

Expressing adaptations to take into account in generator-based exercisers an exploratory study about multiplication facts

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Research context

- **Serious games** for the training of **declarative knowledge**
 - require repetition for encouraging memorization and generalization
 - imply the generation of various adapted learning game activities
- Designing such generators...
 - a very complex design
 - involved various dimensions and actors' viewpoints
- Focus on **teachers'** viewpoint at first



Research objective

■ What

- Explore how generation logic and elements are expressed from teacher's viewpoint
- *Game* dimension NOT considered

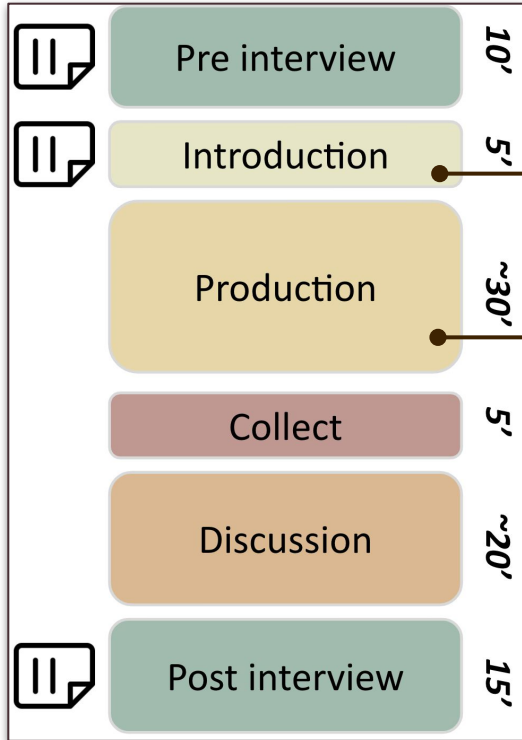


■ How

- Interview-based exploratory study
- Case study about multiplication tables / facts
- Analysis of qualitative data
- Formalization of these elements and logics

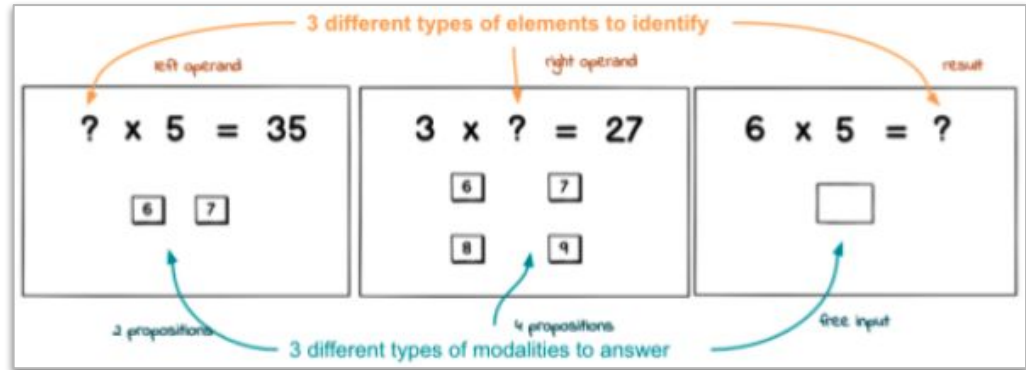


Interview Protocol



Presentation of maths questions and answer modalities

What adaptations to consider?



Collected qualitative data

■ 11 interviews

ID	Main information
#1	6 th grade retired teacher
#2	Middle maths teacher
#3	Maths division pedagogical advisor
#4	2 nd Grade teacher in a priority education zone
#5	Recently graduated of a primary school teaching Master diploma
#6	2 nd Grade teacher
#7	5 th Grade teacher
#8	5 th Grade teacher in a priority education zone
#9	Instructor about teaching adaptations for children with Autism Syndrom Disorder
#10	2 nd Grade teacher
#11	Maths assistant professor in College

Data analysis: main findings

- Didactic viewpoint of the generation of adapted exercises
- Top-down approach
 - from learning paths of objectives and activities for most learners
 - to dedicated paths for groups or single learner
- No explicit specific adaptation or generation rules
- **An implicit and shared generation logic can be identified**

