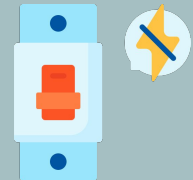


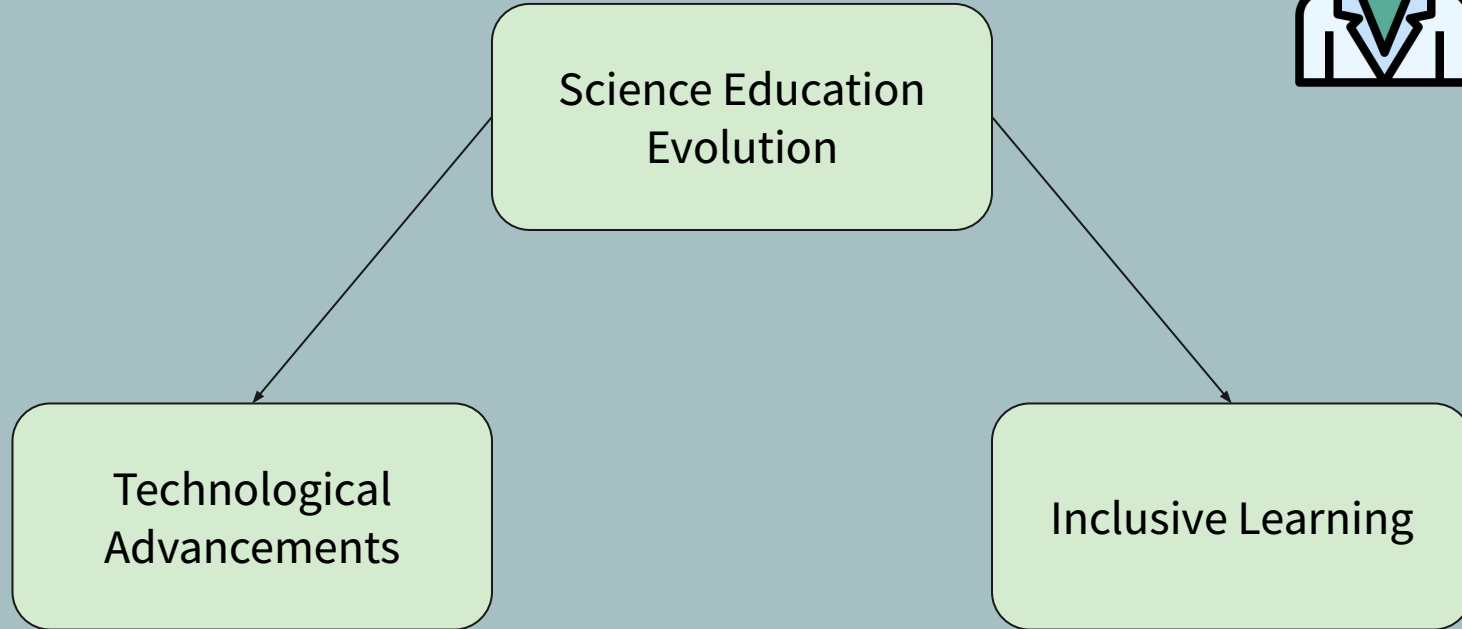
Mystery of Roseberry: An Inclusive Inquiry-based Alternate Reality Game on Electric Circuits for primary school students

