# TEASER

# Teacher as Avatar

## Teaching and learning scenario

## Creation of the visualization of the LC2030 – with avatars



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# Contents





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# I. Master Data and Context

- **Scenario Title and Abstract:** The scenario is titled **"Creating the LC2030 Visualization – with Avatars".** In this learning unit, the trainees independently create a complete digital **visualization of the LC2030 chemical test facility**. In the process, they acquire practical expertise in **process automation and chemical process engineering**. The use of **no-code avatars** serves to interactively demonstrate the functionality of the system and to strengthen the media competence of the learners. Methodologically**, station-based learning** is pursued that closely links theory, practice and reflection.
- **Occupational field and target group:** This scenario is primarily located in the occupational field of **chemistry, process engineering and laboratory professions** .
  - **Target group:** The learning unit is aimed at **trainees (VET apprentices),** especially prospective **chemical technicians** as well as **chemistry and biology laboratory technicians**.
  - **Learning level:** The scenario is designed for apprentices from the **2nd year of apprenticeship** . It requires that the participants already have a basic understanding of technical processes and now learn to transfer them into digital control interfaces.
- **Learning objectives:** The competencies to be acquired are divided into the following areas:
  - **Knowledge:** Participants understand the theoretical **basics of plant visualization** as well as the specific functions and components of the **LC2030 test facility**. They know the importance of signal processing and the principles of process image creation.
  - **Skills:** The learners have mastered the practical **operation of the visualization software** (e.g. Winners laboratory version). You will learn the skill of drawing dynamic filling surfaces for containers, correctly assigning signal and group designations (e.g. "LI 101") and **creating dynamic bitmaps for pump states** (red/green change). They can also draw animated pipelines to visually represent material flows.
  - **Competencies:** The trainees develop the competence to **solve problems independently** in the design of digital control interfaces. They strengthen their **media literacy** through targeted interaction with no-code avatars as digital tutors. Finally, they acquire the ability for **formative self-evaluation** by critically comparing and optimizing their created visualization with the real plant function.



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# II. Educational Design

- **The "Educational Question":** The central pedagogical question of this scenario is: **"How can specialized specialist knowledge at complex chemical plants (such as the LC2030) be taught individually and asynchronously in order to strengthen the media competence of the trainees at the same time?"**. The background to this is the problem identified in the needs analysis that trainers often suffer from a massive lack of time and repetitive technical explanations of plant functions tie up valuable resources. The use of **no-code avatars** solves this problem by providing consistent, always-on instructions that relieve instructors of standard instruction. In addition, it addresses the challenge of making abstract process flows in process engineering more tangible and motivating through interactive visual representations.

- **Didactic setting:** The scenario is theoretically embedded in the **SAMR model** and the European competence framework **DigComp 2.2** (or DigCompEdu). In the sense of the SAMR model, the stage of **"modification" is** reached, as the learning task is functionally changed by the integration of avatars and AI-supported decision points in such a way that asynchronous, individual instruction is possible directly at the facility. **Station-based learning is used** as a teaching method , which can be carried out individually or in small groups. The learners use mobile devices to start specific avatar videos via **QR codes** on the system, which guide them step by step through the creation of the process image. This combination of theory (visualization principles), practice (software operation) and reflection specifically promotes professional competence.

- **Role of the trainer/teacher:** In this scenario, the teacher transforms from primary knowledge broker to **moderator, coach and pedagogical advisor**. While the avatar takes on the role of a "digital twin" and explains the technical basics and operating steps, the instructor concentrates on the following tasks:
  - **Moderation:** Introduction to the learning unit and explanation of the overarching learning objectives.
  - **Individual coaching:** Answering specific technical questions about plant control or process engineering that go beyond the standard avatar instructions.
  - **Learning process support:** Support for trainees in the use of digital tools and in the transfer of theoretical instructions into the visualization software.
  - **Feedback provider:** Implementation of a formative evaluation, in which the created visualizations are jointly reflected on and assessed on the basis of target values.



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# III. Technological implementation

- **AI and avatar solution:** In the scenario for visualizing the LC2030, **2D linear AI-generated avatars** are primarily used, as they enable simple and practical handling in everyday laboratory life. The avatar takes on the role of a **digital tutor and course facilitator**, who asynchronously introduces the learners to the theoretical basics of plant visualization and explains complex process flows in chemical process engineering. A specific interactive component is that the avatar sets specific decision points at the end of video sequences **or asks comprehension questions that** must be answered by the trainees in the learning management system. Although the project also experimented with 3D environments, the focus here is on the consistent and low-threshold transfer of specialist knowledge through visual representations.
- **Technical tools:** The technological basis for this scenario consists of an integrated chain of hardware and software components:
    - **AI text and script tools: ChatGPT (especially GPT-4)** is used to didactically optimize the instructors' raw technical manuscripts and to automatically create quizzes from the video transcripts.
    - **Avatar and speech generation:** Tools such as **HeyGen, Synthesia or Colossyan** are used for visual animation ; the high-quality, natural speech output is **synthesized by Eleven Labs** (11 Labs).
    - **Plant software:** For the actual creation of the process image, the visualization software **Winners (laboratory version)** or WinAR is used.
    - **Hardware triggers:** In the technical center**, QR codes** are attached directly to the LC2030, which **can be scanned via tablets or smartphones** and provide direct access to the task-related instruction videos.
- **Software hopping approach:** The creation of the learning content follows the principle of **"software hopping"** established in the TEASER project, in which various low-threshold applications are combined to achieve professional results without any programming effort:

1. **Content recording:** Teachers first record classic learning videos or create basic technical texts on how to operate the system.

