U!REKA CONNECTS

# Interactive Algorithmic Exercises and Feedback in a Highly Sophisticated Learning Tool

Education, E-Learning System, Automated Assessment, Dynamic and Detailed Feedback

Ibrahim Enes Hayber, Stefan Dusan Kresovic, Jens Liebehenschel

**Project Website**
jensliebehenschel.github.io/ADLT

## MOTIVATION AND CONTEXT

Algorithms and data structures are central topics in computer science education, but many students struggle to connect theoretical concepts with executable program logic. Traditional exercise formats often provide limited feedback and do not support repeated, self-paced practice.

In the module Algorithms and Data Structures, we adapted the learning tool JACK to create interactive algorithmic exercises that combine conceptual questions, code-based tasks and immediate feedback. The goal is to support students while they practice core topics such as searching, sorting, recursion and fundamental data structures.

## EXERCISE TYPES

Our learning tool offers a variety of interactive exercise formats, such as multiple-choice, fill-in, drag-and-drop and dropdown tasks. These formats allow students to practice algorithmic concepts in different ways and receive immediate feedback during the learning process.

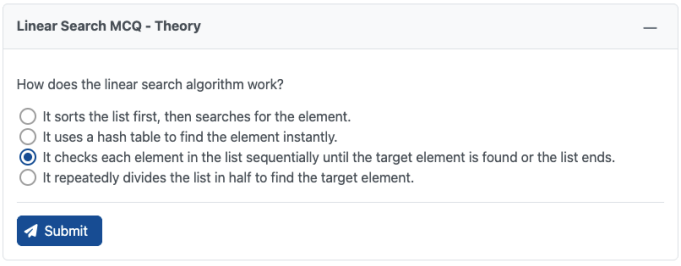


FIG. : Multiple choice question

## FEEDBACK

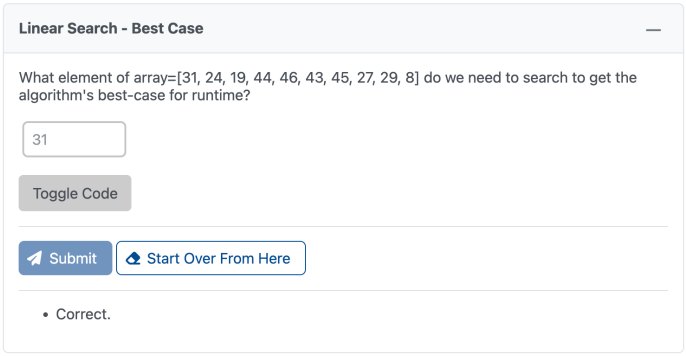


FIG. : Fill-in exercise with feedback

JACK allows us to provide automatic assessment and targeted feedback. Instead of only marking an answer as correct or incorrect, the exercises can explain why a specific choice is appropriate and help students reflect on common misconceptions.

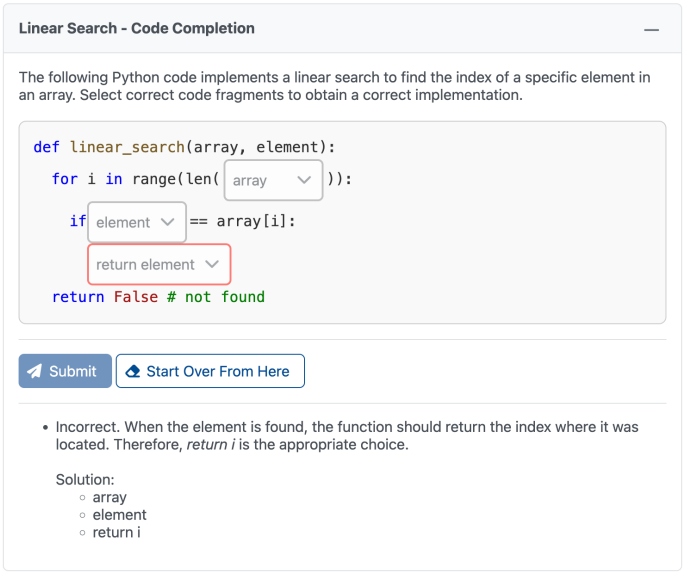


FIG. : Dropdown exercise with feedback

Our learning tool provide students a structured way to practice algorithmic thinking beyond static worksheets. By combining conceptual questions and dynamic feedback, the exercises encourage active learning and allow students to identify errors early. Beyond this module, the approach can be transferred to other courses and study programs that benefit from interactive practice and immediate feedback.