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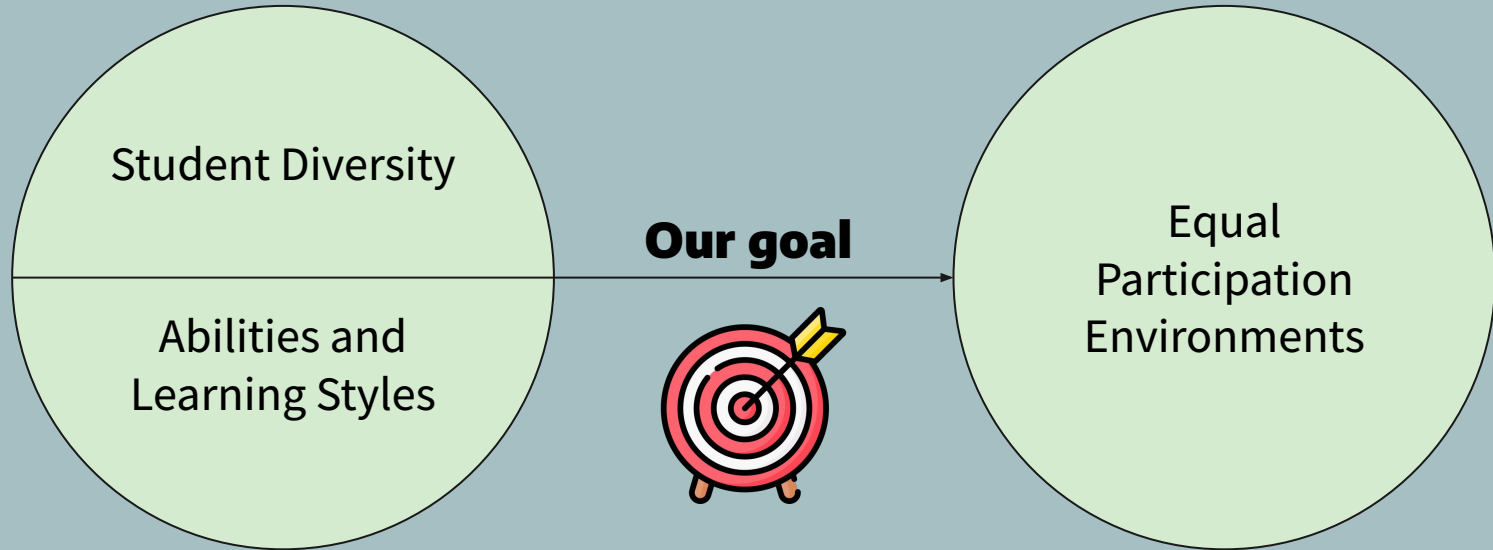


Educational framework



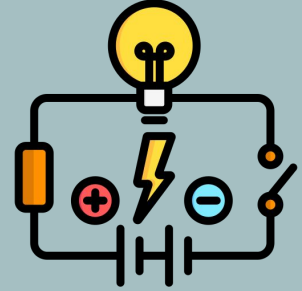
(Becker et al, 2020· Onyema et al., 2019· Radu & Schneider, 2019)

21st century challenges



(Boeren, 2019)

