PedPilot – Self-regulated Learning Guide for Teachers

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PedPilots – Supporting Self-Regulated Learning

Unit 8.

Supporting self-regulated learning, digital support, differentiation.

Digital magic and flexible teaching – how to support self-regulated learning in a modern way

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All nine modules of the curriculum can be downloaded for free from the project’s website and used freely.https://www.pedpilot.eu/

Our Hungarian-language digital curriculum, designed for independent study, is available on the following website.

https://pedpilots.jozsefattilaiskola.ro/

8. Supporting self-regulated learning, digital support, differentiation. Digital magic and flexible teaching – how to support self-regulated learning in a modern way

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Introduction

This module covers digital methods that support self-regulated learning, primarily e-learning resources and platforms, as well as the wide-ranging applications of robots and the topic of artificial intelligence. One of the main aims of digital support linked to self-regulated learning is to use visually supported content to make knowledge as relevant as possible to learners' future lives or current professional practice. The greatest challenge in choosing digital methods is not the technology itself, but finding the right balance between learning style, the learners' age and the pedagogical objectives of the teacher or the teaching process. After all, technology cannot be an end in itself; it can only be a tool for the learning process. Knowledge, moreover, is not merely imparted, but is created through creative activity. Creative pedagogy is built on the active participation of learners, where learning is not the reception of a ready-made curriculum, but is based on solving emerging and deliberately focused problems, creating creative projects and experimentation. The aim is for pupils to generate new knowledge based on their own interpretations and the experiences they have gained during the teaching process.

Objectives

The aim of digital support is to make the learning process more flexible, accessible and interactive. These tools enable students to learn the curriculum in a personalised way, at their own pace and according to their needs. It specifically supports independent learning and critical thinking. Its aim is for students to gather information from various sources, so that they can compare and analyse them.

Time allocated to the lesson:

3 teaching hours

Learning outcomes

- Professional tasks, specialist knowledge
- Supporting learning (emotional and physical well-being, a calm environment, encouraging independent learning, accepting that mistakes can be made)
- Developing groups and communities (openness, creating opportunities, developing a culture of debate, mutual respect, acceptance, cooperation)

Study materials

1. Digital support services

Numerous studies have already examined the motivational, biological and cognitive effects of electronic learning environments, which differ from those of traditional ones. According to the enlightened principles of the recent past, the role of experience was considered extremely important in learning, so the teacher's task was merely to demonstrate and illustrate. Later, under the influence of progressive education, the pedagogy of action became dominant, which places greater emphasis on the learner's own initiative during the learning process.

Nowadays, in a learning environment saturated with electronic devices, learners often encounter only fragments of information, which they must integrate and incorporate into their existing knowledge independently. The teacher's role is to help the learner navigate this sea of fragmented information. Visualisation is particularly well-supported by the world of modern information and communication technologies. Indeed, one of the hallmarks of the modern learning environment, or e-learning environment, is multimedia learning. Action and self-directed activity also play an important role in modern and electronic learning environments; it is no coincidence that educational games attract such great interest. The teacher is no longer the sole source of knowledge, but rather a kind of supporter and helper. The range of required competences is also changing; for example, it is essential that teachers are able to navigate the online space, and that they understand and teach pupils how to use digital tools for learning purposes. They should be familiar with and able to use at least one or two supporting platforms, applications or services.

The following examples – a list which is by no means exhaustive – clearly demonstrate that there are numerous useful services available on the internet which we consider suitable for use.

Task 1: Group the listed and briefly summarised programmes and services into three categories,

which are provided at the end of the list:

