TEASER

Teacher as Avatar

Teaching and learning scenario

Python Basics with AI Avatars

Guidance

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I. Master Data and Context

- **Scenario Title and Abstract:** The scenario is titled **"Python Basics with AI Avatars Guidance".** It provides a basic introduction to the world of programming for beginners in the IT and software development field. The core content includes teaching fundamental **Python concepts such as variables, loops, functions, and conditions**. The special feature of this scenario lies in the methodological combination: An **AI-generated avatar (Synthesia)** guides through the learning content, while the learners use the **Programiz Online Python Compiler** to test their codes and use **ChatGPT** as an interactive "buddy" for debugging and the development of learning strategies.

- **Professional field and target group:** This scenario is located in the professional field of **IT, software development and general digital skills** . The target group is divided into:

  - **Apprentices:** Programming beginners, VET learners at the beginning of their Python training, as well as people from unrelated fields such as business or finance who need to acquire basic IT skills.

  - **Teachers:** IT instructors and VET teachers who want to integrate innovative digital tools into their teaching. The scenario is designed to give learners without a deep technical background access to abstract coding concepts.

- **Learning objectives:** The competencies to be acquired are divided into three categories:

  - **Knowledge:** Understanding of basic Python syntax and logic (variables, data types, control structures such as loops and conditions) as well as the role of AI support in the modern programming process.

  - **Skills:** The ability to execute program code independently, identify errors in the code (debugging), adapt existing code to new requirements, and interact specifically with AI tools to support programming.

  - **Competencies:** Development of strategies for **independent problem solving** and iterative testing. Learners are enabled to systematically correct errors using AI-supported approaches and to develop a critical reflection on the possibilities and limits of AI in programming.

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II. Educational Design

- **The "Educational Question":** The central pedagogical challenge in programming education is that beginners often have difficulty grasping **abstract coding concepts** and are quickly frustrated **when debugging**. The scenario addresses the specific question: **"How can AI-powered avatars in the LMS act as real-time companions to help learners troubleshoot Python programming?"**. The use of AI and avatars solves this problem by providing clear step-by-step explanations, reducing cognitive overload and making learners feel like they have a **"24/7 coding buddy"** by their side.
- **Didactic setting:** The scenario is embedded in the European competence frameworks **DigComp 2.2** and **DigCompEdu**, with particular support for problem-solving and digital content creation. In the **SAMR model**, the unit reaches the level of **"modification" as** AI-powered iterative troubleshooting and code optimization functionally changes and deepens the learning process. The teaching method follows the **4-phase model established in the project**:
  1. **Orientation: (5 min.)** An avatar introduces Python basics (variables, loops, functions).
  2. **Completion (8 mins):** Learners independently create a "Hello World" program in an online compiler.
  3. **Evaluation/Check (10 min.):** Active troubleshooting of faulty code snippets with the support of ChatGPT.
  4. **Conclusion (8-10 min.):** Joint reflection on the possibilities and limitations of AI in programming.
- **Role of the trainer/teacher:** In this scenario, the teacher acts primarily as a **facilitator and coach**. It takes a back seat as a knowledge broker, as the theoretical content is covered by the avatar and the AI. Responsibilities include:
  - **Introduction and guidance:** Set the framework for the session and guide learners in using the online compiler.
  - **Learning process monitoring:** Observe progress, take notes on interaction behavior with AI and provide support in the event of technical hurdles.
  - **Facilitation and clarification:** Lead the final discussion round to clear up misunderstandings and ensure that the pedagogical goals have been achieved.

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III. Technological implementation

- **AI and avatar solution:** In this scenario, an **AI-generated avatar is** used, which primarily provides **linear instructional content** and walkthroughs of programming concepts. The avatar takes on the role of a **structured visual instructor** in the learning process, introducing the topics, demonstrating code examples and guiding the learners step by step through the exercises. This visual guidance complements the AI's text-based feedback and acts as a motivating element to reduce the cognitive load of learning abstract syntax rules. It mainly uses **2D avatars** created using specialized platforms to ensure consistent knowledge transfer without human intervention at each session.

- **Technical tools:** The technical infrastructure is based on a combination of web-based platforms and standard hardware:

  - **AI Avatar Tool: Synthesia** is used to quickly generate the video tutorials, converting text into lip-sync avatar speeches.

  - **Interactive AI (Assistant): ChatGPT** serves as a real-time companion for questions and answers (Q&A) as well as a crucial tool for **debugging** (debugging) in the program code.

  - **Programming tool:** The **Programiz Online Python Compiler** is used as an integrated development environment in the browser, allowing learners to execute and test code directly without having to install software locally.

  - **Learning Platform (LMS):** Content is integrated with a popular **LMS such as Learnpress** , which acts as a one-stop shop for videos, quizzes, and interactive paths.

  - **Hardware:** Performed on standard **laptops or PCs** with stable internet access.

- **Software-hopping approach:** The creation of the learning content follows the **low-threshold "software-hopping approach" established in the TEASER project**, which interlocks various tools with each other without any programming effort.

1. **Content optimization:** First, technical scripts are created and linguistically refined by **ChatGPT** to ensure a didactically valuable approach.