Purpose of study



Implementation and Evaluation of IB-ARGI

Focus:
Electric Circuits



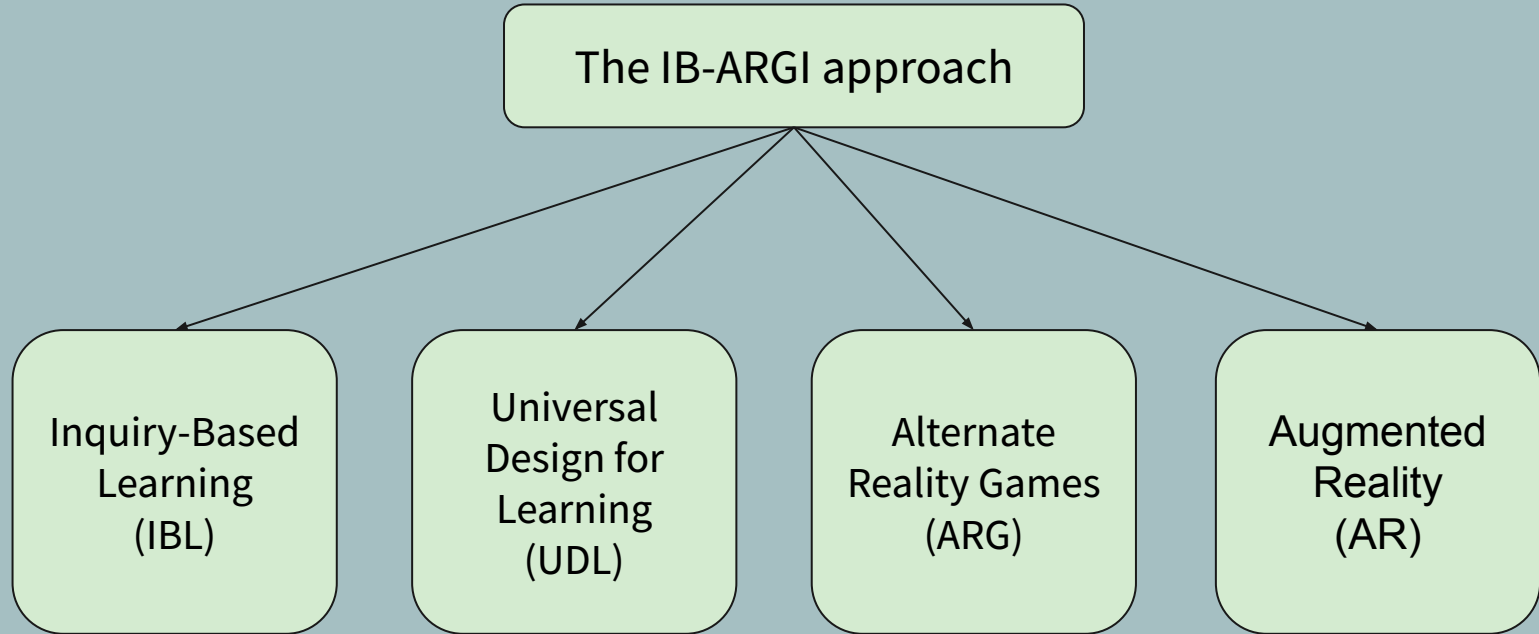
Research question

Question:

How effective are the learning outcomes in 5th-grade students using the IB ARGI approach?



IB - ARG1

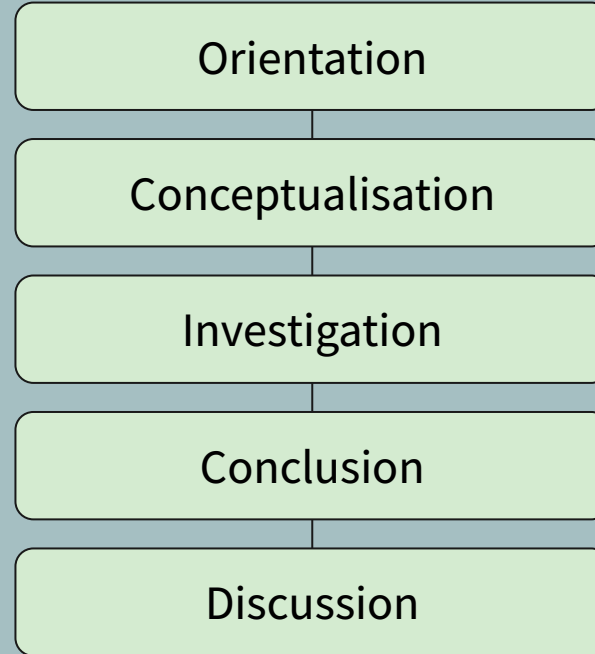


(Sofianidis et al., 2024)

1 Inquiry - Based Learning

(Pedaste et al., 2015)

5 Phases



IB - ARG1

IB - ARG1 phases
(Sofianidis et al, 2024)