- **Duolingo** – an online language learning app offering free courses in around eighty different language combinations.
- **GeoGebra Maths** – An excellent app for countless areas of mathematics, from function graphing to geometry.
- **Geogebra Chemistry** – Free resources, simulations, exercises, lessons and games related to chemistry.
- **GeoGebra Physics** – Free resources, simulations, exercises, lessons and games related to physics.
- **Google Forms** – You can create a survey or test. All you need is a Google account for the teacher. Students can access it without registering.
- **Jigsawplanet** – An online puzzle-making application. It is free, but registration is required.
- **Kahoot!** – A game-based learning environment where you can create quizzes, track pupils' progress and receive detailed feedback on their knowledge.
- **LearningApps** – A task-creation site available in multiple languages, with a focus on interactivity. It supports learning and teaching processes using small, interactive building blocks. You can create classes, and once logged in, you can track students' progress.
- **Mentimeter** – On this site, you can create quizzes and word clouds, request feedback, or introduce a topic.
- **Microsoft Forms** – With Microsoft Forms, you can create surveys, polls or tests, for example. You can set a deadline for the assignment. It is suitable for both formative and summative assessment.
- **PhotoMath** – Take a photo and see the solution; test your knowledge!
- **PowerPoint** – PowerPoint is also available as a web-based application in Office 365. It allows for collaborative online work and sharing. Teachers can easily monitor their students' progress on group work, and can also share their own materials here in the form of presentations.
- **Prezi** – You can create spectacular presentations on this site. The presentation software brings ideas to life through movement, zooming and spatial relationships.
- **Quizizz** – A free quiz-making app with a homework function, allowing students to work at their own pace and set their own schedule for completing tasks.
- **Quizlet** – An app that creates a complete learning pathway with closed-ended tasks in a playful format. It's great for dates, vocabulary learning and interpreting images.
- **Redmenta** – A Hungarian-developed, user-friendly testing system that allows us to assess our

students' knowledge online, without the need for registration.

- Seterra – Blank maps and practice exercises for geography.

- Socrative – An online quiz creation tool where respondents receive real-time feedback on their results as they complete the quiz.

- Wordart – A user-friendly online tool that allows words to be arranged into various shapes, thereby highlighting the key elements of a topic.

- Wordwall – Can be used interactively on any web-based device, such as a computer, tablet or phone. Students can play individually or under the teacher's guidance. The site is in Hungarian, and many interactive templates help us create tasks that are more interesting than ever.

- Zanza.tv – A Hungarian-language site offering high-quality video lessons for numerous subjects and a wide range of areas/topics (e.g. self-awareness, learning methodology), complete with online exercises.

a) Assessments, tests

b) Practice, revision

c) Subject-specific recommendations

d) Presentations

Solutions:

1. Assessments, tests: Google Forms, Microsoft Forms, Redmenta, Quizizz, Quizlet, Socrative
2. Practice, revision: Jigsawplanet, Kahoot!, LearningApps, Mentimeter, Wordart, Wordwall,
3. Subject-specific recommendations: Duolingo, Geogebra (maths, chemistry, physics), Photomath, Seterra, Zanza.tv
4. Presentation: PowerPoint, Prezi

Task 2: Choose one of the programmes or services! After a brief preparation, give a simple presentation explaining how it works, its advantages and any disadvantages! Use what you learnt in Chapters 3 and 4!

2. Robotics in education

Most technological tools are programmable, but they only become truly valuable if we use them not merely to convey information, but to unleash creative energy in the target audience. Robotics is the best example of how it is not merely a modern teaching tool. Pupils can formulate their own questions

during a genuine creative process, the intermediate or final result of which is invariably their own creation. The result of independent experimental work, a ‘creation forged on a path paved with failures’. Robotics plays a key role in the digital education of the future. It never merely imparts technical knowledge, but also teaches complex problem-solving, teamwork and the ability to handle mistakes.

For the sake of simplicity, we distinguish between two main groups of robots suitable for educational use. The curriculum includes descriptions of some of the more important types within these groups.

Programmable, line-following and direction-sensing robots

Construction and building robots

The devices in Group A introduce pupils to the basics of programming, logical thinking and spatial awareness in a playful way. The robots use simple control methods (buttons, colours, cards) to teach direction recognition, an understanding of sequence and algorithmic thinking. They are particularly useful for pre-school and primary school children, but some can also be used for more advanced tasks with older pupils.

