

A.3.5 Implementation of the Innovative Concept of Online Learning

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DEFINING GOALS AND OUTCOMES.

In modern education, especially in the context of online learning, defining goals is a key step that shapes the entire learning process. These goals not only guide curriculum development, but also define the expectations and outcomes that students need to achieve. In an era of rapid digitalization and technological innovation, it is crucial that goals are specifically defined, measurable and relevant in order to achieve maximum impact in the educational process.

Defining goals in a modern context requires adaptability in relation to market needs and trends in education. In the course of the **EU directive**, the targets should reflect not only the legislative frameworks but also the current challenges faced by member states, such as climate change and sustainable development. Students should acquire skills that will enable them to understand and apply these directives in practice, thus becoming more competitive in the labour market.

Within the **framework of the Energy Potentials of Waste**, the objectives should be aimed at identifying innovative solutions for the use of waste as an energy source. Students are expected to develop skills in waste life cycle analysis, taking into account economic and environmental aspects, which is essential for their future careers.

Modern learning models are increasingly integrating digital tools and platforms that facilitate learning. The goals for **Senior Systems** include the development of digital competencies that will enable students to use technology to support older people. For example, students can learn how to use health tracking apps or communication platforms that help connect older people with their families.

In the context of **Energy and Environment**, the objectives should also be extended to the research and use of digital simulations that allow students to test different energy scenarios and assess their impact on the environment. This practice not only enriches the learning experience but also develops students' critical thinking. The objectives of the online learning model should also include the promotion of collaboration and interconnection among students. Within the **Modern Manufacturing Technologies course**, objectives may include the creation of group projects where students jointly explore new technologies and develop solutions to real-world challenges in production. This type of engagement helps to develop team skills and problem-solving skills.

As part of the **Combustion and Ecology course**, the objectives should include and teach the organization of virtual debates or discussions on best practices in reducing greenhouse gas emissions. This activity not only allows for the exchange of ideas, but also develops students' communication skills.

Finally, transparency about the objectives is crucial. In modern education, it is important that goals are clearly communicated to all participants, including instructors and administrators. This step may involve creating guides and informational materials that explain in detail the objectives of each course, as well as expectations for students.

For the Modern **Hydropower Plants** course, clearly defined objectives can help students understand the specific aspects of designing, constructing and operating these plants. Incorporating practical examples and case studies into the objectives can further strengthen students' understanding and engagement.

SELECTION OF TECHNOLOGY AND TOOLS

Choosing the right technologies and tools for online learning is essential for the success of any educational program, especially in the context of modern subjects such as **EU Directives, Energy Potentials of Waste, Senior Systems, Energy and Environment, Modern Production Technologies, Combustion and Ecology, Modern Hydropower Plants and Environment. Energy use waste**. These courses require access to specific resources and technologies that can provide effective learning and understanding of complex topics.

Firstly, the choice of an e-learning platform should be in accordance with the needs of the target group and educational goals. Platforms such as **Moodle, Google Classroom, or Canvas** offer various functionalities, including the ability to create courses, track student progress, and enable interaction between students and instructors. For example, for a course on **EU directives**, platforms can provide specific resources, such as legal acts and analyses, which are crucial for understanding this complex framework.

In the context of **Waste Energy Potentials**, choosing a platform that allows data visualization and the use of multimedia content can help students better understand the environmental impacts of different waste management methods. Given the diversity of students who deal with these topics, it is important to consider the ease of use, technical support, and opportunities to personalize the platform.

In addition to platforms, the use of content creation tools is essential. Tools such as **Camtasia** and **Adobe Captivate** make it possible to record video tutorials that can enrich the learning experience, especially in subjects such as **Modern Manufacturing Technologies** and **Combustion and Ecology**, where a visual presentation of a process can make it easier to understand complex concepts. Infographics and visuals can be easily created using tools such as **Canva** or **Piktochart**, allowing students to better understand complex information concerning **energy and the environment**.