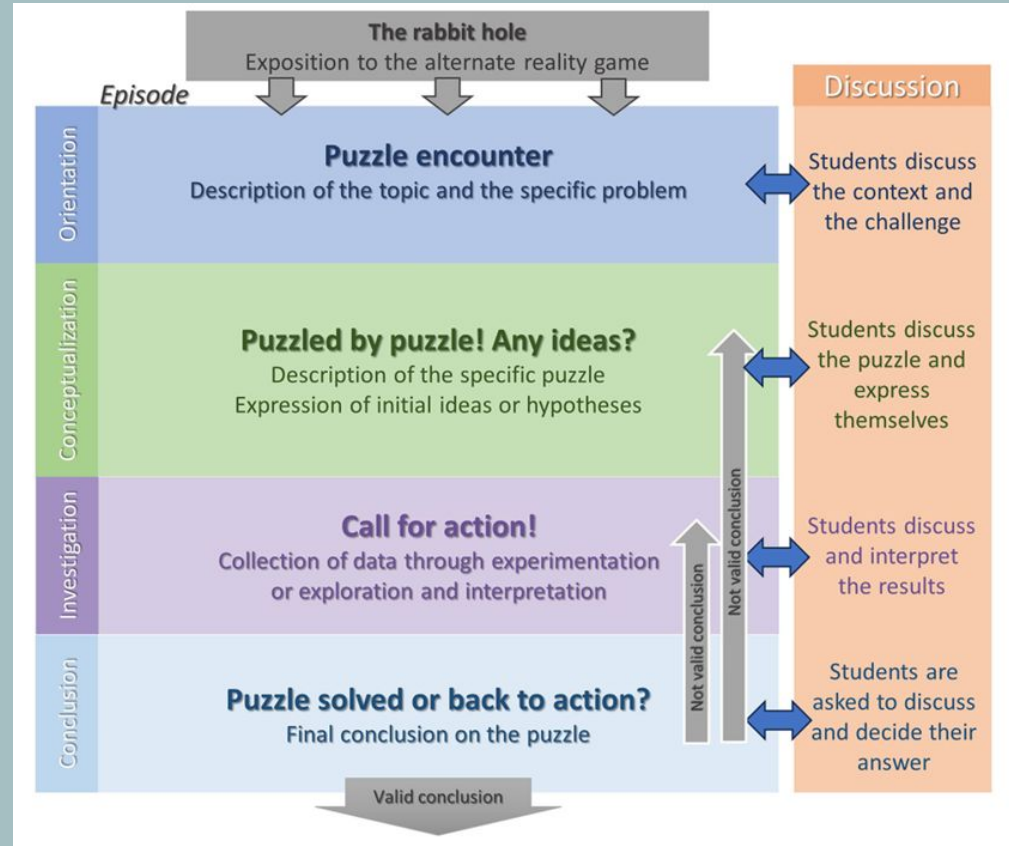
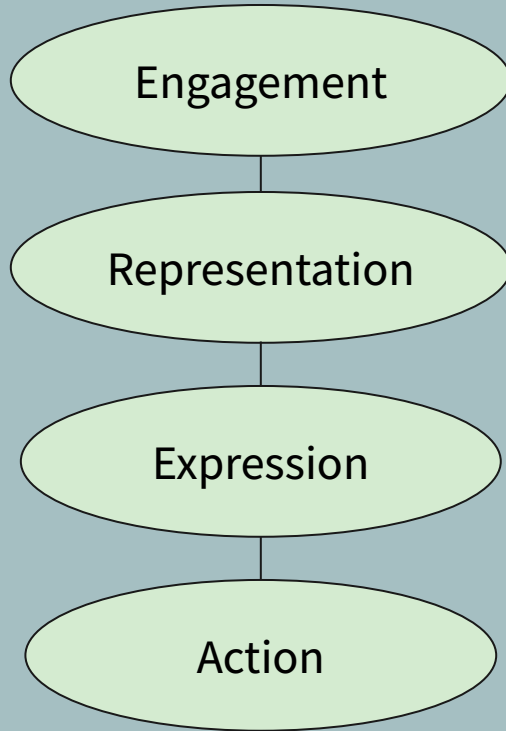


Fig. 1 The phases of an episode in an IB-ARG1 in regard to inquiry phases based on Pedaste et al.

Multiple means



2 Universal Design for Learning

(Meyer et al., 2014)

3 Alternate Reality Games

**Storytelling
+
Puzzles**

Real World ↔ Virtual World

(Chess & Booth, 2014)

Methodology

Participants

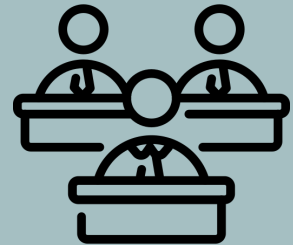
144 students
(5th Grade)

Context

Urban & Rural
Schools in
Greece

Gender

48.3% Male
49.7% Female



Educational Intervention



Timeline	Tools	Teams
4 Class Periods	Tablets and Research book	4 - 5 Students (mixed-ability)

"Roseberry in the Dark"

