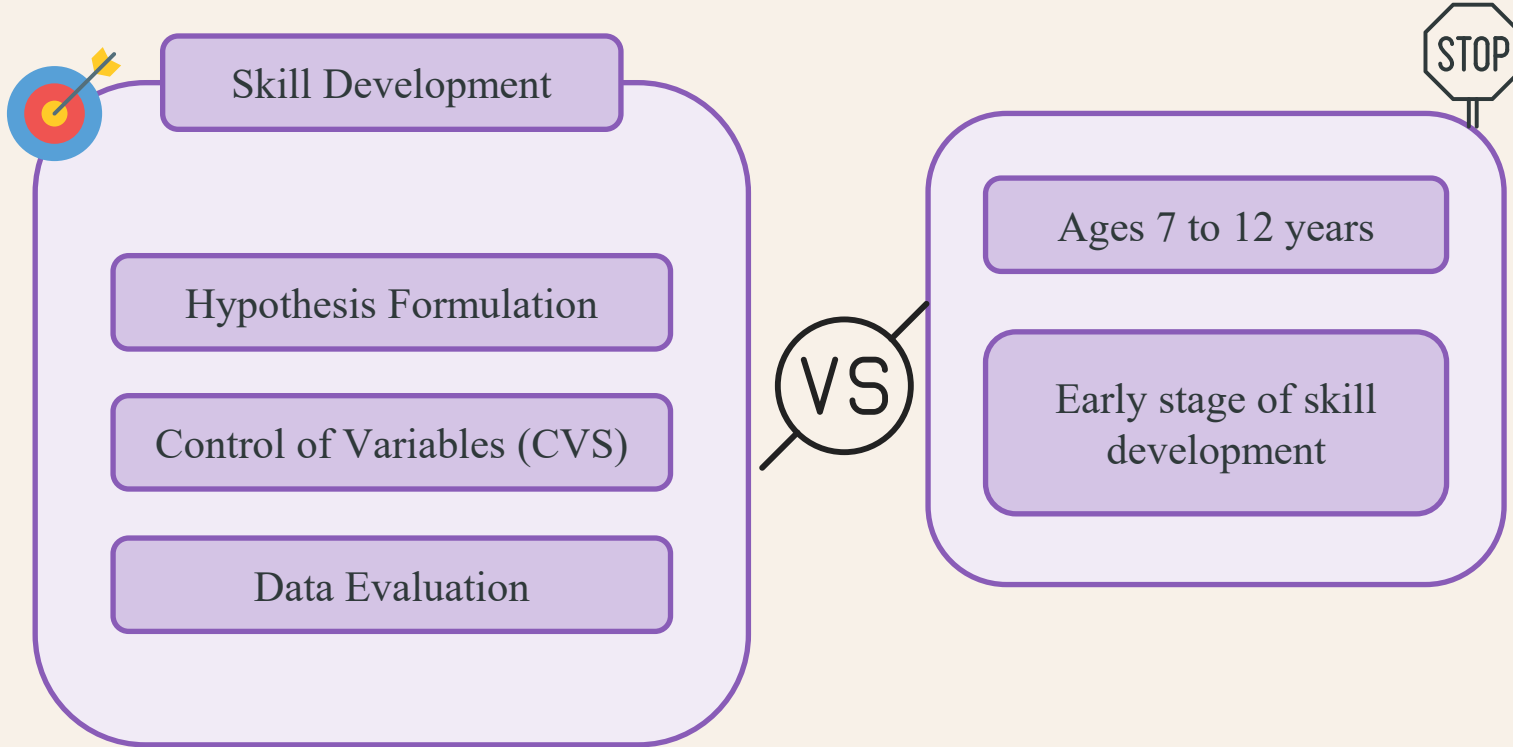
UNDERSTAND

Understanding the
ambiguity of invalid





Primary Education





Teaching approaches

P

1st approach



Explicit instruction

2nd approach



Experimentation

3rd approach



Explicit instruction
&
Experimentation



Chen & Klahr (1999)

Dean & Kuhn (2007)
Schauble (1996)

Lorch et al. (2010)
Strand-Cary & Klahr (2008)
Zohar & David (2008)
Ζουπιδης (2012)



