MODULE 1: PEDAGOGICAL APPROACH IN DIGITAL EDUCATION

TECCHNOLOGICAL UNIVERSITY OF THE SHANNON

PADRAIG KIRBY

TRANSILVANIA UNIVERSITY OF BRASOV

DANIELA POPA

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

Introduction

The module *Pedagogical approach in digital education* refers to the methods and strategies used by educators to design and deliver effective learning experiences for students in a digital or online environment. A successful pedagogical approach in digital education should prioritize student engagement, interaction, and collaboration, as well as the integration of technology to enhance the learning experience.

Some common pedagogical approaches in digital education include:

- Blended learning - combining traditional face-to-face instruction with online learning activities;

- Gamification - using game-like elements to engage students in learning;

- Project-based learning - using real-world projects and problems to drive student learning;

- Flipped classroom - flipping the traditional lecture-homework model, with students engaging in pre-class activities and in-class activities focused on application and practice;

- Personalized learning - using technology to tailor learning experiences to the individual needs and interests of each student.

In addition to these approaches, digital education also emphasizes the development of important 21st-century skills such as critical thinking, problem solving, communication, and collaboration. The goal is to create engaging and meaningful learning experiences that help students develop the skills they need to succeed in the digital age.

Module aims

The "*Pedagogical approach in digital education*" module aims to provide basic information so that the learners can develop skills to select, use and integrate the most effective teaching methods appropriate to the target audience and the type of skills to be developed.

Learning outcomes

By following the activities proposed in the learning units, the learner will be able:

- to develop of the ability to use appropriate terminology specific to the field of pedagogy in order to explain processes and interpret educational situations;

- to develop the ability to appropriately apply principles, norms, operational rules in concrete training and evaluation design or actual training/evaluation

situations;

- to cultivate the future teacher's ability to reflect on his/her own teaching - instructional and evaluative performance.

- to develop an interest in and a responsible attitude towards the teaching profession and towards identifying and interpreting educational, life and school practice issues.

Module structure

LU 1. Blended learning

LU 2. Gamification

LU 3. Project-based learning

LU 4. Flipped classroom

LU 5. Personalized learning

LU 1. Blended learning

1.1. Introduction

Blended learning is an educational approach that combines traditional classroom instruction with online learning. It leverages technology to create a flexible and personalized learning environment, where students can access online resources and interact with their peers and teachers both in-person and online. Blended learning allows for a combination of face-to-face interaction with a teacher, self-paced online learning, and collaborative group work. This approach can accommodate a variety of learning styles and allows students to learn at their own pace, while also providing the structure and support of a traditional classroom. Blended learning can improve student engagement and motivation, while also providing opportunities for individualized and self-directed learning.

1.2. Learning unit objectives

By following the learning unit, the learners will be able to:

- to explain the ambiguous meanings that the term blended learning has;
- to develop simple educational activities in both formats;
- to predict advantages and disadvantages of blended learning.

1.3. Theoretical framework

We are witnessing in contemporary society a transition from the traditional face-to-face teaching model to a new model of approaching the teaching process, which applies new ways of relating to educational actors, which resizes the use of teaching aids, favouring the predominantly technological and digital ones and responds to the particular needs of the digital native generation. In this context, some authors invoke a variety of arguments (e.g. evolution of technology, cost constraints, special needs and situations) and argue that distance learning is more attractive to all involved (teachers and students) than traditional face-to-face learning (Kentnor, 2015). Recent studies highlight the catalytic role of the Covid-19 pandemic as it has accelerated the implementation of alternatives to modernise, digitise and streamline education systems around the world (Kusmaryono et al., 2021).

Massive implementation of distance learning has been imposed with the help of digital technologies, in most cases with poor training of teachers, even in situations where such a solution is not generally considered appropriate. We cannot ignore the fact that changes in education take time to be successfully implemented, and solid research is needed before these changes are widely adopted. Although no longer a novelty, the term blended learning is often considered to be used with an ambiguous understanding (Hrastinski, 2019) that can mean the mixing of two or more teaching methods or pedagogical approaches, learning contexts and is sometimes disputed for its appropriateness as a concept.

Nevertheless, it is most commonly formulated as including a composite of online and face-to-face teaching (Graham et al., 2014). This is a model that combines features of the face-to-face and distance learning models and can be used for a variety of educational contexts, including initial and in-service teacher training.

