

An authentic task-based curriculum to deliver practically skilled laboratory technicians with critical thinking and problem-solving skills

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INTRODUCTION

The undergraduate educational program of ‘Biology and Medical Laboratory Research’ at the University of Applied Sciences Leiden (The Netherlands) specifically trains students to become biomedical laboratory research technicians with a Bachelor of Science (B.Sc.) qualification.

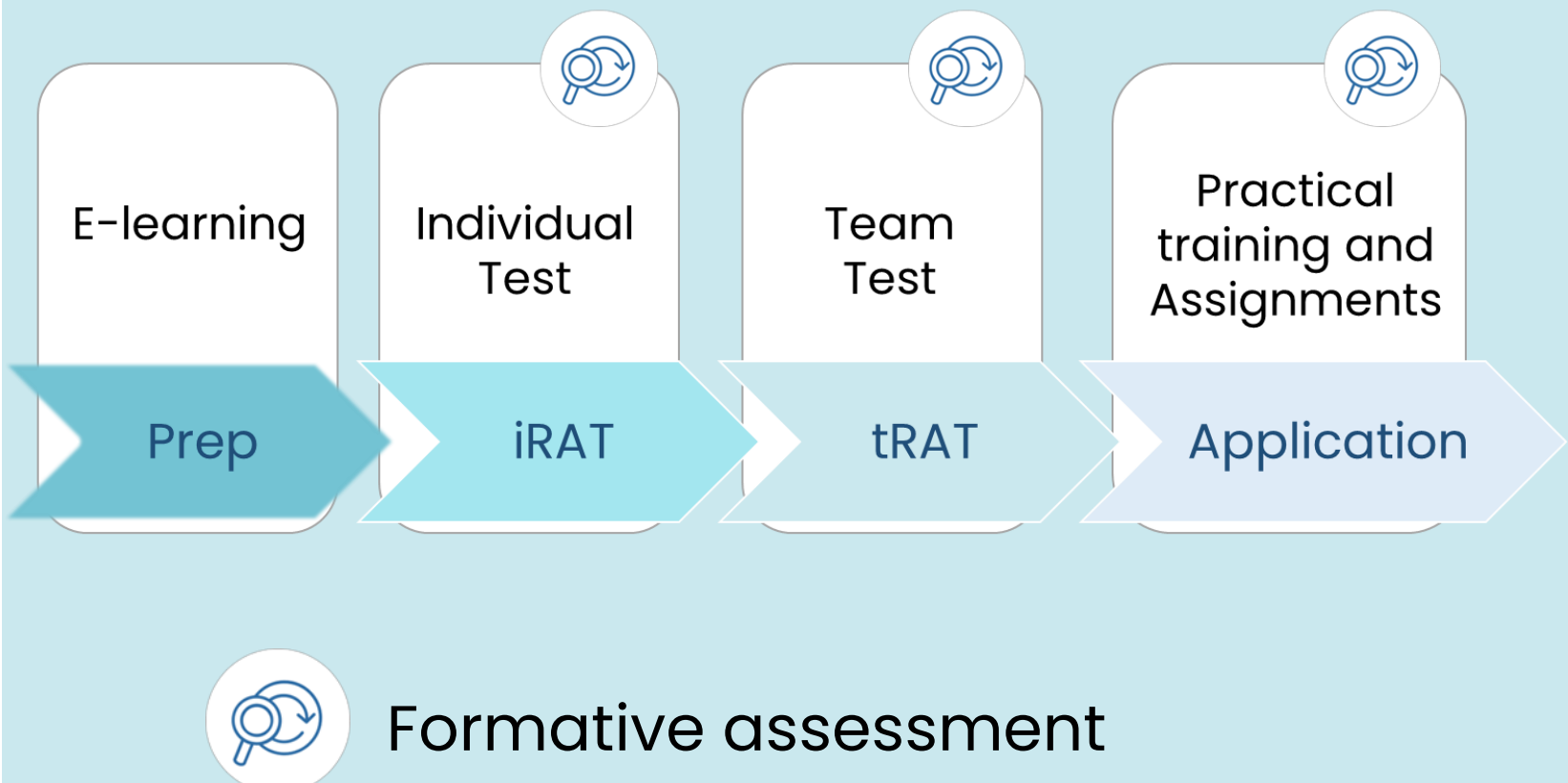
To facilitate development of practical laboratory skills, as well as critical thinking and problem solving skills, we **developed an inquiry-based curriculum framework** that incorporates authentic task-based and iterative learning.