1. Bee-Bot: A bee-shaped robot that can be programmed using buttons. It can store up to 40 commands, move forwards and backwards in 15 cm increments, and turn 90°. It helps children understand directions, spatial relationships and logical sequences. It can also be used for language, maths, map-based and storytelling tasks.
2. mTiny (Makeblock): A panda-shaped educational robot that teaches the basics of programming in a playful way. Children give instructions to the robot using coding cards and a controller. It develops spatial awareness, logical sequencing, directional recognition and fine motor skills. It is also excellent for transport, route planning and direction-finding tasks.
3. Ozobot: A tiny line-following robot that interprets colour codes on paper or a screen. It aids the development of algorithmic thinking, sequencing, directional awareness and spatial awareness. It can be used with manual coding (drawing coloured lines) and digitally (Ozobot Blockly programming).
4. Sphero Indi: A small car-shaped robot that reads coloured cards; each colour represents a different command (e.g. turn, accelerate, stop). Pupils design their own routes and tracks, thereby developing spatial awareness, logical thinking and problem-solving skills. It is compatible with the Sphero Edu app, so it can also be expanded with block-based programming. Its simplicity makes it enjoyable even for nursery school children, but secondary school pupils can also use it for more complex course

design and algorithmic tasks.

5. Micro:bit: The micro:bit is a compact, programmable microcontroller featuring sensors and an LED matrix display. Pupils can programme it using a block-based interface (MakeCode), Scratch or Python, enabling them to create robots, vehicles, interactive devices and creative projects. Simple tasks include, for example: displaying the message 'Hello!' and an animation on the LED matrix at the press of a button, or a reaction time game triggered by the 'GO' signal appearing on the display. Educational benefits: develops algorithmic and programming thinking, encourages a creative and experimental approach, and enables the practice of sensor-based tasks and interactive projects.

The construction robots in Group B are educational tools that develop students' **creativity, logical thinking and problem-solving skills** through **design, construction and programming.** Students not only use but also **build** the robot, thus becoming active participants in the learning process. These tools are particularly effective **in STEM-based education** (Science – Technology – Engineering – Mathematics), as they simultaneously engage the fields of science, technology and computing.

1. LEGO Education SPIKE Prime: LEGO SPIKE Prime is a modern, modular robotics kit that combines building, sensors and programming. The central Hub unit can be connected to multiple motors, as well as distance, light and gyro sensors. Programming takes place in the LEGO Education SPIKE app, using Scratch-like blocks, and is also available in Python for advanced users. Educational benefits: it develops engineering and algorithmic thinking, and supports teamwork and problem-solving. It develops fine motor skills, as during the building process, pupils fit various components together, test them and make adjustments. It develops not only programming skills but also manual dexterity, spatial reasoning and construction skills, and is suitable for project-based learning (e.g. vehicles, cranes, robotic arms, automated systems).

2. ArTeC Robo: ArTeC Robo is a modular robotics educational kit based on the three pillars of construction, sensor use and programming. The building blocks (cubes, panels, axles, gears) fit together easily, allowing students to freely design and build functional robots – such as autonomous vehicles, cranes or robotic arms. The creative building blocks allow for the creation of original stories or even adaptations of literary works, as pupils can create their own characters, scenes and fantastical robots. Educational benefits: develops engineering and problem-solving thinking. Encourages creativity and an experimental approach, and develops fine motor skills during the building process. It provides an opportunity to adapt their own stories and literary works, and is well suited to project-

based and cooperative learning.

3. Edison Robot: The Edison Robot is a LEGO-compatible, easily programmable robot designed to develop students' programming, sensor and experimental skills. The robot is equipped with multiple sensors (line-following, light, sound and infrared sensors), two motors and LEDs, allowing students to experiment in a real-world environment. Examples of use: building and controlling vehicles: line-following cars, obstacle courses, robot competitions. Interactive tasks: robots that react to sound or light, sensor-controlled projects. Curriculum and STEM projects: experiments related to mathematics, physics, computer science and technology.

Task 1: How could you combine practising spatial awareness and direction recognition with a transport-related task?

Track design and the use of line-following or colour-coded robots (Bee-Bot, Ozobot), where pupils must guide the robot and follow the correct sequence.

Task 2: Which robots can be used without assembly, i.e. can be programmed and played with straight away?

Bee-Bot – a ready-made bee that can be programmed using buttons; no assembly required, ready to use straight away.

Ozobot – a small line-following robot, also pre-assembled; only the track needs to be prepared before use.

Task 3: If pupils had to create their own story using robots, which tool would you recommend?

ArTeC Robo, because its creative building blocks allow for the creation of custom characters, scenes and stories, complemented by sensors and programming.