In order to achieve an authentic and effective blended learning context, it is necessary to pay more attention to the most important aspects, namely: design aspects, the blended model as an educational strategy, effectiveness factors, evaluation, methodological aspects, literature review of its effectiveness and suitability of use for different levels of education.

Recent investigations into the application of blended learning in teacher education have sought to explore the feasibility of integrating interactive e-learning and face-to-face learning, particularly when learners are in constructivist pedagogical contexts of professional competence training. The results of some current studies have also revealed that combining different training models (traditional and online, workshops, etc.) was perceived by teachers in professional development contexts as a challenging innovation and attracted their interest (Mouzakis et al., 2012).

There have been particular difficulties, however, in designing a blended learning model for ICT teacher education (Seethal, 2019).

A recent case study conducted on a substantial population of teachers in Greece in a context of in-service training for the use and application of digital technologies in teaching practice had a blended learning training design and met with resounding success (Zagouras, 2022). The research compared the results of this programme with a similar one run in a traditional training context only. The blended learning model comprised: 8 face-to-face activities in 3-hour training sessions, 12 synchronous, 3-hour online sessions, 12 asynchronous activities, each estimated at 3 hours, 8 online, 3-hour sessions to advise teachers in solving classroom applications. The whole programme lasted 5-6 months and a total of 120 hours of training.

The research results show better performance for teachers who participated in blended teacher education programmes compared to those who participated in traditional face-to-face teacher education programmes. The main advantages for trainees who used the mixed learning model were:

- Increased degree of comfort in participating in examinations to certify acquired knowledge and skills,

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

- They showed a slightly higher level of success and

- Achieve slightly higher marks in these types of examinations.

The findings of this study showed that the learning outcomes achieved by applying blended learning in this approach to teacher education exceeded those of the 'classical' model.

1.4. Methodological guidelines

For teachers:
Present the training module, materials, methods and tools to trainees and clarify their expectations.
Highlight the importance of knowing information about the specifics and particularities of the two pedagogical approaches.
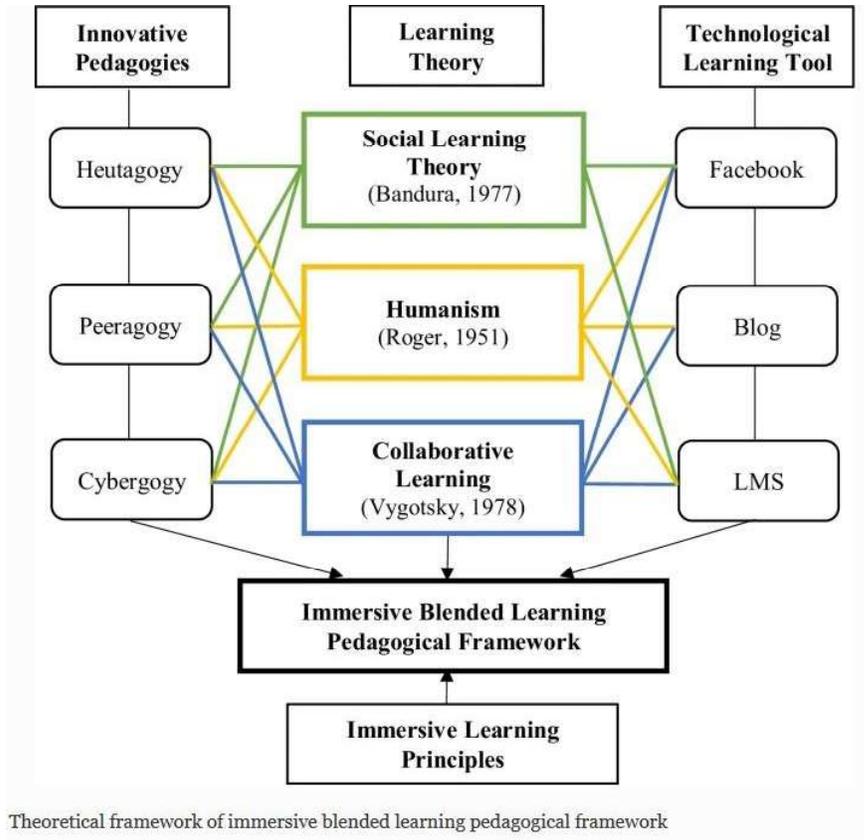
Application

