Didactic recommendations

Sustainable Livestock Production and Animal Welfare

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Acronyms and abbreviations

NGO	Nnon-Governmental Organisations
EU	European Union
DSTU	State standards of Ukraine
PJSC	Public Joint-Stock Company
MXP	Myronivskyi bread product
RISE	Reponse-Inducing Sustainability Evaluation
ECTS	European Credit Transfer and Accumulation System
DLOs	Digital learning objects
PBL	Problem-based learning
HEI	Higher Educational Institution
PSAU	Poltava State Agrarian University

1 Contextual Background

The Strategy for the Development of Agriculture and Rural Areas in Ukraine until 2030 (Cabinet of Ministers of Ukraine, 15 November 2024, No. 1163-r) was developed in accordance with the problems that led to it. One of the problems is the low efficiency of the system of knowledge exchange, innovation, and training, as well as the lack of research aimed at developing and modernising agriculture, and the low level of digitalisation in agriculture and rural areas.

One of the Strategy's Directions is 'Improving access to research, innovation, knowledge sharing and encouraging its use and learning'. Ukraine's agricultural research, education and extension system needs to improve its efficiency to meet the needs of the agricultural sector and respond to global challenges in a timely manner. Scientists and innovators in Ukraine need to be actively integrated into the global agricultural research community, promote the dissemination of knowledge and innovations aimed at increasing the productivity and efficiency of agricultural producers and processing companies, introduce an effective technology transfer system, disseminate modern technologies for the production and processing of agricultural products, methods and ways of organising and managing agricultural businesses.

The Strategy identified the key problems that hinder the development of the higher education system and suggested ways to overcome them, and set the main goals for the next decade. Subsequent events have made significant adjustments to all spheres of life, including the development of higher education.

The operational plan of the Strategy envisages a number of aspects, including creating conditions for the development of innovations, effective implementation of new knowledge and technologies with the participation of higher education institutions, business confidence in the results of research and consulting work of higher education institutions, ensuring state regulation of educational activities (licensing, standards, training priorities, etc.), continuous improvement of the quality of education in accordance with the standards and recommendations for quality assurance in the European Higher Education Area.

Ukraine is steadily moving towards EU membership, recognising the need to implement strategic policies, including farm animal welfare, and therefore it is extremely important to bring legislation into line with European requirements.

Today the state policy on animal welfare is based on the following legal documents.

- The Law of Ukraine "On the Protection of Animals from Cruel Treatment" https://zakon.rada.gov.ua/laws/show/3447-15#Text

- The Law of Ukraine "On Veterinary Medicine" https://zakon.rada.gov.ua/laws/show/2498-12#Text

- Law of Ukraine "On Ensuring Sanitary and Epidemic Well-being of the Population" https://zakon.rada.gov.ua/laws/show/4004-12#Text

- Criminal Code of Ukraine (Article 299) https://zakon.rada.gov.ua/laws/show/2341-14#Text

- Code of Ukraine on Administrative Offenses (Article 89)– https://vsezakony.com.ua/kupap/statya89

- Rules for keeping domestic animals in settlements https://kyivcity.gov.ua/navkolyshnie_seredovyshche_mista/tvaryny/pravila_utrimannya_i_doglyadu_za_domashnimi_tvarinami/

- Sanitary norms and rules for keeping animals https://zakon.rada.gov.ua/laws/show/z1015-10#

- State Standards (DSTU) - https://www.kmu.gov.ua/news/blagopoluchchya-tvarin-v-ukrayini-regulyuvatimetsya-za-yevropejskimi-pravilami

- Instructions and methodological recommendations of the Ministry of Agrarian Policy and Food of Ukraine - https://dpss.gov.ua/news/ukraina-na-shliakhu-do-ies-armonisatsiia-standartiv-shchodo-blahopoluchchia-silskohospodarskykh-tvaryn

- International agreements and conventions ratified by Ukraine - https://dpss.gov.ua/news/ukraina-na-shliakhu-do-ies-

harmonisatsiia-standartiv-shchodo-blahopoluchchia-silskohospodarskykh-tvaryn

The Order of the Ministry of Education and Science of Ukraine dated 17.12.2024.