Inclusive Education

Flexible and adaptive
process

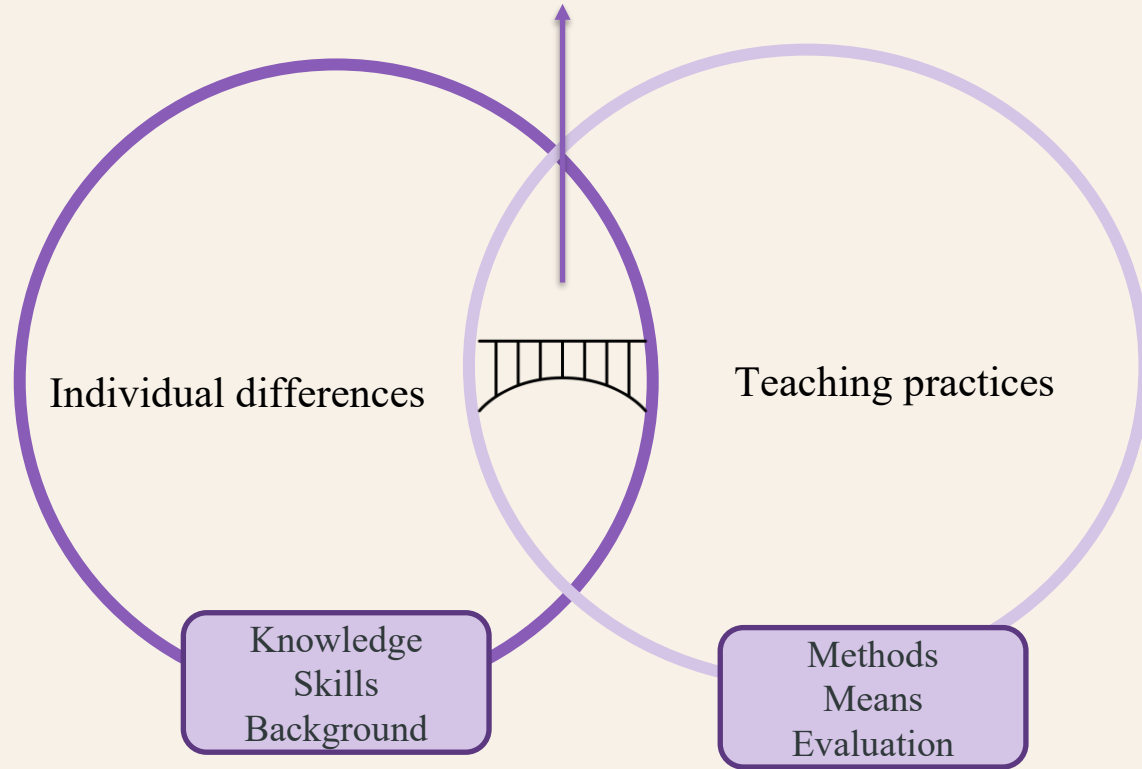
Democratic educational
practice

Access to all

Active participation

Equality and justice

Inclusive Pedagogical Approach





Fundamental principles of UDL

CAST Universal Design for Learning Guidelines

The goal of UDL is **learner agency** that is purposeful & reflective, resourceful & authentic, strategic & action-oriented.

Design Multiple Means of Engagement



Design Options for Welcoming Interests & Identities (7)

- Optimize choice and autonomy (7.1)
- Optimize relevance, value, and authenticity (7.2)
- Nurture joy and play (7.3)
- Address biases, threats, and distractions (7.4)

Design Options for Sustaining Effort & Persistence (8)

- Clarify the meaning and purpose of goals (8.1)
- Optimize challenge and support (8.2)
- Foster collaboration, interdependence, and collective learning (8.3)
- Foster belonging and community (8.4)
- Offer action-oriented feedback (8.5)

Design Options for Emotional Capacity (9)

- Recognize expectations, beliefs, and motivations (9.1)
- Develop awareness of self and others (9.2)
- Promote individual and collective reflection (9.3)
- Cultivate empathy and restorative practices (9.4)

Design Multiple Means of Representation



Design Options for Perception (1)

- Support opportunities to customize the display of information (1.1)
- Support multiple ways to perceive information (1.2)
- Represent a diversity of perspectives and identities in authentic ways (1.3)

Design Options for Language & Symbols (2)