Task 4: Which robot would you choose for nursery school children, and why?

Bee-Bot or mTiny, because they are easy to programme, fun to use, and help develop spatial awareness, sequencing skills and fine motor skills.

Task 5: Which robot would you recommend to secondary school students who are ready to tackle complex algorithmic and project-based tasks?

LEGO Education SPIKE Prime, ArTeC Robo, Edison – because they are modular, advanced, programmable in block-based and text-based languages, and suitable for STEM projects.

3. Artificial Intelligence in Education

In the coming years, the use of AI-based methods will become increasingly prominent in education. Hopefully, we will see the spread of systems that do not replace the teacher, but rather support differentiation, student autonomy and self-regulated learning. Content and possibly tasks will be recommended taking into account individual pace of progress, areas of interest and learning styles. It will certainly completely transform the digital learning environment we have become accustomed to. Artificial intelligence is the collective term for computer systems capable of learning, solving problems and making decisions without human intervention. In education, for example, AI takes the form of adaptive learning systems, intelligent educational programmes and automated assessment systems. It helps learners to analyse data, discover patterns and receive personalised support. The use of AI in the classroom supports creative thinking, problem-solving and algorithmic skills, as well as the development of various subject-specific competences. It can also assist teachers, for example by speeding up the creation of tasks, feedback and lesson materials, thus freeing up more time for personal mentoring. It is important that students understand how artificial intelligence works and its limitations so that they can use the technology consciously. When using AI, data protection, the security of personal information and the avoidance of bias must be taken into account. Students need to be made aware that AI does not always provide accurate or correct answers.

Below are some activities you can try with your students in class.

Activity 1: Spotting fake news: Show your students short news stories and ask them to use AI tools to verify the information.

Task 2: Ask the students to write an essay using AI, then discuss which parts are reliable and which need to be rewritten.

Task 3: Have students create images using AI, then discuss when their use is appropriate and when it is problematic (e.g. depicting real people).

Task 4: AI source criticism: Compare the same information from two different AI tools and decide which source appears more credible.

Table 1: Overview of tool features

Tool	Brief description	Educational application
ChatGPT	Text-based generative AI capable of answering questions, providing explanations and generating ideas.	Explanations of lesson content, question-and-answer exercises, essay ideas, and support for language learning.
Microsoft Copilot	An AI assistant integrated into Office tools and educational platforms.	Lesson creation, interaction with students, rapid generation of assignments and feedback.
Google Gemini	Multimodal generative AI capable of processing text, images, code and audio.	Support for creative tasks, visual and text-based projects, coding and STEM projects.

Supporting materials

No. 1: https://www.youtube.com/watch?v=XmK28Yb0_kM

No. 2: https://www.youtube.com/watch?v=-ovNoW7hlr8

No. 3: https://quivervision.com/coloring-packs

Test exercises

For the test or, rather, practice exercises, we offer three rarely used and little-known applications for you to try out. We haven't mentioned any of these on the previous pages, but you may nevertheless be familiar with one of them.

Task 1

Use the simpleshow application to create an explanatory video. You can log in to the video-making programme using a Gmail or Facebook account. Then create a video on any subject within your field of study, with content of your choice. The short video (No. 1) included in the supporting materials will help you get started. The site allows you to create the presentation in 20 languages, including Hungarian.

https://www.mysimpleshow.com/

Task 2

Create a digital book using the BookCreator app or website! This creative tool enables students of different ages and abilities to publish their own digital books. The title of the digital book you are to create should be simple: “About Me”. To create it, first register on the website. Then, using the support video No. 2, create your own book!

https://bookcreator.com/

Task 3 (primarily for primary school pupils, target age group: 6–10 years)

Download the Quiver app for either Android or Apple iOS. Colouring pages designed for children can be downloaded from the app and the website: see support material no. 3. Choose a theme from these, and a page within that theme. Colour them in any way you like. Then comes the magic: use the Quiver mobile app to scan the coloured-in sheets, and the figures and objects on the sheet will become three-dimensional and come to life on the screen. They move, can become interactive to some extent, and the app can place the figures onto objects seen through the rear-facing camera.

http://www.quivervision.com/

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