Create a cognitive map of the definition of educational psychology based on the definitions you will find in the following documents:

1. Bizami, N. A., Tasir, Z., & Kew, S. N. (2022). Innovative pedagogical principles and technological tools capabilities for immersive blended learning: a systematic literature review. *Education and Information Technologies*, 1-53. https://link.springer.com/article/10.1007/s10639-022-11243-w

2. Belur, J., Glasspoole-Bird, H., Bentall, C., & Laufs, J. (2023). What do we know about blended learning to inform police education? A rapid evidence assessment. *Police Practice and Research*, *24*(1), 32-52. https://www.tandfonline.com/doi/pdf/10.1080/15614263.2022.2073230?needAccess=true&role=button

TIP: You can start from the model designed in the first article (Bizami et al., 2022)

Theoretical framework of immersive blended learning pedagogical framework

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

LU 2. Gamification

2.1. Introduction

Gamification is the application of game design techniques and mechanics to non-game contexts, such as education, marketing, and productivity, to motivate and engage users. It involves adding elements such as points, badges, leaderboards, and challenges to increase user involvement and drive specific behaviors. Gamification can be used to improve learning outcomes, encourage customer loyalty, or enhance employee performance, by making tasks and activities more enjoyable and rewarding. The key principles of gamification include clear goals, immediate feedback, and a sense of progress and achievement.

2.2. Learning unit objectives

By following the learning unit, the learners will be able to:

- explain the modern trends in gamification;

- differentiate between the expectations and demands that different educational actors have towards gamification;

- identify the effects of gamification on learning.

2.3. Theoretical framework

Gamification in education involves incorporating game elements into the learning process to increase student engagement and motivation. This can take the form of educational games, interactive simulations, or adding elements such as points, levels, and rewards to traditional classroom activities. The aim is to make learning more fun and engaging, while also helping students to develop important skills such as problem-solving, critical thinking, and teamwork. Gamification can also be used to personalize learning by allowing students to progress at their own pace and providing immediate feedback on their performance. By using gamification techniques, educators can create a more dynamic and interactive learning experience that can help students retain information and develop a deeper understanding of the subject matter.

Although play is one of the golden methods of education, especially at young ages, its potential is often overlooked in educational contexts for adolescent and adult learners. Gamification has come in response to the undesirable effects observed by researchers in adolescent and adult education. Some of these undesirable effects, often mentioned in academic studies, are: lack of active engagement in one's own learning, tendency to avoid solving school and academic tasks, procrastination, lack of interest or motivation on the part of learners.

The purpose of using gamification in educational contexts is to improve learners' concentration levels in teaching activities, to boost their engagement in the

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

activity and stimulate better academic and school performance, and to reduce students' frustration and demotivation in educational contexts considered typical. Gamification is an interesting process not only for education but also for industry. The human-digital interaction has been explored enough and is still being studied and continuously developed to create new ways of spending time. Recent literature review studies show what are the emerging trends in gamification and e-learning for young learners (Behl et al., 2022). In the aforementioned study, the authors tried to discover the most interesting themes in the literature. The results highlighted several major research themes for the near future: personalization of didactic game play, game elements with educational impact, game correlations with learning styles and learner engagement.

Some literature review studies highlight the need to bring elements of gamification into the teaching process (Caponetto, Earp, & Ott, 2014). The authors of the study state that the phenomenon of gamification is extremely attractive to researchers, both in terms of theoretical underpinning and its use in empirical studies. Also, the vast majority of research studies distinguish between game-based learning and gamification. Gamification techniques can be used in a wide range of curricular areas (e.g., science, mathematics, economics, language and communication, etc.), sometimes also addressing interdisciplinary perspectives (Oliveira et al., 2023). The use of gamification in the teaching process addresses the need to differentiate learning (Santos et al., 2021). *"Researchers stated the differences between "gamification" and "game-based learning" and explained that in "game-based learning," students reach their educational goals by playing games. In learning by playing, "playing" often plays an essential role in the learning process. Game-based learning is the use of games to improve the learning experience. However, gamification takes place entirely outside the game context and makes learning more active. Gamification is the process of adding game elements to a non-game situation. Students are rewarded for completing specific tasks (Kim et al. 2009; Al-Azawi et al. 2016; Ceker & Ozdamli 2017). For this reason, the research community has developed a greater interest over gamification"* (Saleem, Noori, & Ozdamli, 2022, p.142).