- Clarify vocabulary, symbols, and language structures (2.1)
- Support decoding of text, mathematical notation, and symbols (2.2)
- Cultivate understanding and respect across languages and dialects (2.3)
- Address biases in the use of language and symbols (2.4)
- Illustrate through multiple media (2.5)

Design Options for Building Knowledge (3)

- Connect prior knowledge to new learning (3.1)
- Highlight and explore patterns, critical features, big ideas, and relationships (3.2)
- Cultivate multiple ways of knowing and making meaning (3.3)
- Maximize transfer and generalization (3.4)

Design Multiple Means of Action & Expression



Design Options for Interaction (4)

- Vary and honor the methods for response, navigation, and movement (4.1)
- Optimize access to accessible materials and assistive and accessible technologies and tools (4.2)

Design Options for Expression & Communication (5)

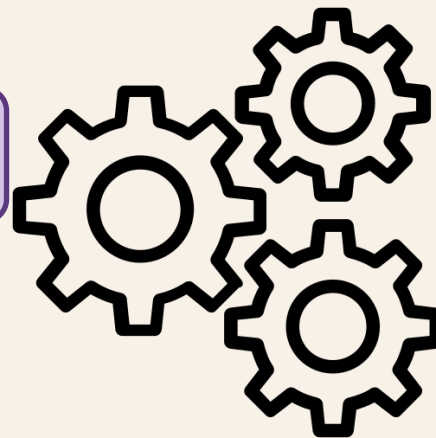
- Use multiple media for communication (5.1)
- Use multiple tools for construction, composition, and creativity (5.2)
- Build fluencies with graduated support for practice and performance (5.3)
- Address biases related to modes of expression and communication (5.4)

Design Options for Strategy Development (6)

- Set meaningful goals (6.1)
- Anticipate and plan for challenges (6.2)
- Organize information and resources (6.3)
- Enhance capacity for monitoring progress (6.4)
- Challenge exclusionary practices (6.5)

Multiple means of representation

Multiple means of engagement



Multiple means of action & expression



Augmented Reality

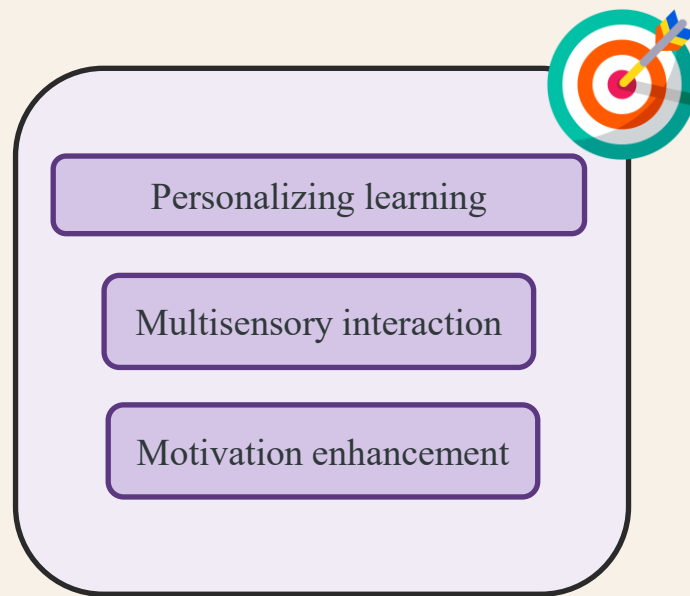
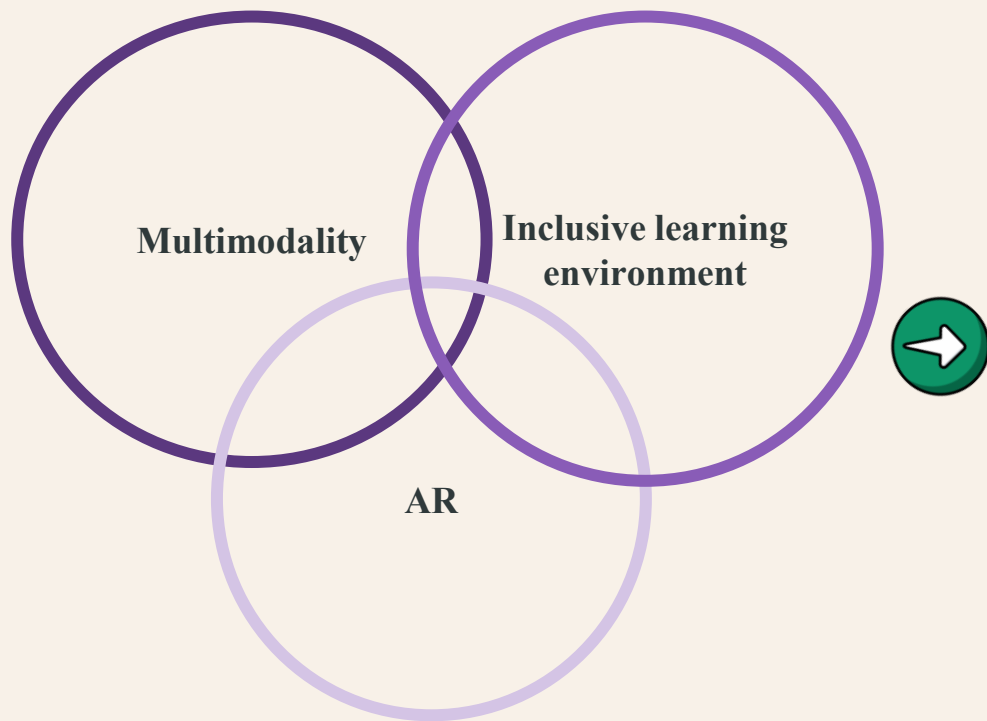
Combining real world with
digital elements