Formalization of teachers' viewpoint

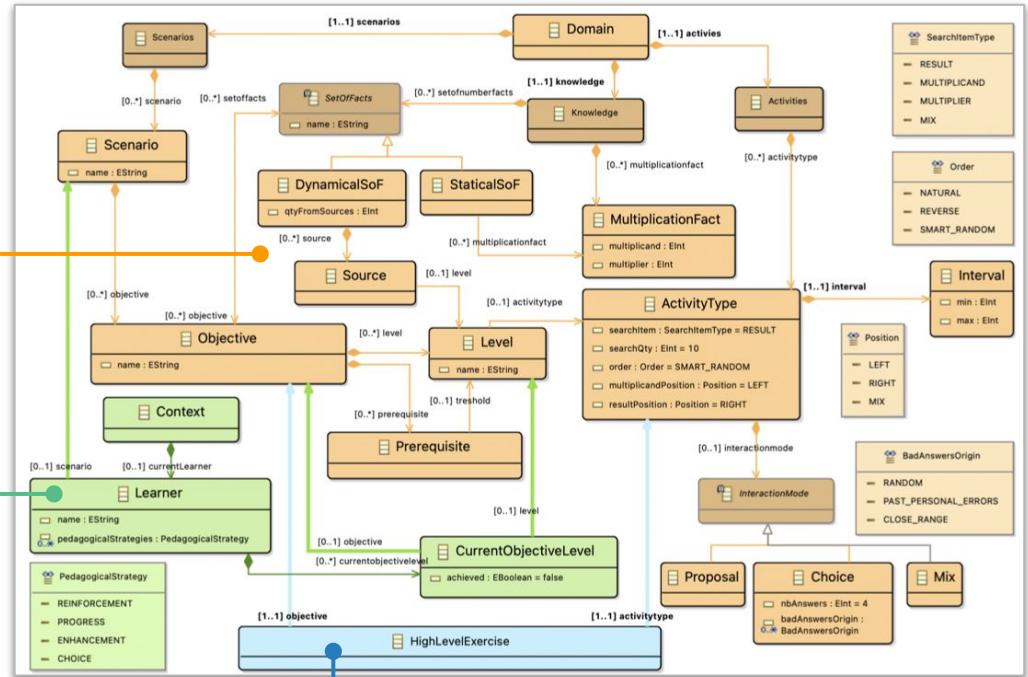
- Explicit elements to consider in the generation
 - as a **metamodel**
- Implicit logics (not expressed by teachers) to realize a high-level generation
 - as an **algorithm**
 - Selection of objectives, parameters, etc. to be considered by the low-level generation
 - domain-independent

Capture of elements as a metamodel

Domain metamodel
Objectives, learning paths,
prerequisites, activities
parameters...

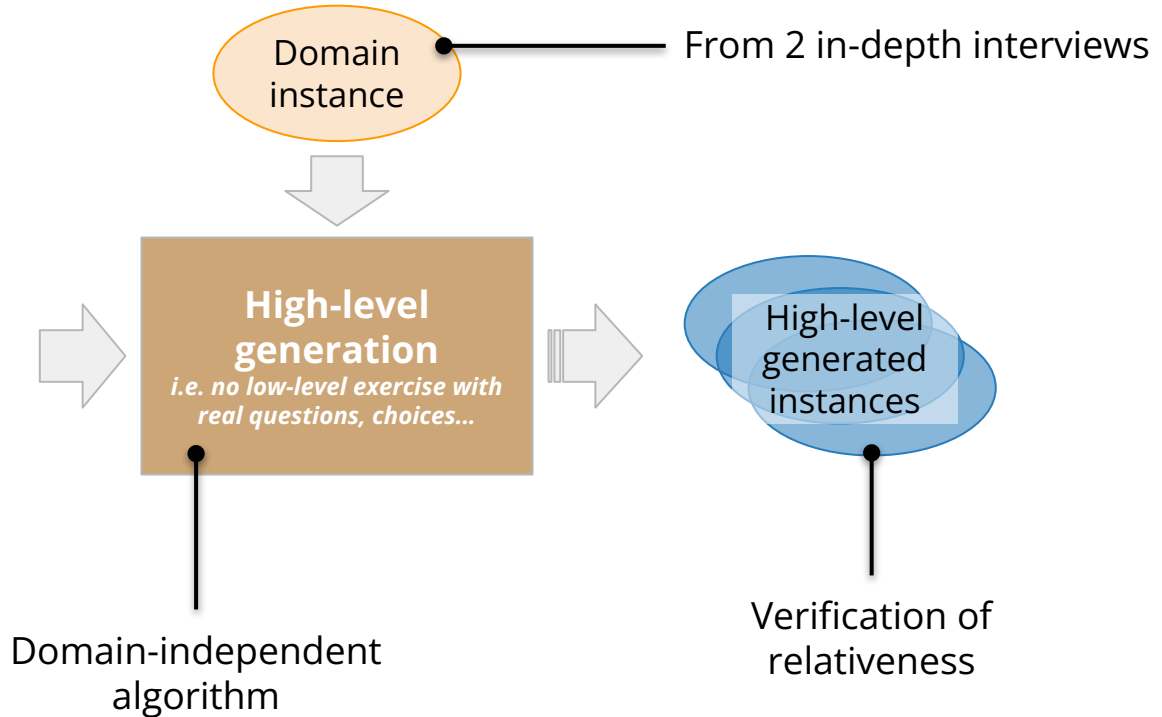
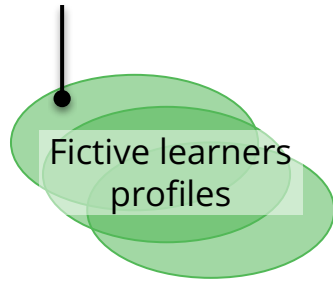
Learner metamodel
Progress, learning path...

High generation metamodel
Selected objective & activity
parameters



Simulating high-level generations

Multiple test cases identified from the metamodel's cardinalities and boundaries



Remaining challenges

- Deal with the **low-level** generation
 - Responsible for the production of an exercise as a list of questionable facts with potential answer proposals...
- Consider more the **learning** dimension
 - Feedbacks, instructions, guidance...
- Consider the **gaming** dimension
 - Gameplay, mechanics, rules, aesthetics...



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Contact us for in-depth discussions



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