Some authors consider that the main types of approaches in game-based didactic learning are: 1. memory games, 2. simulation games, 3. interactive games, 4. question games, 5. puzzles, 6. strategy games and 7. reality testing games (Dimitra et al., 2020).

2.4. Methodological guidelines

After defining gamification and presenting the elements that differentiate the concept from game-based learning, allow 10 minutes for individual reflection. If necessary, you can direct this stage towards discovering the advantages and disadvantages of the two designated realities as well as building arguments for using one of the two modalities. Provide learners with several systematic literature reviews. Some are already suggested in the bibliography.

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

Application

Creating an educational game

Short description of the activity
Students are divided into groups of 5-7, with the task of creating a didactic game to develop a moral competence. They receive a worksheet to structure the game in such a way that it can be played by another team of colleagues without further explanation.

The aim of the activity is to practice the ability to design and moderate learning activities appropriate to the speciality, the chosen topics and the age group they work with. To train the ability to implement the proposed objectives in a targeted, structured and effective way. Last but not least, training teamwork skills and creativity.

It is important for a teacher to initiate contact and build trust, to give reassurance, to be flexible, to give creative ideas, to mediate authority, neutrality and to give feedback. The proposed activity facilitates all this in a structured working environment, where there is freedom of expression and creativity.

Creating exercises

1. Gathering information

a) Clarify the general conditions: place, duration, topic, etc.

b) Gathering information about the problem, purpose and resources

2. Naming the purpose of the exercise

What is the purpose of the game?

3. Record

How do you know that the game has achieved its purpose?

4. Pathways to the goal

What possibilities are there to convey this goal to students?

What possibilities exist for activating the necessary resources?

5. Naming the process

a) What process needs to be carried out to achieve this goal?

b) Through which process do you want to guide someone towards achieving this goal?

c) What are the elements of the process?

d) How do you recognise that the process has been successful?

6. Choice of methods

Which methods are appropriate for the learners, purpose, general conditions?

7. Establish the process

a) Introductory phase: how do you start?

b) Process phase: how do you divide the process into distinct steps?

c) Transfer phase: how will you build the bridge to everyday life?

8. How will you verify that the proposed objectives will be achieved?

9. How do you ask for feedback from the learners on the content of the activity, on the learning opportunities, on the inner state created?

10. How do you evaluate the effort of designing such a learning activity?

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

LU 3. Project-based learning

3.1. Introduction

Project-based learning is an educational approach where students learn by actively engaging in real-world and personally meaningful projects. It emphasizes hands-on, experiential learning and focuses on solving complex, authentic problems and creating tangible products. Projects are often interdisciplinary and may include collaboration, problem-solving, critical thinking, and decision making. The goal of project-based learning is to provide students with deeper understanding and transferable skills that can be applied beyond the classroom.

3.2. Learning unit objectives

By following the learning unit, the learners will be able to:

- Identify key elements of project-based learning

- Analyse a teaching situation through project-based learning, based on a set of criteria
- evaluate the impact of using this pedagogical approach on the learner

3.3. Theoretical framework

The main elements mentioned by experts who have investigated this type of learning, and which give it its constructivist specificity are: learning is contextualised, learners are actively involved in the teaching process and with the help of their peers, information is transferred and knowledge is constructed. It is an investigative, highly contextualised type of learning that addresses real problems typical of the learner's environment. In this way, not only is the learner's interest and motivation stimulated, but broader meaning is given to the understanding of abstract, theoretical knowledge, leading to meaningful learning experiences (Kokotsaki, Menzies, & Wiggins, 2016).

Project-based learning starts in a heuristic approach from a question or task. Its specificity is, as mentioned above, its most important feature, namely to address a real and meaningful fact for the learner's life context. Extremely important is the appropriateness of the question or task to the learner's level of knowledge and development.