№ 1745 "On Approval of the Personal Composition of the Scientific and Methodological Commissions (Subcommissions) of the Higher Education Sector of the Scientific and Methodological Council of the Ministry of Education and Science of Ukraine" determines the composition of the members of the Subcommissions for the Development of the Standards of Higher Education of Ukraine.

Therefore, one of the priority tasks of the scientific and pedagogical community is the development of professional standards, the development of new standards of higher education, educational programmes taking into account professional competences, learning outcomes of students in the field of sustainable agriculture and animal welfare.

Documents which are key aspects of the educational process and which require development and improvement on issues of sustainable livestock development and animal welfare are the following:

- <u>Professional standard:</u> these are requirements for the competences of employees, approved according to the established procedure, which serve as a basis for the formation of professional qualifications;
- <u>Higher education standard</u>: this is a set of requirements for the content and outcomes of the educational activities of higher education institutions and scientific institutions at each level of higher education within each discipline. Standards establish requirements that are common to an educational programme is a single set of educational components planned and organised by a general secondary education institution for students to achieve learning outcomes. The basis for the development of an educational programme is the higher education standard.

Among the most important perspectives for the development of the agricultural sector, it is worth highlighting the improvement of sustainable agricultural practices, including the development of urgent, ambitious and realistic measures at all levels to ensure

that the agricultural sector operates not only at the European and national levels, to strengthen the competitiveness of farmers, increase transparency in the agri-food chain, support cooperation and capacity development.

Immediate guidelines for the development of the Ukrainian agricultural sector are as follows: Emphasises the need to develop an appropriate strategy for the role of livestock in the agricultural sector, based on quality scientific research and consultation with all stakeholders; develop and implement policies aimed at creating demand for a balanced, less resource-intensive and healthier diet, including instruments to support the further transition towards the consumption of plant proteins instead of animal proteins; Reducing greenhouse gas emissions in the agricultural sector should involve a harmonious mix of strategies combining incentives and regulatory measures, including the establishment of a greenhouse gas accounting system and a comprehensive methodology for setting specific targets for different types of agriculture; additional steps to better conserve and manage agricultural land, promote water-resilient agriculture and develop innovative approaches, specific tools to facilitate agricultural adaptation to climate change; creating attractive social conditions in rural areas, access to education and redressing gender imbalances.

2 Target Audience Analysis

The main target group for the modules and courses developed within the framework of the SULAWE project are users looking for quick and accurate answers to their professional questions. Such users may be students, teachers, scientific and educational staff or simply interested individuals who wish to obtain reliable information and understand it quickly and effectively.

The specific needs and expectations of this audience may include a desire to promote sustainable livestock production by supporting the ethical treatment of animals, reducing the environmental impact of production, improving product quality and ensuring animal welfare through proper care and housing.

There may also be expectations regarding the availability of information on sustainable livestock production and opportunities for training and awareness raising on these issues.

Understanding the target audience plays an important role in the development of educational materials, as it allows accurate consideration of the audience's needs, interests, knowledge levels and previous experience. This allows for the creation of more effective and useful materials that are interesting and understandable to a specific group of people. This approach will also help to ensure optimal perception of the educational material and increase the effectiveness of learning.

The use of didactic materials by the target audience will allow to:

i. individualise, differentiate and intensify the learning process;
ii. increase motivation for learning due to the use of various types of activities and sources of information;
iii. form the ability to navigate the problem and find ways to solve it.

3 Assessment of Developed Materials

In order to support the development of high quality, accessible and modern education in lifelong learning centres and to ensure equal opportunities for all, training courses have been developed. The following key approaches have been taken into account in their design:

i. <u>Individualisation of learning:</u> development of flexible learning formats (online, blended learning), adapted to the employment of the students, which allows to take into account as much as possible the individual needs of each participant;

ii. <u>Involvement of all stakeholders:</u> working with companies and other stakeholders to create practice-oriented courses, increasing their relevance and practical value.