The technology tools also include tracking and analytics apps, such as **Google Analytics** and **Hotjar**, that help collect student engagement data. For example, in the course. **Modern hydropower plants**, analytics can help instructors understand which topics arouse the greatest interest and engagement of students, thus allowing the curriculum to be adapted to the needs of students.

All of these technologies enable effective communication and collaboration between participants. The use of online forums and discussion groups can further enrich the online learning experience, especially when it comes to topics such as **Energy Use of Waste**, where students can exchange ideas and strategies for reducing waste and using resources more efficiently.

In conclusion, choosing the right technologies and tools for online learning is crucial to the success of modern educational programs. By taking into account the specificities and needs of the subject, such as EU directives and the energy potentials of waste, we can create an engaged and effective learning environment that encourages the development of critical thinking and practical skills in students.

CONTENT DEVELOPMENT

Developing content for online learning is one of the most important aspects of implementing a learning model. This process requires careful planning to ensure that the content is relevant, interesting, and easily accessible. Incorporating a variety of content formats, such as text articles, video tutorials, audio recordings, infographics, and interactive elements, can significantly improve student engagement. For example, video tutorials can provide a visual presentation of complex concepts, while infographics allow for quick and efficient data analysis.

Also, the content should be structured into modules or units that are logically organized and easy to follow. This will make it easier for participants to orient themselves in the material and acquire new knowledge more quickly. Additionally, providing opportunities for interactivity, such as quizzes, surveys, and discussion forums, can further encourage engagement and allow students to actively participate in the learning process.

It's also important to update your content regularly to keep it relevant. This may include adding new research, articles, or case studies, as well as adapting materials based on student feedback. Additionally, ensuring that all materials are available in different formats and languages can increase accessibility and allow a wider range of learners to participate in online learning.

The development of content for online learning is one of the most important aspects of the implementation of the learning model, especially when it comes to modern topics such as **EU directives, Energy potentials of waste, Senior systems, Energy and the environment, Modern production technologies, Combustion and ecology, Modern hydropower plants and Energy use waste**. This process requires careful planning to ensure that the content is relevant, interesting, and easily accessible to different target groups.

Incorporating a variety of content formats, such as text articles, video tutorials, audio recordings, infographics, and interactive elements, can significantly improve student engagement. For example, for the subject of **an EU directive**, video tutorials can provide a visual presentation of complex legal frameworks and explanations of specific regulations, while infographics allow for quick and efficient analysis of data on the impact of these directives on energy and the environment. Also, interactive elements, such as quizzes and simulations, can help students better understand the application of these directives in practice.

Suggestions for current content for digitalization

1. **EU directives:**

Create interactive digital guides explaining specific EU directives with practical examples.

Organize online events with experts who can provide up-to-date information on the latest directives.

Include discussion forums where students can ask questions and exchange views on directives.

2. **Energy potentials of waste:**

Create video documentaries that explore different methods of using waste as an energy resource.

Develop interactive case studies that show successful examples of waste-using power plants.

Designing educational games that allow students to simulate the process of converting waste into energy.

3. **Senior systems:**

Develop courses covering digitalization and innovation in support systems for older people.

Include tutorials on using apps that help seniors in their daily lives.

To provide guides on technologies that help improve the quality of life of older people.

4. **Energy and Environment:**

Creating videos that show the impact of different energy sources on the environment.

Create virtual tours through environmentally sustainable projects and initiatives.

Include online forums where students can discuss dilemmas and solutions in the field of energy efficiency.

5. **Modern production technologies:**

Organize online sessions with industry experts who share their experiences and knowledge.

Develop applications that allow students to explore different production processes and technologies.

Include practical projects that allow students to apply theoretical knowledge in real-world situations.

6. **Combustion and Ecology:**

Develop simulations that show the effects of different combustion methods on the environment.

Create infographics that show statistics and analysis on the impact of combustion on the ecosystem.

Organize workshops that focus on sustainable combustion techniques and waste management.

7. **Modern Hydropower Plants:**

Creating a virtual tour through hydropower plants, providing insight into their operation and functionalities.