3D models & interactive
content



Understanding abstract
concepts, achieving cognitive
goals, enhancing student
motivation



Aim of the Study



Assessment of learning outcomes



PLAN

Designing a valid experiment



IDENTIFY

Distinguishing a valid from an invalid experiment



INTERPRET

Interpretation of a valid experiment



UNDERSTAND

Understanding the ambiguity of invalid



Assessment of Participants' Views

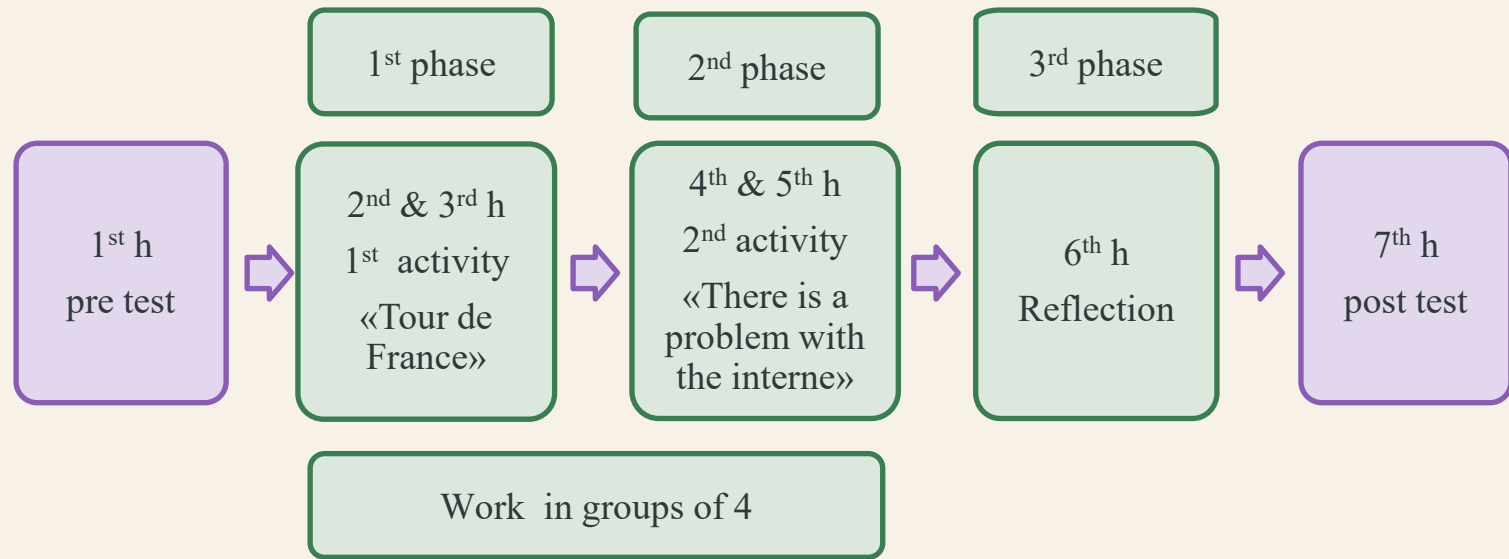


Augmented Pedagogy Agent Evaluation

Evaluation of UDL principles



Research & educational intervention



3-week period



Learning intervention Worksheets

Two contextual
learning scenarios

Step-by-step
progression of
activities

Construction of CVS
understanding

9 questions

1

Tour de France