Based on the Innovative Sector of Excellence for Lifelong Learning: Sustainable Poultry Farming, two training courses were developed: "Innovative Poultry Farming: Experience of PJSC "Myronivskyi Hliboproduct" in Ensuring Poultry Welfare and Principles of Sustainable Development" and "Biosecurity and Sustainable Poultry Farming: Experience of PJSC "Myronivskyi Hliboproduct", which examine in detail the issues of biosecurity in poultry farming, measures to prevent the spread of diseases and maintain poultry health.

<u>Target group profiles</u>

1. Farmers
    1. Aim: To acquire practical knowledge and skills to implement innovative technologies on their farms.
    2. Course content: Practical aspects of poultry farming, including modern production methods, equipment and feed.
2. Agricultural professionals
    - Objective: To deepen their knowledge of poultry farming and gain new tools to improve production efficiency.
    - Course content: In-depth study of animal welfare, disease prevention and sustainable practices.
3. Entrepreneurship

- Aim: To expand your business by gaining new knowledge and skills.

- Course content: Technological control and process management, quality control of animal raw materials.

4. Students and teachers

- Aim: To provide up-to-date information on current trends in poultry production.

- Course content: A comprehensive understanding of production technologies, animal welfare, biosecurity and sustainable development.

- Main topics

  o Production technologies: modern poultry farming methods, equipment, feed.

  o Animal welfare: creating optimal conditions for poultry, disease prevention.

  o Biosecurity: measures to prevent the spread of infectious diseases.

  o Sustainable development: reducing environmental impact, using environmentally friendly technologies.

- Training format:

  o Interactive learning: lectures, practical classes, discussions and factory visits;

- Certification: Participants receive a certificate at the end of the course.

- Advantages of the courses:

  o Relevance: based on the latest scientific research and MHP's practical experience;

  o Comprehensive approach: covers a wide range of issues related to poultry production;

  o Practical: knowledge and skills can be applied immediately in production;

  o Flexible format: classroom and online learning options;

  o Certification: an official document confirming training.

These courses aim to improve the skills of poultry professionals and promote the development of sustainable agriculture in Ukraine.

The course "Veterinary Telemedicine" was created on the basis of the Center for Modern Education and Information Technologies. The course program includes basic knowledge about veterinary telemedicine, the organisation of various forms of communication between a patient and a veterinarian, between doctors during teleconsultations, forms and standards for transmitting veterinary data. The questions cover the organisation of networks for video conferences, telemonitoring, biotelemetry and other aspects. The study of the legal foundations of veterinary telemedicine is also included in the course program.'

It is necessary to ensure communication between the patient and the veterinarian, between doctors during teleconsultations, forms and standards for the transmission of veterinary data. The issues include the organisation of networks for videoconferencing, telemonitoring, biotelemetry and other aspects. The study of the legal framework for veterinary telemedicine is also included in the course.

The second course at the Centre for Modern Education and Information Technology is dedicated to the topic "Animal Production Waste and By-products: their Processing and Utilisation". The aim of the course is to train highly qualified specialists with general knowledge and skills in the technological control and management of the livestock waste processing process. The course will help participants to acquire skills in the reception, storage, processing and quality control of livestock raw materials at a modern level.

<u>Veterinary Telemedicine</u>

- Course program:
    - o Basic knowledge of veterinary telemedicine.
    - o Organisation of various forms of communication between the patient and the veterinarian, as well as between doctors during teleconsultations.
    - o Forms and standards for transmitting veterinary data.
    - o Organisation of videoconferencing networks, telemonitoring, biotelemetry, etc.
    - o Study of the legal framework of veterinary telemedicine.
- Serving the learner profiles:

- o farmers and agricultural professionals: provides practical knowledge on the organisation and management of telemedicine services;
- o business professionals and entrepreneurs: offers an understanding of the commercial potential and business models of veterinary telemedicine;
- o students and teachers: equips future veterinarians and teachers with essential skills and knowledge.
- o general public: raises awareness of the benefits and applications of veterinary telemedicine.