The teacher's main role is to guide and guide learners in the process of discovery, guiding the process of reflection, suggesting appropriate aids or materials, but the whole process belongs to the learners. Even the evaluation of the achievement of the task or the attainment of the objectives is oriented by the

teacher to be self-evaluation or to determine the learners' level of effectiveness of the individual and group work. If the problem addressed proves to be too complicated, the teacher can intervene and offer possible solutions or strategies to guide them in overcoming bottlenecks. It is important to bear in mind that the whole approach is intended to be pleasant and stimulating, not to create frustration and disappointment. Project-based learning is not limited to the school/academic environment. It is even desirable that other resource persons or other sources of acquiring the necessary information or even the local community can be involved.

Recent systematic literature review studies highlight that the major benefits of using this approach include:

- increasing motivation for learning (Saad, & Zainudin, 2022);
- facilitates critical thinking (Duc, 2022);
- develops social competence (Guo, 2020);
- stimulates in-depth learning (Du, & Han, 2016);
- acquiring high-level thinking skills (Ferrero, Vadillo, & León, 2021);
- facilitates a sense of personal achievement;
- learners make connections between knowledge from different curricular areas;
- self-directed learning is stimulated;
- the techniques of independent work and teamwork are improved,
- etc.

Additional resources

Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International journal of educational research*, *102*, 101586. https://www.sciencedirect.com/science/article/pii/S0883035519325704
https://www.pblworks.org/what-is-pbl

3.4. Methodological guidelines

One of the most elegant pedagogical approaches to this topic would be to teach it through the very pedagogical approach it is intended to teach. If, however, you feel that you have not mastered it sufficiently, it is sufficient to lead the activity through heuristic conversation and to facilitate solving the following task in teams.

Application

Conduct a comparative analysis between project-based learning and the project teaching method. Use what materials you think will be useful, including the

bibliography recommended in this module.

CRITERIA	PROJECT-BASED LEARNING	PROJECT TEACHING METHOD

LU 4. Flipped classroom

4.1. Introduction

The flipped classroom is a pedagogical approach that reverses the traditional model of teaching by having students engage in pre-class activities, such as watching lectures or reading materials, before coming to class. This frees up class time for more active, hands-on learning activities, such as problem-solving, group work, or discussion.

4.2. Learning unit objectives

By following the learning unit, the learners will be able to:

- to present the key aspects of the flipped classroom;

- identify the principles of learning in this approach;

- reflect on their own experience as a participant in a flipped classroom training module.

4.3. Theoretical framework

The flipped classroom is a pedagogical approach that reverses the traditional model of teaching by having students engage in pre-class activities, such as watching lectures or reading materials, before coming to class. This frees up class time for more active, hands-on learning activities, such as problem-solving, group work, or discussion.

The idea behind the flipped classroom is that students can learn at their own pace and on their own schedule before class, and then use class time for more personalized instruction and guidance from the teacher. This approach has been shown to be particularly effective for students who need more time to understand difficult concepts, as well as for students who benefit from more individualized attention.

To implement a flipped classroom, teachers typically use digital tools such as video lectures, screencasts, or interactive simulations to deliver content outside of class. In-class activities can include group work, discussion, problem-solving, or hands-on projects. The goal is to create an environment where students are more engaged and actively participating in their own learning, while teachers are able to provide more individualized support and feedback.

Overall, the flipped classroom has been shown to be a highly effective pedagogical approach for a wide range of subjects and students, particularly in STEM fields. It has been found to improve student engagement, motivation, and

achievement, as well as to promote the development of important 21st-century skills such as critical thinking, problem solving, and collaboration.

The most interesting aspects of this pedagogical method are given by the unique combination of learning theories considered as diametrically opposed - learning activities typical of the constructivist approach, highlighting their active, problem-based character, and teaching aspects with a deep behaviourist foundation, strongly structured and directed by the teacher (Bishop, & Verleger, 2013).

This approach is suitable for blended learning design, allowing both time savings in face-to-face learning activities and individual, personalised time, as everyone can spend as much time before the lesson as they need to understand a concept. Although, from the teacher's point of view, it is an ideal organisation of the teaching activity, it nevertheless has great disadvantages in practice. Few learners are interested enough to study individually before face-to-face meetings (Akçayır, & Akçayır, 2018).

In order to counteract negative effects, it is necessary that the teacher prepares and critically evaluates the materials that will be sent to the learners for the preparation phase prior to the face-to-face meetings. This material should arouse learners' curiosity, trigger cognitive dissonance, incite reflective and, why not, individual study of the additional supporting material.

