LEO-Based Assessment Tool

User Handbook

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1. Introduction

The **LEO-Based Assessment Tool** is a learning outcome–oriented assessment system developed as part of the *Software Engineering Project* course at **FHTW**.

The system supports **constructive alignment**, where learning outcomes (LEOs – Learning Outcome Elements) define what students are expected to know or be able to do, and assessments measure mastery of these outcomes rather than isolated tasks or grades.

This handbook explains how **teachers** and **students** use the system through the **frontend application**. End users do **not** interact directly with the backend.

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2. System Overview

The system consists of three main components:

- **Frontend Application**: Electron-based desktop application used by teachers and students
- **Backend Service**: Spring Boot REST API handling business logic and data management
- **Database**: Cloud-based PostgreSQL (Neon) for persistent storage

User Roles

- **Teacher**: Manages courses, creates LEO structures, assesses students, and monitors progress
- **Student**: Views courses, checks LEO progress, and receives learning recommendations

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3. Login & Accounts

Authentication

Users log in using a username and password. Each account is assigned a role that determines available features.

Demo Accounts

Teacher Accounts

- Username: `teacher1` / Password: `password`
- Username: `teacher2` / Password: `password`
- Username: `teacher3` / Password: `password`

Role: Teacher
Permissions: - Course management - LEO graph creation and editing - Student assessment - Progress monitoring

Student Accounts

- Username: `student1` / Password: `password`
- Username: `student2` / Password: `password`
- Username: `student3` / Password: `password`
- Username: `student4` / Password: `password`
- Username: `student5` / Password: `password`

Role: Student
Permissions: - View enrolled courses - Check LEO progress - View recommendations

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4. Teacher Guide

4.1 Logging In

1. Start the Electron application
2. Enter teacher credentials
3. After login, the teacher dashboard is displayed

4.2 Course Management

Teachers can: - Create new courses - Edit existing courses - View enrolled students

Each course serves as a container for its own LEO structure and assessments.

4.3 Creating and Managing LEO Graphs

A **LEO (Learning Outcome Element)** represents a concrete, assessable learning objective.

Key Concepts

- LEOs are organized as a **graph**, not just a simple list or tree
- LEOs can have **dependencies** (prerequisites or implied outcomes)
- Mastering a higher-level LEO may imply mastery of lower-level LEOs

Actions

Teachers can: - Create new LEOs - Define dependencies between LEOs - Edit or delete LEOs

The LEO structure visually represents learning progression within a course.

4.4 Assessing Students

Teachers can record and update assessment results for each student and LEO.

Grading Scale

Each LEO can have one of the following states:

- **Not Reached**
- **Partially Reached**
- **Reached**
- **Unmark**

Assessment Process

1. Select a course
2. Select a student
3. Choose a LEO
4. Assign an assessment status

4.5 Cascade Grading Logic

The system automatically applies **cascade rules**:

- When a **higher-level LEO** is marked as *Reached*, all dependent (lower-level) LEOs are automatically updated
- This reflects implied mastery (e.g., mastering 3-digit multiplication implies mastery of 2-digit multiplication)

This ensures consistent and transparent grading.

4.6 Progress Monitoring & Recommendations

Teachers can: - View individual student progress - See overall course progress - Review system-generated recommendations for next LEOs

Recommendations help identify which learning outcomes a student should work on next.

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5. Student Guide

5.1 Logging In

1. Start the Electron application
2. Enter student credentials
3. Access the student dashboard

5.2 Viewing Courses

Students can: - See all courses they are enrolled in - Open a course to view its LEO structure

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5.3 Checking LEO Progress

For each course, students can:

- View all LEOs
- See the current status of each LEO
- Track their learning progress transparently

The list-based view provides a clear and precise overview of learning outcomes.

5.4 Recommendations for Next LEOs

The system automatically suggests **next possible LEOs** based on:

- Current assessment status
- Dependency rules
- Unlocked learning paths

These recommendations help students focus on achievable next steps.

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6. General Notes

- Users do not interact with the backend directly
- All actions are performed via the frontend UI
- Data is stored securely in a cloud-based database
- The system supports multiple teachers and students

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7. Purpose and Educational Value

The LEO-Based Assessment Tool supports:

- Transparent assessment
- Outcome-oriented learning
- Consistent grading across students and courses
- Clear visualization of learning progress

By focusing on **what students can actually do**, the system improves both teaching and learning experiences.

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8. Support & Documentation

Additional documentation is available in the project repositories:

- Frontend Repository: https://github.com/piy678/SENGPRJ_Group6_FrontendPart
- Backend Repository: https://github.com/piy678/SENGPRJ_Group6

This user handbook is shared between frontend and backend projects and reflects the system from an end-user perspective.

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