Variables under consideration



Wheel size



Frame weight



Tire pressure



Saddle position

2

There is a problem with the internet

Variables under consideration



Wi-Fi quality



Number of users



Message size



Distance from router



Pedagogical Agent



Continuous guidance

Support

Tips

Reminders





Πίνακας μεταβλητών			
Δοκιμή	1 ^η Μεταβλητή	2 ^η Μεταβλητή	Τι παρατηρούν τα παιδιά;
1			
2			
3			
4			

Επόμενο

Ερώτηση 2

Reset



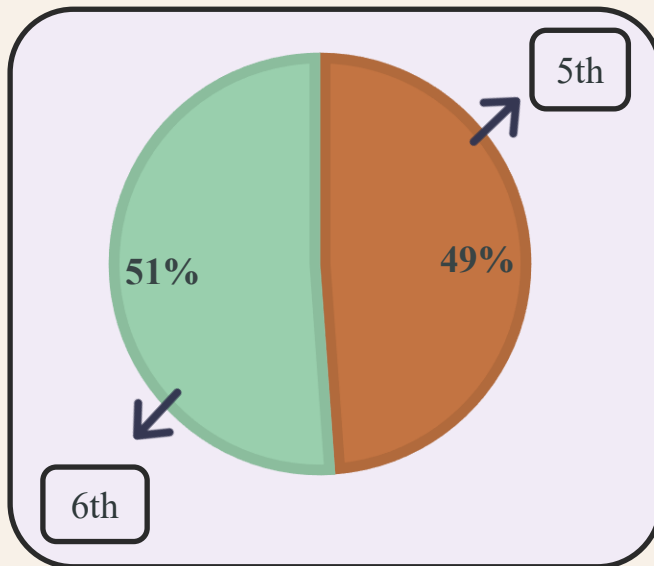
Data collection

Participants

95



88



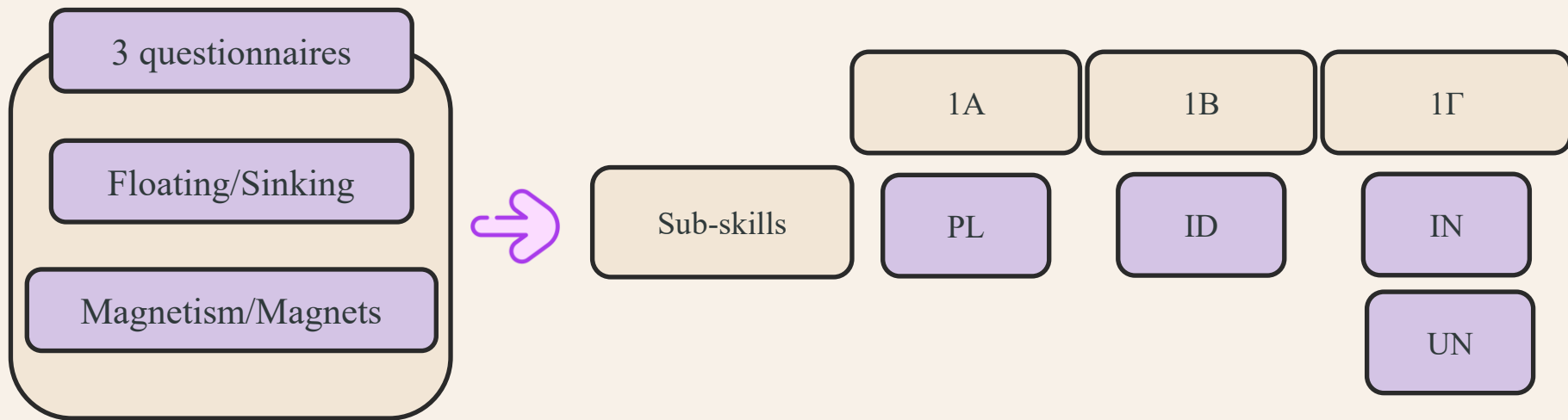
Data collection tools

Pre-Post test

Opinion questionnaire



Pre-Post test





Assessment of Participants' Views

10 questions

Gender

Attitudes toward
Science
Education (SE)