Narrative-driven learning

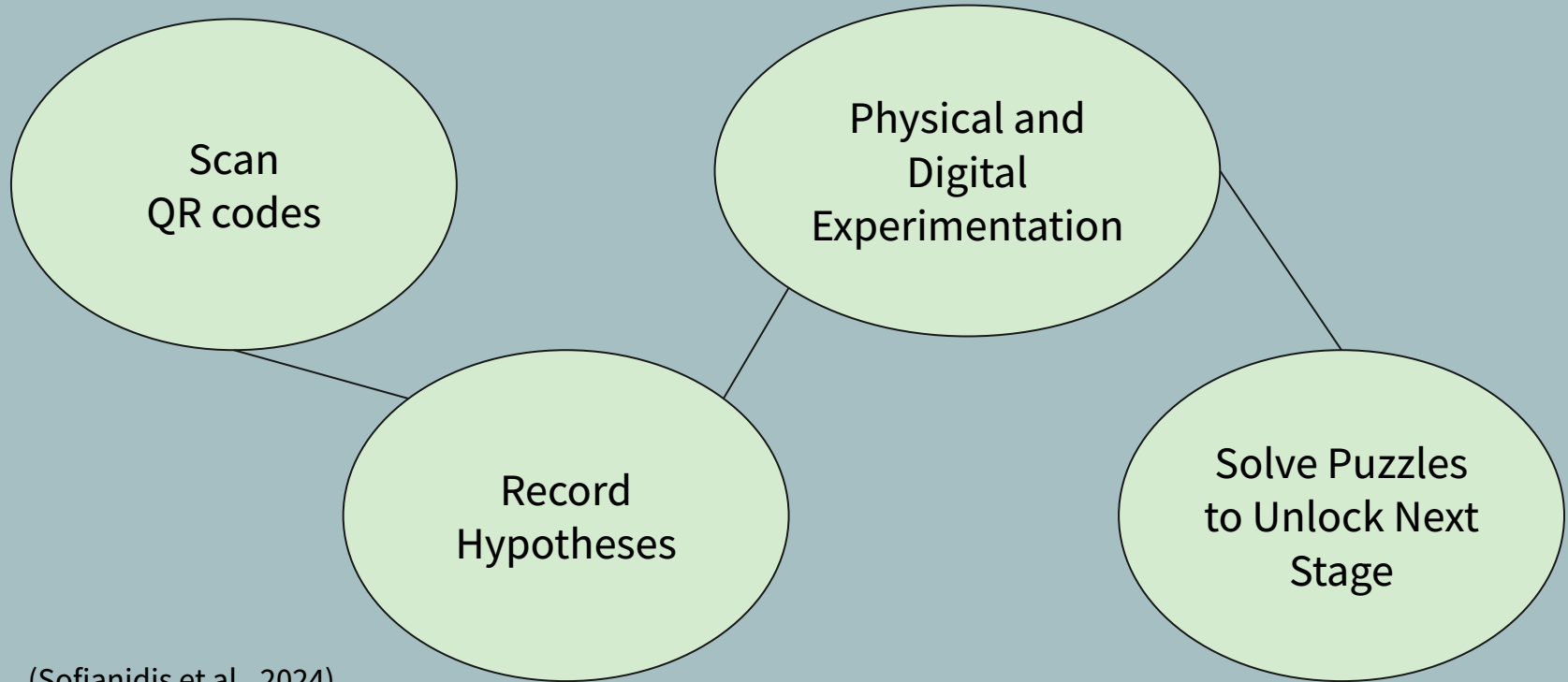


Digital interaction through video
and QR scans

Narration/plot



Procedure



(Sofianidis et al., 2024)



