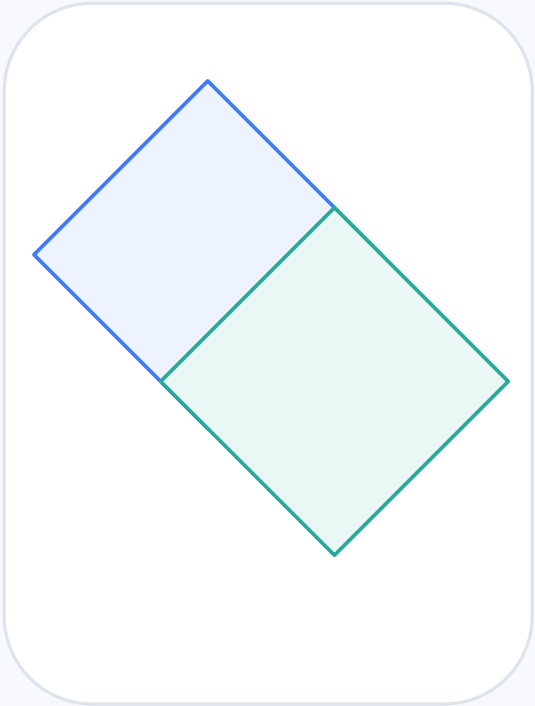
INSTRUCTIONAL DOSAGE OF AUGMENTED REALITY

in secondary school lesson design

Stanislav Zadachyn

3rd-year PhD student
Simon Kuznets Kharkiv National University of Economics

Scientific supervisor: T. Yu. Pohorielova, PhD, Associate Professor



AR is not a yes/no intervention.
Its instructional dose can be designed.

The same AR time can support different lessons

Total duration alone does not describe what students actually do with the technology.

10 minutes total

Continuous exposure

AR available throughout the reasoning process

Distributed exposure

AR | explain / reflect | **AR**

Instructional dose is more than minutes.

- frequency of AR episodes
- position in the lesson sequence
- instructional function
- information density and interaction intensity

Same exposure ≠ same learning sequence

What the evidence suggests

The literature points to a multidimensional design problem rather than a single optimal duration.

1

Duration is not linear

Longer AR exposure can improve performance, but the lowest mental load may occur at an intermediate duration.

2

Frequency matters

A recent meta-analysis found intervention frequency and feedback format to be significant moderators of cognitive load.

3

Design shapes cognitive demand

Working-memory demands depend on interface complexity, guidance, information density, and interacting elements.

Implication: AR dosage should describe how support is organized, not only how long the device is in use.

Instructional dosage: four practical dimensions

A compact framework for deciding how AR is used within a lesson.

TIME & FREQUENCY

How long is each AR episode, and how often do students return to it?

POSITION IN THE LESSON

What happens before, during, and after the AR-supported activity?

INSTRUCTIONAL FUNCTION

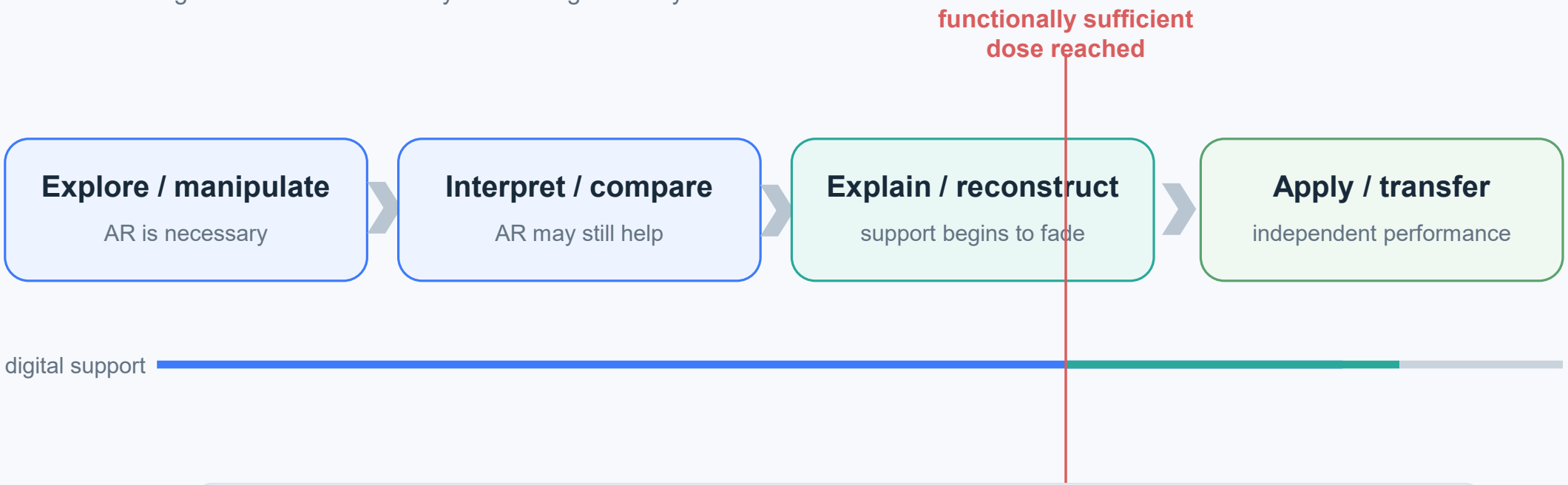
What does AR support: spatial analysis, modelling, inquiry, practice, feedback?

INFORMATION & INTERACTION

How much information, guidance, and manipulation must students handle at once?

The key idea: a functionally sufficient dose

AR is used as long as it remains necessary for the target activity.



The boundary is task-specific. Students can return to AR later if a new operation requires it.

Why fading matters for learning and assessment

Digital support should remain when it is part of the competence, and recede when independent performance is the goal.

LEARNING SEQUENCE

AR-supported performance

reduced prompts / partial support

independent explanation or transfer

ASSESSMENT

Keep AR

when the competence includes manipulating an AR model or conducting an AR-supported experiment.

Reduce AR

when the goal is causal explanation, transfer, recall, or another operation expected to be performed without external support.

Conclusions and the next empirical step

Instructional dosage is a design parameter, not a universal time limit.

Three takeaways

- The same total AR time can represent different instructional doses.
- A functionally sufficient dose depends on the task and on when support is no longer needed.
- Fading support helps separate supported performance from independent learning outcomes.

Proposed experiment

Keep constant	same content • same AR application
Vary	duration • frequency • guidance • fading point
Measure	task performance cognitive load delayed retention transfer without AR

Goal: identify combinations of parameters that are sufficient for specific learning activities.