2. **Video production:** These optimized texts are imported into **Synthesia** to generate the avatar that explains the theoretical basics (such as variables and loops).

3. **Interactive application:** The finished videos are combined in the LMS with the **Programiz Compiler** and specific **ChatGPT prompts** . This process allows instructors to create professional and interactive digital learning experiences even without in-depth multimedia skills.

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IV. Detailed Lesson Plan

This lesson plan is designed to teach novice programmers basic Python concepts in an interactive, AI-powered environment.

1. Introduction and orientation

- **Duration:** 5 minutes.
- **Content:** Learners will be introduced to the importance of programming with **Python**, a language used by companies such as Google, Netflix, and NASA. Core concepts such as **variables** (as "labeled boxes"), **loops** for automation, **conditions** for logical decisions, and **functions** as reusable pieces of code are presented. In addition, the role of AI as a "24/7 coding buddy" is explained.
- **Activities:**
    - **Learners:** Viewing the avatar-based video tutorials and first interactions with ChatGPT.
    - **Teacher:** Gives an overview of the session, guides learners through the setting, and highlights the key points of the video tutorials.
- **Media: Synthesia avatar videos**, ChatGPT.

2. Execution of the task

- **Duration:** 8 minutes.
- **Contents:** Practical application of basic Python functions. The goal is to create and execute a first program that outputs a message on the screen.
- **Activities:**
    - **Learners:** Use the **Programiz Online Python Compiler** to output a message such as "Hello, Geo". They delete existing sample code and write their own commands based on the avatar instructions.
    - **Teacher:** Guides learners in interacting with the online compiler, monitors progress through note-taking, and moderates group sharing.
- **Media:** AI avatars, **Programiz Online Python compiler**.

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3. Evaluation / Review

- **Duration:** 10 minutes.
- **Contents: Troubleshooting** and correction of common coding errors (bugs).
- **Activities:**
    - **Learners:** Complete the **"Fix the Code"** challenge. They analyze erroneous code snippets (e.g., misspellings such as prnt instead of print, or missing quotation marks). They use ChatGPT specifically for tips ("Why doesn't my code work?") and present their solutions.
    - **Teacher:** Provides feedback to fill knowledge gaps, reinforces the concepts learned, and performs an evaluation of the results.
- **Media:** ChatGPT, Programiz Compiler, AI Avatar.

4. Completion of the session

- **Duration:** 8–10 minutes.
- **Contents:** Summary of what has been learned and reflection on the use of AI in software development.
- **Activities:**
    - **Learners:** Summarize the learning outcomes and discuss the main challenges and the help provided by AI.
    - **Teacher:** Moderates the final discussion, addresses the limits of AI and the importance of human intervention, and clears up any final misunderstandings.
- **Media:** Group discussion, moderated by the teacher (facilitator).

V. Resources and collateral

1. Videos

The theoretical teaching is based on **Synthesia avatar videos:**

- **Phase 1: Unlock the Power of Python – Your First Steps into Coding**
    - *Content:* Definition of programming as a step-by-step instruction for computers. Introduction to Python as a beginner-friendly language used by Google, Netflix, and NASA.
    - *Concepts:* Explanation of **variables** (data that can change), **loops** (repetition of actions), **conditions** (control of logic), and **functions** (reusable pieces of code).
    - *AI role:* Introducing AI as a **"24/7 coding buddy"** that helps debug and learn.

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- **Phase 2: Python Functions and Syntax Basics**
    - *Content:* Focus on **syntax** as the "grammar of the code".
    - *Practice:* Explanation of the print() function for displaying messages, using variables as "containers" for information, and using **comments (#)** for human readability.
    - *Instruction:* Prompt to open the **Programiz Online Compiler** and write a first program ("Hello, Geo").
- **Phase 3: Fix the Code**
    - *Content:* A coding challenge for troubleshooting.
    - *Examples:* Analysis of snippets with typos (e.g. prnt instead of print) or missing punctuation marks (quotation marks, brackets).
    - *Motivation:* Debugging is described as a way to **build** up "programming superpowers".

2. Interactive Components

The scenario integrates various tools for active, exploratory learning:

- **ChatGPT as a debugging assistant:** Learners are expressly encouraged to consult ChatGPT directly in the event of error messages (e.g. "Why doesn't my code work?"). The AI provides step-by-step instructions for troubleshooting.
- **AI-supported basics quiz:** After completing the tasks, a **4-question quiz** on the Python basics can be started.
    - *Feedback loop:* The AI not only outputs a score, but also provides **personal feedback** and individual tips for improvement.
- **Programiz Online Python Compiler:** A browser-based tool that allows code to be executed and tested instantly without local installation.

3. Media Portfolio

- **Avatar Videos:** A suite of linear instructional videos created with **Synthesia**.
- **YouTube Portfolio:** Direct links to the videos for each stage:
    - Phase 1: *Unlock the Power of Python*.
    - Phase 2: *Python Functions and Syntax Basics*.
    - Phase 3: *Fix the Code*.
- **Visual materials:** Screenshots of correct syntax and graphical representations of variables as "labeled boxes" to illustrate abstract concepts.

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