<u>Livestock waste and by-products: their processing and use</u>

- Course programme:
  - o Training of highly qualified specialists with general knowledge and skills of technological control and management of the livestock waste processing process.
  - o Skills of acceptance, storage, processing and quality control of animal raw materials at the modern level.
- Objectives:
  - o To provide theoretical and practical knowledge to perform organisational, technological and veterinary and sanitary tasks.
  - o Mastering the skills of processing additional raw materials obtained from animal slaughter, primary processing, processing of sub-products.
  - o Acquiring practical skills in the processing of animal by-products.
- Target audience profiles:
  - o farmers and agricultural professionals: improves their capacity to manage waste and recycle by-products;
  - o Business professionals and entrepreneurs: provides knowledge about commercial opportunities in recycling and waste management;
  - o students and teachers: offers comprehensive training that combines theoretical knowledge with practical skills;
  - o General public: promotes understanding of sustainable practices in animal husbandry and waste management.

These courses are customised for farmers, agricultural professionals, entrepreneurs, students, and teachers to improve their skills and competence in their respective fields. This approach ensures that the courses meet the specific needs of different learner profiles, providing both theoretical knowledge and practical skills, using flexible and innovative formats.

The main objectives of the disciplines are:

1. Providing theoretical and practical knowledge for solving organisational, technological, veterinary and sanitary issues.
2. Mastering the skills of processing additional raw materials obtained from animal slaughter, primary processing and processing of by-products.
3. Acquisition of practical skills in livestock waste processing technologies.

Two training courses have been developed based on the Centre for Innovative Sustainable Pig Production Technologies.

Pig Welfare in an Industrial Farm". The aim of the training course is to provide students with knowledge of the Ukrainian and EU legislative framework in the field of animal welfare, to show the relationship between the impact of technological stress on pork quality and to organise training of production staff in animal welfare practices.

On completion of the course, students will have developed professional competence in the management of industrial pig production, taking into account the principles of animal welfare. Scientific and educational staff will improve their qualifications in the field of pig welfare on industrial farms.

Training course "Evaluation of farm sustainability as a tool for successful transformation of agriculture". The purpose of the training course: to familiarise students with the basic principles of sustainable development of Ukraine, as well as to highlight the role and place of the agricultural sector, especially the livestock sector, in its provision. On the example of using a specific tool (RISE method).

Target profiles of participants:

1. Farmers
- Objective: to acquire knowledge and practical skills in implementing innovative technologies in their farms.

- Needs

  • Effective farm management.

  • Increasing productivity and product quality.

  • Implementing sustainable farming practices.

- Course content:

  • practical aspects of pig farming, modern production methods, equipment, feed;

  • mastering knowledge about disease prevention and keeping animals in comfortable conditions.

2. Agricultural professionals

- Goal: to deepen their knowledge in the field of pig farming and obtain new tools to increase production efficiency.

- Needs

  o Updating knowledge according to the latest scientific research.

  o Advanced training in the field of animal welfare and sustainable development.

- Course content:

  o in-depth study of animal welfare, disease prevention measures and sustainable practices;

  o methodology for assessing the sustainability of agricultural enterprises.

3. Entrepreneurs

- Goal: to expand their business by acquiring new knowledge and skills.

- Needs:

  o Effective business management in the livestock industry.

  o Improving the quality and safety of products.

  o Using modern technologies and management methods.

- Course content:

  o technological control and process management;

  o quality control of animal raw materials;

  o use of specialised software.