Develop case studies that focus on successful examples of hydropower production.

Provide access to detailed articles and guides explaining the principles of hydropower operation.

8. **Energy use of waste:**

Develop courses that cover waste-to-energy technologies and their benefits.

Create videos that explore specific projects that use waste as an energy source.

Include interactive panels that allow students to ask questions to experts in this field.

4. TRAINER/INSTRUCTOR TRAINING

Training of lecturers/instructors is a key element of the successful implementation of online learning models, especially in areas such as **EU Directives, Energy Potentials of Waste, Senior Systems, Energy and Environment, Modern Production Technologies,**

Combustion and Ecology, Modern Hydropower Plants, and Energy Use of Waste. Instructors not only need to have expertise in their subject matter, but also the ability to effectively use online learning technologies and student engagement strategies.

The first step in the training is to provide technical training on the use of selected platforms and tools. This may include workshops, online seminars, or tutorials that cover all of the platform's functionality, including course creation, content management, and student progress tracking. In the context of **modern manufacturing technologies**, instructors can be trained to use specialized software tools that enable real-time simulations and analysis. Also, for topics such as **energy use of waste** and **combustion and ecology**, it can be useful to train instructors on how to use analytical tools to monitor the environmental impacts of different technologies.

In addition to technical skills, it is important to provide training in pedagogical methods specific to the online environment. This can include strategies for engaging students, facilitating online discussions, and providing constructive feedback. For example, in subjects such as **EU directives** and **energy and the environment**, instructors should be trained to use interactive tools that encourage critical thinking and discussion among students about regulations and their impact on the environment.

Creating a community among teachers/instructors is also crucial. This community can enable support and collaboration among team members, which further strengthens the quality of online teaching. Instructors can exchange best practices and resources related to specific topics such as **modern hydropower plants** and **waste energy potentials**. This mutual cooperation can ensure that all instructors are up-to-date on the latest trends and research in their fields.

Regularly evaluating the performance of lecturers/instructors through student feedback can help identify areas that require additional training or support. For example, in subjects such as **senior systems** and **modern manufacturing technologies**, it is important to gather feedback on how instructors have applied digital tools and engagement techniques. This information can help shape future trainings and ensure that instructors are effective in imparting knowledge on these complex and dynamic topics.

Monitoring and evaluation are essential for the success of the online learning model, as they allow the identification of strengths and weaknesses of the educational program, especially in areas such as **EU Directives, Energy Waste Potentials, Senior Systems, Energy and Environment, Modern Production Technologies, Combustion and Ecology, Modern Hydropower Plants, and Energy use waste**. The key components of this phase are discussed below.

The first step in this phase is to establish analytical tools that will collect data on student engagement and progress. Using tools such as **Google Analytics** can help track the number of visits to the platform, traffic sources, and time spent on pages. For example, in the course **Energy Potentials of Waste**, analytical data can show how many students have actively reviewed materials related to recycling and sustainable waste management, which can indicate an interest in these topics.

In addition to traffic analysis, tracking user engagement is also essential. This includes metrics such as course completion rate, participation in interactive activities, as well as feedback on content quality. In the context of **Senior Systems**, it monitors how engaged students are in discussions and activities, such as virtual workshops on the application of new technologies in older systems. Analysis tools, such as **Hotjar** or **Crazy Egg**, can provide deeper insights into user behavior through heat maps and session recordings, thereby identifying the parts of courses that are most interesting or cause difficulties.

Collecting feedback from students on a regular basis is key to improving the online program. Participants can make suggestions about the content, teaching methods, and technical aspects of the platform. For example, in courses in **Modern Manufacturing Technologies**, students may suggest additional examples or research that would be useful for understanding the practical application of theoretical concepts. This information can be used to continuously improve the content and structure of the courses, thus ensuring quality education that meets the needs of students.