If these first conditions are met, face-to-face time is made more efficient. The teacher/trainer and learners can use the face-to-face time to clarify issues that are considered difficult or to address more difficult topics that require cognitive operations such as analysis, synthesis and evaluation of certain information.

4.4. Methodological guideline

Prepare on the online platform the material you would like the learners to go through before having the face-to-face meeting for this course. Don't forget also to motivate the learners to engage in these individual tasks prior to your meeting with them. It wouldn't hurt to prepare a reward system in points, credits that count or represent a percentage of the final grade.

Also, don't forget to attach additional materials and warn learners that they are not compulsory, but only for those interested.
Suggested course materials for the topic of the assignment:

1. Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education*, *126*, 334-345. https://www.sciencedirect.com/science/article/pii/S0360131518302045?casa_token=njMZVNBlFh8AAAAA:fvUqgUAm_28BWKnW1pp_0DblrNCb5DA5OrUo-a40DE-0DZN1h6ScWoYcp9rqAiPPodJ6kAAt

2. https://www.youtube.com/watch?v=BCIxikOq73Q

3. https://www.youtube.com/watch?v=10IrShX_v2Q

4. https://omerad.msu.edu/teaching/teaching-skills-strategies/27-

teaching/162-what-why-and-how-to-implement-a-flipped-classroom-
model

Application

Based on the four pillars of this teaching method, which you can find in the
following   link   (https://flippedlearning.org/wp-
content/uploads/2016/07/FLIP_handout_FNL_Web.pdf), design a learning unit
using this method.
The activity will be carried out in pairs of two.
Make a poster with the essential elements in all stages of the teaching process
(design, implementation and evaluation).

F FLEXIBLE ENVIRONMENT

L LEARNING CULTURE

I INTENTIONAL CONTENT

P PROFESSIONAL EDUCATOR

Co-funded by the
Erasmus+ Programme
of the European Union

DigiTools
E-Learning

LU 5. Personalized learning

5.1. Introduction

In this learning unit, concepts such as: inclusive learning environment, differentiation of teaching-learning prices as well as personalized learning.
A distinction will be made between key concepts and related concepts.

5.2. Learning unit objectives

By following the learning unit, the learners will be able to:

- to explain the principles of inclusive education;

- to develop simple educational plan to personalize the educational approach;

- to analyse curricular elements that can be subject to personalisation.

5.3. Theoretical framework

Personalized learning is a pedagogical approach that uses technology to tailor learning experiences to the individual needs, interests, and abilities of each student. The goal is to create a more individualized and engaging learning experience that helps students progress at their own pace and build upon their strengths.

In a personalized learning environment, students have greater control over the pace and direction of their learning, with the teacher serving as a facilitator and coach. Technology is used to support this process, for example through:

- Adaptive learning systems - software that adjusts the difficulty of the material based on a student's performance;

- Learning analytics - the use of data and technology to track student progress and provide feedback to teachers and students;

- Digital content and resources - providing students with access to a wide range of multimedia resources, including videos, simulations, and interactive activities.

In addition to these technology tools, personalized learning also emphasizes the importance of student choice and agency. For example, students might be given the opportunity to select their own projects, or to choose which topics they want to study in more depth. This approach has been shown to be particularly effective for students who are more motivated and engaged when they have a sense of ownership over their own learning.

Overall, personalized learning is a promising approach that has the potential to transform education by providing students with a more individualized and engaging learning experience. By using technology to support this process, teachers are able to provide a more customized and effective learning experience that meets the needs of each student.

5.4. Methodological guideline

For teachers: laptop/computer, internet connection

Additional resources for students:

1. https://www.understood.org/en/articles/personalized-learning-what-you-need-to-know
2. https://www.youtube.com/watch?v=6oLNLCO0vfI
3. https://www.structural-learning.com/post/personalised-learning-a-teachers-guide

FINAL ASSESSMENT

The final product of this module will consist of a profile. It will contain the following elements:

1. A concept map highlighting the links between the pedagogical approaches presented in this model;
2. A gamification strategy for a subject you teach;
3. A model of using the flipped classroom in one of your courses;
4. An example of personalised learning.

Each piece scores equally in the final grade.

REFERENCES

Behl, A., Jayawardena, N., Pereira, V., Islam, N., Del Giudice, M., & Choudrie, J. (2022). Gamification and e-learning for young learners: A systematic literature review, bibliometric analysis, and future research agenda. *Technological Forecasting and Social Change*, *176*, 121445.