Hands-on experiments



Batteries

Wires

Bulbs

Insulators

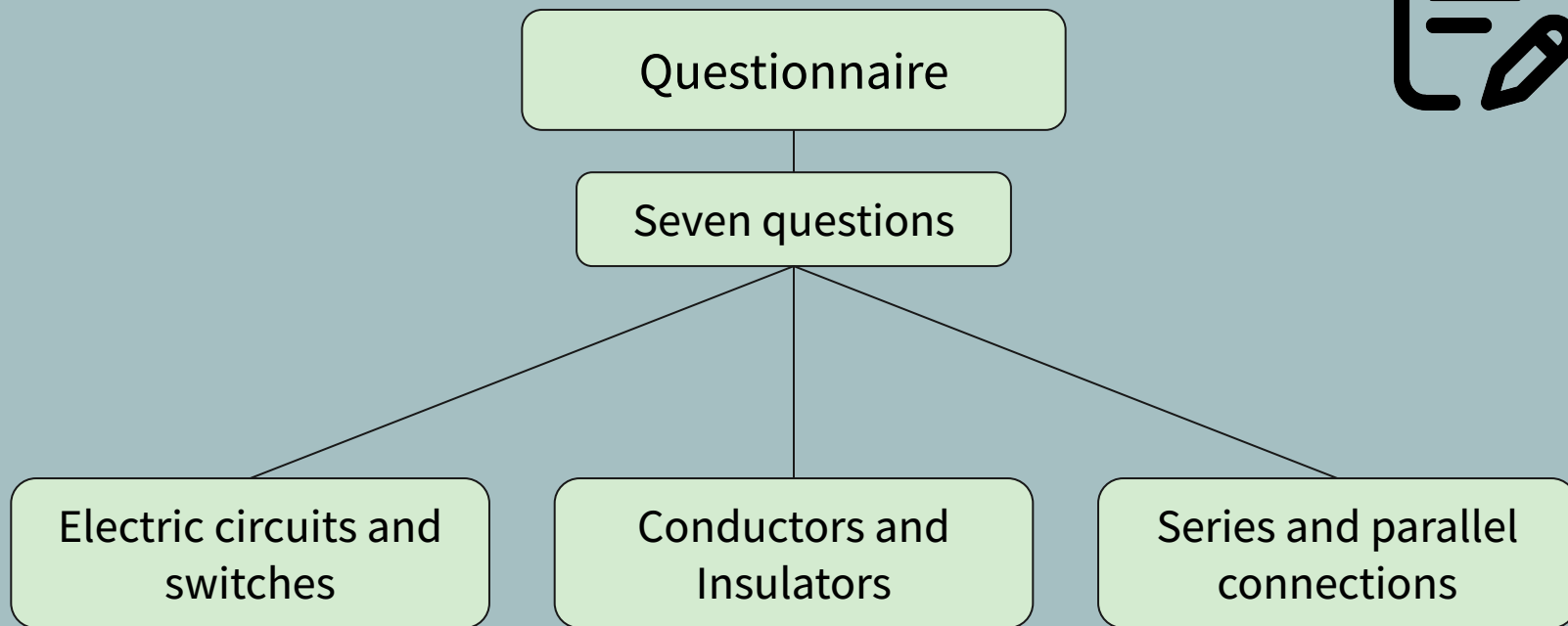
Conductors

Data collection

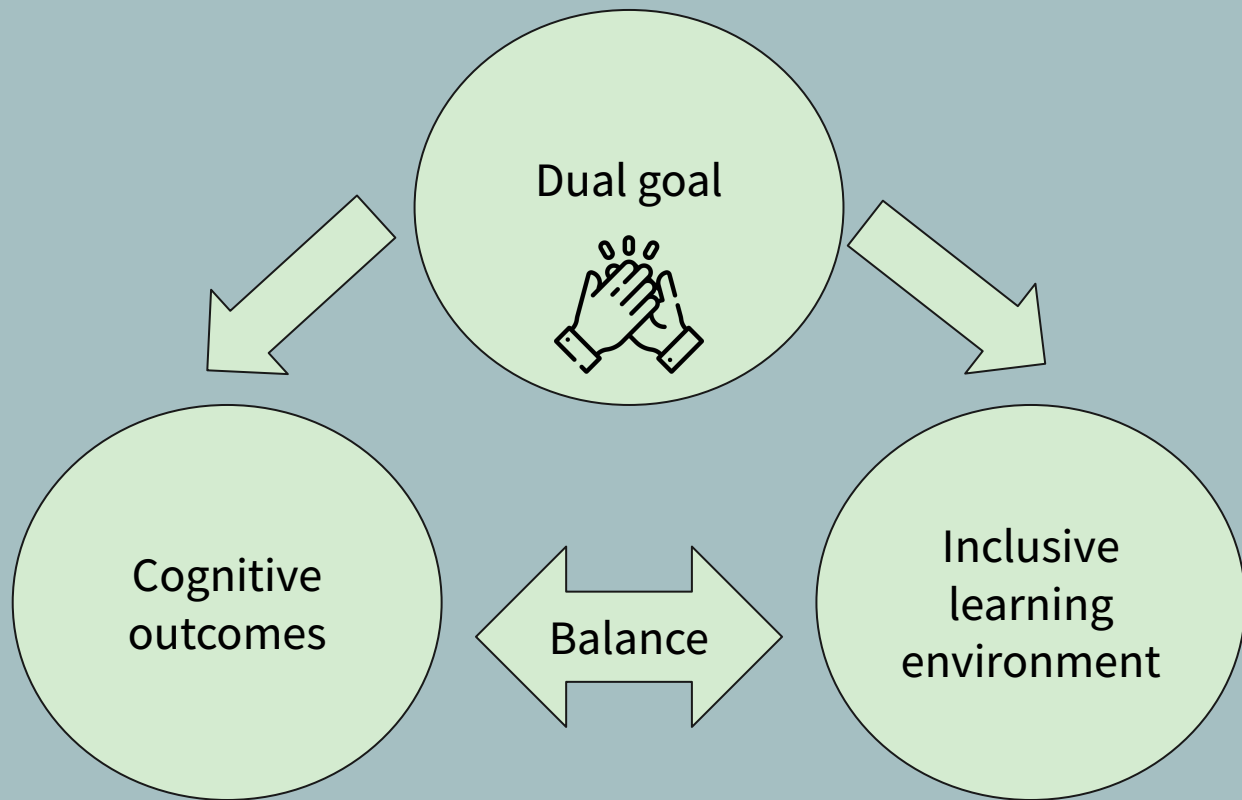
**Pre-test
and
Post-test
(anonymous)**

**Analysis:
Mann-Whitne
y U
test**

Data collection



Conclusions



Conclusions

The IB - ARGI method enhanced

Motivation



Collaboration



Autonomy



Conclusions

Expansion

```
graph TD; A[Expansion] --> B((In others areas of the natural science)); A --> C((At higher educational levels (as Secondary Education)));
```

The diagram illustrates the expansion of a concept into two distinct areas. At the top, a rectangular box labeled "Expansion" has two arrows pointing downwards to two light green circles. The left circle is labeled "In others areas of the natural science" and the right circle is labeled "At higher educational levels (as Secondary Education)". The background is a light blue grid with decorative star clusters in the corners.

In others areas
of the natural
science

At higher
educational
levels (as
Secondary
Education)

References

1. Becker, S., Klein, P., Gößling, A., & Kuhn, J. (2020). Using mobile devices to enhance inquiry-based learning processes. *Learning and Instruction*, 69, 101350.
2. Boeren, E. (2019). Understanding sustainable development goal (SDG) 4 on “quality education” from micro, meso and macro perspectives. *International Review of Education*, 65, 277–294.