Based on the data and feedback collected, it is necessary to conduct regular revisions and improvements of the courses. This may include adding new resources, updating old materials, or making changes to how content is delivered. For example, in the subject of **Energy and Environment**, it is possible to add new case studies that illustrate current challenges and solutions in the field of renewable energy. This approach ensures that the educational program remains relevant and in line with the latest trends and research.

A comprehensive approach to monitoring and evaluating online learning models is essential to ensure the quality of education. By using analytical tools to collect data, monitor user engagement, and regularly collect feedback from students, it is possible to continuously improve courses and ensure that they meet modern educational needs. In the context of subjects such as **EU directives**, **Energy Potentials of Waste**, and others, this approach allows courses to adapt to dynamic changes in industry and education, thus contributing to the quality of learning and student success.

CONTINUOUS IMPROVEMENT OF ONLINE LEARNING MODELS

Continuous improvement of the online learning model implies regular updating and adaptation of courses and content in order to maintain their relevance and effectiveness, especially in the context of subjects such as EU Directives, Energy Potentials of Waste, Senior Systems, Energy and Environment, Modern Production Technologies, Combustion and Ecology, Modern Hydropower Plants, and Energy Use of Waste. This process focuses on several key aspects.

One of the basic steps of continuous improvement is to conduct regular checks and analyses of the program's performance. These analyses make it possible to identify areas for improvement, such as courses that show a high abandonment rate. For example, if a course on Modern Manufacturing Technologies notices that students are dropping out quickly, the team may

investigate the causes, such as unclear goals, overly complex materials, or lack of interactivity, and take steps to improve the structure or content of the course.

Incorporating new technologies and innovations can further enrich the online learning experience. For example, introducing virtual reality into courses on Energy and the Environment can allow students to experience real-life situations, such as simulations of energy management in urban environments. Also, the use of AI assistants can help students get answers to questions quickly and be directed to relevant resources, thereby increasing student engagement and allowing them to learn in new, exciting ways.

Collection and analysis of feedback

In addition to implementing technologies, it is important to collect and analyze feedback from instructors and students to create a culture of continuous improvement. Regular meetings and workshops can help exchange ideas and strategies for improving online learning. For example, within subjects such as Combustion and Ecology, instructors and students can discuss the latest research and trends, allowing courses to be updated with relevant content.

CONCLUSION

The implementation of the online learning methodology significantly improves education in the field of green energy, enabling faster and more efficient transfer of knowledge and skills needed to solve modern challenges in energy and the environment. This methodology provides flexibility and accessibility, which is especially important in the context of rapid technological development and changes in the labor market.

By using digital tools and platforms, such as video tutorials, interactive content, and virtual classrooms, students can engage in learning in a way that is tailored to their needs and learning styles. In addition, this accessibility allows a wider audience, including students, professionals and interested individuals from different parts of the world, to be educated about innovations and technologies in the field of green energy.

The digitalization of education also plays a key role in developing the skills needed to implement sustainable solutions and energy technologies. Online courses can cover a wide range of topics, from the EU's renewable energy directives, through energy efficiency and waste management, to modern production technologies and hydropower systems. Students acquire knowledge that is directly applicable in industry, which increases their employability and contributes to the development of the labor market.

In addition, online learning allows for continuous updating of content, ensuring that information remains relevant and in line with the latest research and innovation. Through the active involvement of instructors and students, as well as the regular collection of feedback, it is possible to create a dynamic educational community that is constantly improving.

In conclusion, the online learning methodology not only improves educational practices in the field of green energy, but also contributes to the wider digitalization and transformation of society. Through education that is adapted to the needs of the modern market and environmental challenges, this methodology can play a key role in sustainable development and the transition to a green economy.