4. Students and teachers

- Goal: to obtain up-to-date information on current trends in pig farming.
- Needs
    o Obtaining theoretical knowledge and practical skills.
    o Preparation for professional activity in the field of animal husbandry.
    o Updating curricula and teaching methods.
- Course content:
    o Comprehensive understanding of production technologies, animal welfare, biosecurity and sustainable development;
    o Use of the latest scientific research and practical experience.
- Main topics:
    o Production technologies: modern methods of pig production, equipment, feed.
    o Animal welfare: creating optimal conditions for pigs, disease prevention measures.
    o Biosecurity: measures to prevent the spread of infectious diseases.
    o Sustainable development: reducing environmental impact, using environmentally friendly technologies.
- Training format: interactive learning: Lectures, practical classes, discussions.
- Certification: participants receive a certificate of completion of the 30-hour course (1 ECTS credit).
- Advantages of courses
    o Relevance: compliance with European requirements.
    o Comprehensive approach: covering a wide range of issues.
    o Practical focus: knowledge and skills that can be applied in production.
    o Flexible format: opportunities for classroom and online learning.
    o Certification: an official document confirming advanced training.

These courses are aimed at improving the skills of specialists in the field of pig farming and promoting sustainable development of the agricultural sector.

Two training courses were developed on the basis of the Center for Sustainable Cattle Breeding and Milk Production:

1. Proper calf rearing is the key to a successful dairy business.
    - Course objective: To increase knowledge of optimal housing conditions for calves, effective feeding strategies, modern breeding technologies, preventive measures and treatments, farm planning and management, and principles of sustainable development in calf farming.

2. Accounting for Animal Productivity and Reproductive Capacity in Sustainable Dairy Farming
    - Course objectives: To learn the basic principles and methods of accounting, legal requirements and standards, specific accounting methods, to use accounting information for management decisions, to increase production efficiency and to become familiar with modern digital accounting methods.

Target profiles of the students

1. Managers of small and medium-sised enterprises
    - Aim: To acquire practical knowledge and skills for effective business management and to increase productivity and product quality.
    - Course content: Practical aspects of calf rearing and zootechnical accounting, modern production methods, equipment, disease prevention, farm management.

2. Scientific and educational staff
    - Aim: to deepen knowledge and skills in the field of dairy farming, zootechnical accounting and modern technologies.
    - Course content: updated curricula taking into account the latest scientific achievements, interdisciplinary knowledge, use of digital technologies in accounting.

3. University students
    - Aim: To acquire theoretical knowledge and practical skills in preparation for professional activity in the dairy sector.

- Course content: theoretical basics and practical tasks in calf rearing, disease prevention, zootechnical accounting, use of modern technologies.
- Main topics:
  o Calf raising technologies: optimal housing conditions, effective feeding strategies, modern technologies, preventive measures.
  o Farm planning and management: practical aspects of management, sustainable development in calf raising.
  o Animal accounting: principles and methods of accounting, use of accounting information, digital accounting methods.
- Training format
  o Interactive learning: hybrid form of teaching, problem lectures, lecture-dialogues, lecture-consultations, online excursions, consideration of specific cases, practical classes.
- Certification: participants receive a certificate of completion.
- Course benefits
  o Relevance: Compliance with modern scientific achievements and industry challenges.
  o Comprehensive approach: coverage of a wide range of issues in the dairy farming industry.
  o Practical orientation: the ability to immediately apply the acquired knowledge and skills in practice.
  o Flexible format: classroom and online learning options.
- Certification: an official document confirming advanced training.

These courses are designed to improve the skills of dairy farming professionals and contribute to the sustainable development of the agricultural sector.

The modern world requires new approaches to learning, and digital technologies have become an integral part of education. In the context of global challenges, the creation and implementation of electronic educational resources (EERs) is not just a desirable but a vital step to ensure the quality and continuity of the educational process.

Digital learning objects (DLOs) are educational, scientific, informational, reference materials and tools developed in electronic form and presented on any type of media or placed in computer networks, which are reproduced using electronic digital technical means and are necessary for the effective organisation of the educational process.

Traditional forms of education are complemented by distance, blended and asynchronous formats. The purpose of creating e-Learning resources is to provide content in the educational space, to ensure equal access of participants in the educational process to quality educational and methodological materials, regardless of their place of residence and form of education, created on the basis of information and communication technologies.