This curriculum consists of two main tracks that are based on authentic tasks a technician performs in the laboratory setting of the biomedical work field, providing an authentic context for their learning:

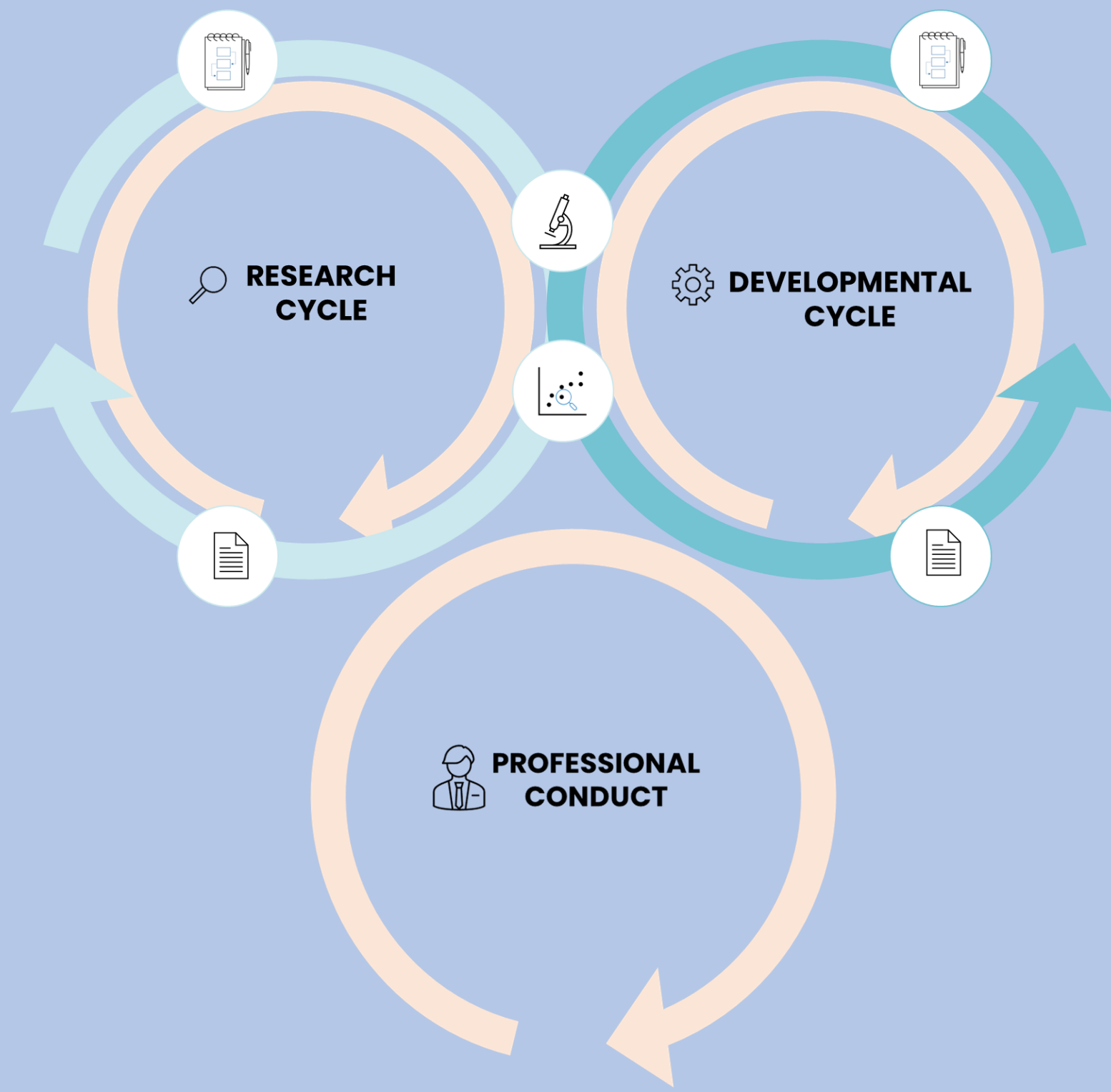
- Skills & knowledge track
- Project track

SKILLS & KNOWLEDGE TRACK

In this track students learn biological concepts on the molecular, cellular and population level using e-learnings, team-based learning lessons and practical trainings. Students learn all basic laboratory techniques and (big) data analysis.



PROJECTS



- Preparation of project plan:** Written experimental plan based on research question
- Execution of project plan:** Performance of laboratory experiments
- Analysis results:** (Statistical) analysis and interpretation of results
- Reporting:** Written or oral report of project

LEARNING OUTCOMES

Learning outcomes are described as tasks a laboratory technician performs on molecular, cellular or population level



The technician isolates, detects and quantifies macromolecules and characterizes variation in macromolecules

The technician characterizes and analyses cellular processes

The technician manipulates cellular processes using genetic or phenocopy-based techniques



The technician isolates, identifies, characterizes and quantifies microorganisms

The technician cultures, maintains, quantifies and characterizes eukaryotic cells and tissues

The technician characterizes and analyzes tissues, organs and physiological processes



The technician analyses and maps evolutionary processes

PROJECT TRACK

In the project-based track integral learning is facilitated by combining the obtained knowledge and skills to set up and carry out experiments and analyze and report results from authentic research studies.

These studies are either hypothesis-driven or focused on process development, optimization and validation within the context of the pharmaceutical companies, academic medical centers, university institutes or the plant industry.