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A SURVEY PROPOSAL TO ASSESS THE SATISFACTION OF PARTICIPANTS IN ONLINE CLASSES AND COURSES

1. Content satisfaction

1. **How would you rate the quality of the content of the courses?**
 - Very dissatisfied

- Dissatisfied
 - Neutral
 - Satisfied
 - Very satisfied
2. **Are the materials relevant and useful for your education?**
- I completely disagree
 - I disagree
 - Neutral
 - I agree
 - I completely agree
3. **How much do you like the variety of content formats (video, text, interactive)?**
- Very dissatisfied
 - Dissatisfied
 - Neutral
 - Satisfied
 - Very satisfied
4. **Is the content regularly updated and relevant?**
- I completely disagree
 - I disagree
 - Neutral
 - I agree
 - I completely agree
-

2. Engagement and Interactivity

5. **How would you rate the level of engagement during the course?**
- Very low
 - Low
 - Neutral
 - High
 - Very high
6. **How much did the interactive elements (quizzes, forums, discussions) help you in your learning?**
- They didn't help at all
 - They didn't help

- Neutral
- Helped
- They helped a lot

7. Have you had a chance to ask questions and get answers from the instructor?

- Never
 - Rarely
 - Sometimes
 - Often
 - Always
-

3. Organization and accessibility

8. How would you rate the organization of the course?

- Very bad
- Bad
- Neutral
- Good
- Very good

9. Is the platform easily accessible and easy to use?

- I completely disagree
- I disagree
- Neutral
- I agree
- I completely agree

10. Are the materials available in different formats (npr. PDF, video, audio)?

- I completely disagree
 - I disagree
 - Neutral
 - I agree
 - I completely agree
-

4. Technical support

11. How would you rate the technical support?

- Very dissatisfied
- Dissatisfied

- Neutral
- Satisfied
- Very satisfied

12. Have you had trouble accessing the platform or content?

- Yes I do
 - No
-

5. General satisfaction

13. Overall satisfaction with the course:

- Very dissatisfied
- Dissatisfied
- Neutral
- Satisfied
- Very satisfied

14. Would you recommend this course to others?

- Definitely not
 - No
 - Maybe
 - Yes I do
 - Definitely yes
-

6. Qualitative feedback

15. What aspects of the courses would you like to praise?

Open answer:

16. What changes or improvements would you recommend?

Open answer:

17. Do you have any additional comments or suggestions?

Open answer:

ASSESSMENT OF PEDAGOGICAL QUALITY OF LECTURERS

1. Quality of teaching

- *How would you rate the overall quality of teaching provided by the lecturer?*

- 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
- ***How would you rate a lecturer's ability to explain complex topics clearly?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
- ***Was the lecturer able to answer your questions and provide additional information?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
-

2. Student Engagement

- ***How would you rate the level of engagement of the teacher during the online course?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
- ***Did the presenter use different methods to hold your attention (e.g. discussions, quizzes)?***
 - 1 - very bad
 - 2 - bad

- 3 - average
 - 4 - Good
 - 5 - excellent
 - ***How would you rate the interactivity of teaching? Do you want to encourage your active participation?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
-

3. Pedagogical skills

- ***How would you rate a lecturer's ability to adapt a teaching style to different learning styles of students?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
- ***Did the lecturer's presentation skills (e.g., visual materials, use of technology) contribute to your understanding of the material?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
- ***How would you rate a lecturer's ability to provide constructive feedback?***
 - 1 - very bad
 - 2 - bad
 - 3 - average

- 4 - Good
 - 5 - excellent
-

4. Technological aspects

- ***How would you rate the teachers' skills in using technology for online teaching (e.g., platforms, interactive tools)?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
 - ***Was the lecturer available for technical assistance in case of problems?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
 - ***How would you rate the use of technology tools to improve teaching (e.g. video, graphics)?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
-

5. Quality of resources

- ***How would you rate the quality of additional materials (e.g. articles, video tutorials) provided by the lecturer?***
 - 1 - very bad
 - 2 - bad

- 3 - average
 - 4 - Good
 - 5 - excellent
 - ***Were the resources easily accessible and suitable for learning?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
 - ***How would you rate the variety of content formats used during the course?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
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6. General satisfaction

- ***How would you rate your overall experience with this lecturer's online classes?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent
- ***Would you recommend this lecturer to other students?***
 - 1 - very bad
 - 2 - bad
 - 3 - average
 - 4 - Good
 - 5 - excellent