Interest

Participation

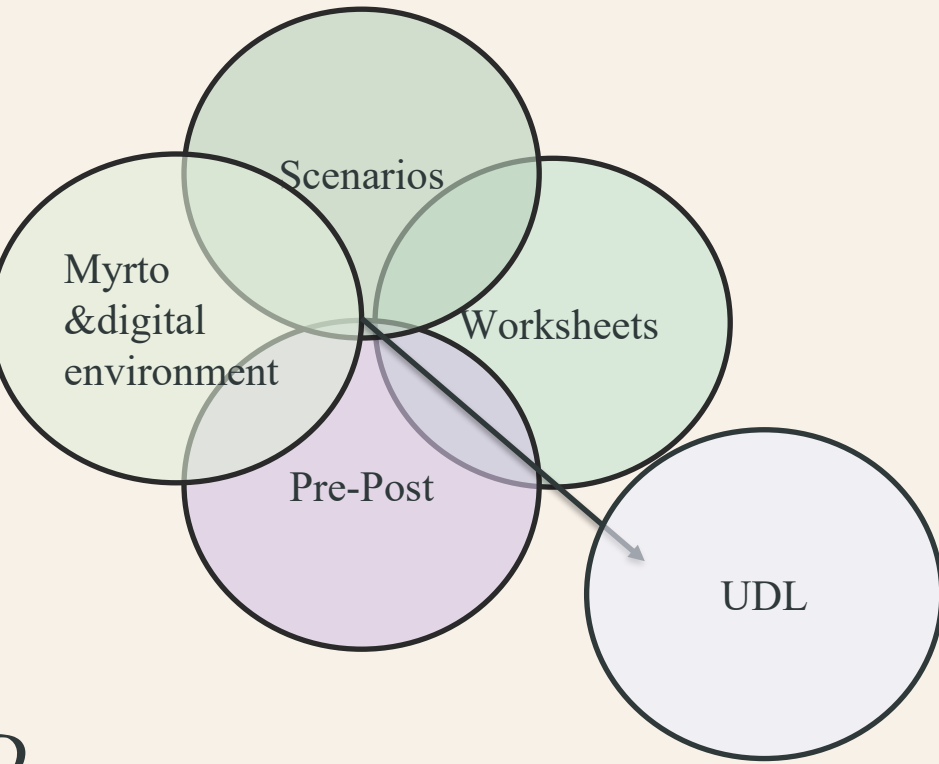
Concentration

Ease of Use of
AR application

Multiple Means
of
Representation

Multiple Means
of Expression &
Action

Implementation of Universal Design for Learning



Best practices from various fields

Combination & systematic application

Guidelines as a guide to instructional design



Multiple Means of Engagement

Optimizing individual choice and autonomy

Guideline 7.1.



Autonomy in decision-making through collaborative work

Minimizing distractions

Guideline 7.3.



Opportunities for trial and error

Fostering collaboration and communication

Guideline 8.3.



Encouragement of discussion

Optimizing authenticity

Guideline 7.2.



Familiar and realistic scenarios

→ Multiple Means of Representation

Customizing the display of information

Guideline 1.1.



Images, text, and tables

Providing alternatives for auditory information

Guideline 1.2.



“Myrto’s” narration/audio

Guiding information processing

Guideline 3.3.



Prompts and reminders from
“Myrto”

Multiple Means of Action & Expressions

Vary the methods for response and navigation

Guideline 4.1.



Interaction in physical and digital environments

Use multiple media for communication

Guideline 5.1.



Responses through drawing, description, or diagrams

Build fluencies with graduated levels of support for practice and performance

Guideline 5.3.



Scaffolding and graduated levels of difficulty



Data analysis