2. **AI text optimization:** These texts are entered into **ChatGPT** to refine them linguistically and transfer them into a structured avatar script.

3. **Audio synthesis:** The final text is uploaded to **Eleven Labs** to generate a living AI voice.

4. **Avatar Animation:** The audio file and script are imported into **HeyGen or Synthesia** to lip-sync the selected avatar.

5. **Distribution:** The finished videos are **made available** on YouTube and linked via **QR codes**, with interactive elements such as **H5P** for 360-degree environments being added.



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# IV. Detailed Lesson Plan

The teaching unit dovetails theoretical knowledge of process automation with the practical creation of digital control interfaces under the guidance of AI media.

## 1. Introduction and orientation

- **Duration:** 30–45 minutes.
- **Content:** The apprentices receive an introduction to the basics of **plant visualization** and the operation of the **LC2030** chemical test facility. A central focus is on increasing **media literacy** through targeted interaction with the digital avatar.
- **Activities:**
  - **Apprentices:** Start the avatar by scanning the **QR code** at the system, follow the video instructions on their mobile device and take notes on the first operating steps.
  - **Teachers:** Act as **moderators**, answer technical questions about the LC2030 and support the correct use of the avatar instructions.
- **Media:** Avatar video for system operation, QR codes, mobile devices (tablets/smartphones), instruction script.

## 2. Execution of the task

- **Duration:** 60–90 minutes.
- **Contents:** Practical creation of the process image in the software **Winners (laboratory version).** This includes signal control for tasks such as heating and pumping as well as the graphical implementation of system statuses.
- **Activities:**
  - **Learners:** Create the visualization independently according to the script. Steps include drawing **dynamic fill surfaces** for containers (adjusting the upper limit to 35 cm), mapping signals (e.g., "LI 101"), inserting dynamic bitmaps for **pump states** (red for off, green for on), and drawing animated piping that changes color to blue when the flow is active.
  - **Lecturers:** Provide targeted assistance in case of uncertainties in software operation, support signal assignment and provide technical feedback.
- **Media:** LC2030 test facility, laptop/PC with visualization software, avatar video suite.



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## 3. Evaluation / Review

- **Duration:** 45–60 minutes.
- **Contents: Formative self-evaluation and external evaluation** of the work results as well as reflection on the increase in professional and media competence.
- **Activities:**
  - **Learners:** Operate the LC2030 via their self-created visualization (individually or in groups of two), document the results, reflect on their performance and make necessary adjustments in the event of deviations.
  - **Teachers:** Provide structured **evaluation forms** (evaluation questionnaires), accompany the reflection process and support learners in self-assessment.
- **Media:** Questionnaires for specialist knowledge and media literacy, visualization tools, note-taking material.

## 4. Completion of the session

- **Duration:** 30–45 minutes.
- **Contents:** Summary of the learning experiences in the operation of the system and the independent use of digital media.
- **Activities:**
  - **Learners:** Conduct **self-reflection** on their learning experiences and engage with peers on how to use the avatar and the LC2030.
  - **Lecturers:** Conclude the unit with a presentation, moderate the final discussion and give valuable advice for transfer to further **laboratory and workshop practice**.
- **Media:** LC2030, avatar video suite, presentation media (e.g. whiteboard or screen).

# V. Resources and collateral

## 1. Videos

The scenario is based on an AI-optimized video guide:

- **Visualization of LC2030**
  - *Introduction:* The avatar greets the learners and introduces them to the basics of process automation with the software **"Winners Lab Version".**
  - *Process Steps:* Detailed explanation of renaming projects, opening the startup version, and enabling signal mapping.
  - *Technical parameters:* Step-by-step instructions for creating **dynamic fill surfaces**. In this context, explicit reference is made to the adjustment of the upper limit to **35 cm** (capacity of the LC2030 containers) and the assignment of the signal **"LI 101".**
  - *Animations:* Description of the integration of dynamic bitmaps for pump states (signal **"M2").** The text explains the color change between **red (state 0/off)** and **green (state 1/on)** as well as the representation of water flow by blue animated pipes.
  - *Summary:* The avatar asks the learners to complete the visualization on their own using the instruction script.

## 2. Interactive Components

In order to ensure learning progress and to practice operating the system in a safe environment, the following components are used:

- **Avatar-based knowledge quizzes:** At the end of each video sequence, a digital avatar asks specific comprehension questions.
  - *Topics:* Correct signal assignment, interpretation of system states and logic of level calculation (e.g. "What is not in the left container must be in the right").
- **360-degree learning environment (H5P/Hedra):** Embedded in the scenario is an immersive environment in which trainees can interact with virtual objects to retrieve in-depth information about the plant components.
- **Software simulation:** The "Winners" software itself acts as an interactive component, as it makes it possible to connect the virtual control interface live to the real system and to test reactions (e.g. pressing buttons, switching on lamps).



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## 3. Media Portfolio

The portfolio includes all digital assets necessary to carry out and document the learning unit:

- **AI avatar videos:** Created with the "technical chain" of **HeyGen** (animation) and **Eleven Labs** (high-quality voice generation), which act as digital tutors directly at the facility.
- **QR code system:** Physical triggers are attached directly to the LC2030 test facility. When scanning via tablet or smartphone, the appropriate video suite for the respective work step is automatically started.
- **Visualization Guides:** Digital screenshots of the correct software settings in Winners serve as reference values for comparing your own work.
- **YouTube integration:** All learning videos are hosted on a central channel for asynchronous use.



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