Belur, J., Glasspoole-Bird, H., Bentall, C., & Laufs, J. (2023). What do we know about blended learning to inform police education? A rapid evidence assessment. *Police Practice and Research*, *24*(1), 32-52.

Bishop, J., & Verleger, M. A. (2013, June). The flipped classroom: A survey of the research. In *2013 ASEE Annual Conference & Exposition* (pp. 23-1200).

Bizami, N. A., Tasir, Z., & Kew, S. N. (2022). Innovative pedagogical principles and technological tools capabilities for immersive blended learning: a systematic literature review. *Education and Information Technologies*, 1-53.

Caponetto, I., Earp, J., & Ott, M. (2014, October). Gamification and education: A literature review. In *European Conference on Games Based Learning* (Vol. 1, p. 50). Academic Conferences International Limited.

Dimitra, K., Konstantinos, K., Christina, Z., & Katerina, T. (2020). Types of Game-Based Learning in Education: A brief state of the art and the implementation in Greece. *The European Educational Researcher*, *3*(2), 87–100. https://doi.org/10.31757/euer.324

Du, X., & Han, J. (2016). A literature review on the definition and process of Project-Based Learning and other relative studies. *Creative Education*, *7*(07), 1079.

Duc, C. N., Thi, P. N., Hoang, T. N., & Thanh, T. N. T. (2022). A Literature Review of the Project-Based Teaching Method in the Education of Vietnam. *International Journal of Educational Methodology*, *8*(3), 567-584.

Ferrero, M., Vadillo, M. A., & León, S. P. (2021). Is project-based learning effective among kindergarten and elementary students? A systematic review. *Plos One*, *16*(4), e0249627.

Graham, C. R., Henrie, C. R., & Gibbons, A. S. (2014). Developing models and theory for blended learning research. Blended Learning: Research Perspective

Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International journal of educational research*, *102*, 101586.

Hrastinski, S. (2019). What do we mean by blended learning? TechTrends, 63(5), 564–569. https://doi. org/10.1007/s11528-019-00375-5

Jarnac de Freitas, M., & Mira da Silva, M. (2023). Systematic literature review about gamification in MOOCs. *Open Learning: The Journal of Open, Distance and e-Learning*, *38*(1), 73-95.

Kentnor, H. (2015). Digital Commons @ DU Sturm College of Law: Faculty scholarship distance education and the evolution of online learning in the United States distance education and the evolution of online learning in the United States. Curriculum and Teaching Dialogue, Vol. 17, Nos. 1 & 2, 2015

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving schools*, *19*(3), 267-277.

Kusmaryono, I., Jupriyanto, & Kusumaningsih, W. (2021). A systematic literature review on the efectiveness of distance learning: Problems, opportunities, challenges, and predictions. International Journal of Education, 14(1), 62–69. https://doi.org/10.17509/ije.v14i1.29191

Mouzakis, C., Tsaknakis, H., & Tziortzioti, C. (2012). Theoretical rationale for designing a blended learning teachers' professional development program. In Blended Learning Environments for Adults: Evaluations and Frameworks, IGI Global. 274–289. https://doi.org/10.4018/978-1-4666- 0939-6.ch014

Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2023). Tailored gamification in education: A literature review and future agenda. *Education and Information Technologies*, *28*(1), 373-406.

Saad, A., & Zainudin, S. (2022). A review of Project-Based Learning (PBL) and Computational Thinking (CT) in teaching and learning. *Learning and Motivation*, *78*, 101802.

Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in E-learning: A literature review. *Technology, Knowledge and Learning*, *27*(1), 139-159.

Santos, A C G , Oliveira, W, Hamari, J, Rodrigues, L, Toda, A M, Palomino, P T, & Isotani, S (2021). The relationship between user types and gamification designs. *User Modeling and User-Adapted Interaction*, *31* (5), 907–940.

Seethal, K., & Menaka, B. (2019). Digitalisation Of Education In 21ST Century: A Boon Or Bane. *Higher Education*, *43*, 196.

Zagouras, C., Egarchou, D., Skiniotis, P., & Fountana, M. (2022). Face to face or blended learning? A case study: Teacher training in the pedagogical use of ICT. *Education and Information Technologies*, 1-29.