# **Guided Tours in ALeA**

Assembling Tailored Educational Dialogues from Semantically Annotated Learning Objects

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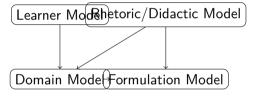
Al4Al Workshop @ ECAl23 2023 - 09 - 30





#### Motivation

#### Context: ALEA



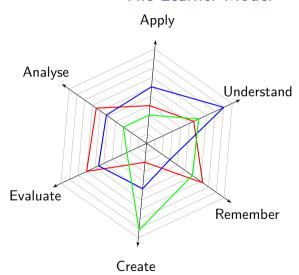


Semantic annotation on the *concept level* in course materials.

```
1 \begin{sassertion} [name=Pythagorean Theorem]
2 \importmodule [geometry] {right-triangle}
3 In a \symname{right triangle}, the \symname{square} of the
4 \symname{hypotenuse} is \symname{equal} to the \symref{plus}{sum}
5 of the \symnames{square} of the other two \symnames{side}.
6 Often, this is expressed as the formula
7 $\definiens{\equal{\plus{\square \a, \square \b}, \square \c}}.
8
9 \includegraphics{right_triangle.png}
10 \end{sassertion}
```

An Example STEX Fragment

#### The Learner Model



foo bar

Educational Dialogues good!

Hello, Jonas. It seems like you want to learn more about the Pythagorean Theorem.

This topic concerns right-angled triangles. Do you already feel comfortable with that topic?

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That is okay. We can do a small exercise and find out. Please try to answer the following problem:

In a right-angled triangle, one of the angles at the longest side is 60°. What would that make the other angle on the longest side?

Hello, Jonas. It seems like you want to learn more about the Pythagorean Theorem.

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That is okay. We can do a small exercise and find out. Please try to answer the following problem:

In a right-angled triangle, one of the angles at the longest side is 60°. What would that make the other angle on the longest side?

30°

Hello, Jonas. It seems like you want to learn more about the Pythagorean Theorem.

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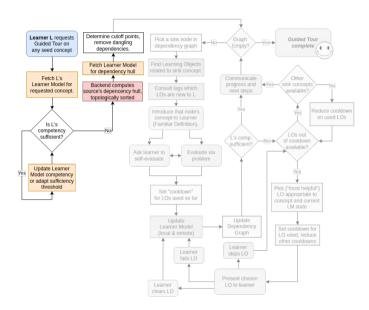
That is correct! Okay, let's talk about the Pythagorean Theorem.

#### Determine cutoff points. Learner L requests Pick a sink node in Guided Tour Granh remove dangling Guided Tour on dependency graph Empty? complete ( any seed concept dependencies. Fetch Learner Model Find Learning Objects related to sink concept for dependency hull Fetch L's Communicate Learner Model for Backend computes progress and sink concents Consult logs which requested concept. source's dependency hull. next steps available? LOs are new to L topologically sorted Introduce that node's Reduce cooldown on used LOs concept to Learner (Familiar Definition). Is L's competency LOs out sufficient? L's comp. of cooldown sufficient? available? Ask learner to Evaluate via self-evaluate problem Undate Learner Model competency or adapt sufficiency threshold Pick ("most helpful") Set "cooldown" LO appropriate to for LOs used so far concept and current I M state Undate Undate Learner Model Dependency Set cooldown for (local & remote) Graph LO used, reduce other cooldowns Learner Learner skips LO fails LO Present chosen Learner LO to learner clears LO

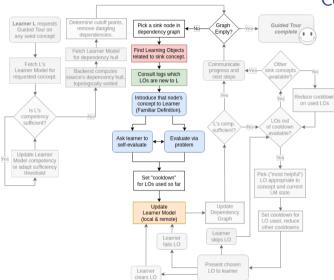
#### Overview

The complete algorithm for guided tours in  ${\rm ALEA}.$ 

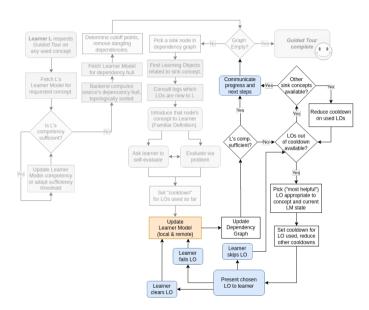
#### Initialisation



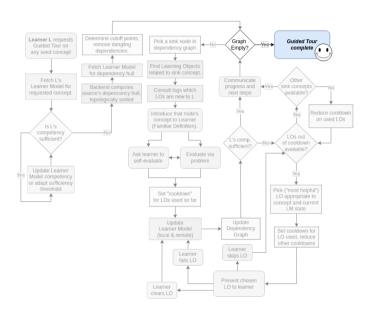
# Concept Introduction



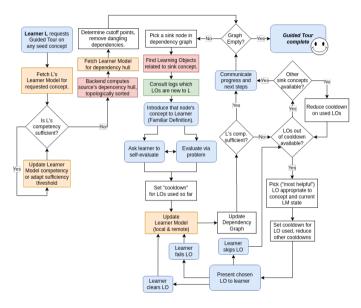
#### Learning



#### **Finish**



#### Recap



The complete algorithm for guided tours in  $\mathrm{ALeA}.$