3. Carmigniani, J., & Furht, B. (2011). Augmented reality: an overview. *Handbook of augmented reality*, 3-46.
4. Chess, S., & Booth, P. (2014). Lessons down a rabbit hole: Alternate reality gaming in the classroom. *New Media & Society*, 16(6), 1002–1017.
5. Onyema, E. M., Ogechukwu, U., Anthonia, E. C. D., & Deborah, E. (2019). Potentials of mobile technologies in enhancing the effectiveness of inquiry-based learning approach. *International Journal of Education (IJE)*, 2(01), 1–22.
6. Pedaste, M., Mäeots, M., Siiman, L. A., De Jong, T., Van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, 14, 47–61.
7. Radu, I., & Schneider, B. (2019). What can we learn from augmented reality (AR)? Benefits and drawbacks of AR for inquiry-based learning of physics. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1–12). Association for Computing Machinery.
8. Sofianidis, A., Skraparlis, C., & Stylianidou, N. (2024). Combining inquiry, universal design for learning, alternate reality games and augmented reality technologies in science education: the IB-ARGL approach and the case of magnetman. *Journal of Science Education and Technology*, 33(6), 928-953.
9. Meyer, A., Rose, D. H., & Gordon, D. T. (2014). *Universal Design for Learning: Theory and Practice*. Wakefield, MA: CAST Professional Publishing.