For this purpose, three modules of the SULAWE project were developed **(please see also https://sulawe.org/sulawe-modules)** - electronic manuals for use by both teachers and students, which have certain advantages.

  i.   Flexibility and accessibility (remote access to materials at any time and from anywhere in the world, the ability to choose the pace of learning).

  ii. Interactivity and visibility (enhancing understanding of complex topics through visual demonstrations).

  iii. Relevance and adaptability (prompt updating of the content in accordance with changes in programmes and regulations, the ability to quickly add new materials).

  iv. Ensuring continuity of education in crisis conditions.

The development and use of e-Learning resources in the educational process contributes to the formation of digital literacy of all participants in the educational process, increase the effectiveness of teaching, create inclusive and equal access to education for all participants in the educational process.

4 Didactic Approaches and Methodologies

In the process of developing teaching materials for **the SULAWE** modules, different pedagogical approaches are used, namely:

1. Experiential learning:
   - Emphasis on practical experience and active involvement of students in real situations;
   - Use of simulations, laboratory work, practical classes and projects to apply theoretical knowledge in practice.
2. Problem-based learning (PBL):
   - Aimed at developing critical thinking and problem solving skills;
   - Students work on real or simulated problems that require the application of interdisciplinary knowledge.
3. Personalised Learning:
   - Adapting curricula to the individual needs, pace and interests of students;
   - using digital technologies to create personalised learning pathways.
4. Project-based learning:
   - Engaging students in long-term projects that integrate different subjects and skills;
   - Working in groups and developing collaborative skills.
5. Multimodal learning:
   - Using different formats to present information (text, video, audio, interactive materials);
   - Providing access to materials through different channels to support different learning styles.
6. Interactive learning:
   - The use of interactive tools and techniques such as discussions, debates, interactive whiteboards, surveys;
   - Encouraging students' active participation in the educational process.

These approaches ensure the comprehensive development of students' knowledge and skills, promote their active participation and improve the quality of education.

The following main methods can be distinguished**:**

1. <u>Updating curricula</u>
   - Introducing new disciplines: adding disciplines to curricula that reflect current trends in animal husbandry, such as precision animal husbandry, animal welfare, organic production, etc.
   - Updating the content of existing disciplines: reviewing and updating curricula in the light of the latest scientific findings and industry challenges.

2. <u>Involvement of experts</u>
   - Lectures by invited experts: inviting experienced practitioners from leading Ukrainian enterprises to hold lectures and master classes.
   - Online lectures by foreign experts: inviting leading European scientists to conduct online seminars and webinars.
   - Joint online courses: organising joint online courses with consortium partners to exchange experience and knowledge.

3. <u>Use of innovative technologies</u>
   - Online learning: implementation of online distance learning platforms, organisation of webinars and publication of teaching materials.
   - Interactive teaching methods: use of interactive whiteboards, presentations, simulations, cases to increase student engagement.
   - Multimedia materials: development of multimedia materials for teaching and student support.

4. <u>International cooperation:</u>
   - Mobility of students and teachers: exchange of students and teachers with partner universities.
   - Joint scientific projects: Participation in international scientific projects.
   - Publication of articles in international journals: enhancing the scientific reputation of universities.

5. <u>Key principles of curriculum modernisation</u>
   - Student-centred: focus on the needs and interests of students.
   - Practical orientation: combining theoretical knowledge with practical skills.

- Interdisciplinary: integrating knowledge from different fields (biology, chemistry, economics, management).
- Innovation: introduction of new technologies and teaching methods.
- International cooperation: participation in international projects and exchange of experience.

How can active learning strategies be integrated?

Integrating active learning strategies into educational programmes is a priority task for teachers in order to increase students' interest in the educational process in general and in each discipline separately.

To this end, the following strategies can be proposed

1. The use of group projects: working in a team, sharing tasks and disseminating knowledge.
2. The use of discussions: stimulating discussions based on questions and problems that arise in the learning process.
3. The use of games and simulations: the use of games and simulations helps to better master the material presented.
4. Practical classes, both in specialised laboratories and in production, which allow students to apply the acquired knowledge in practice.
5. The use of interactive and digital technologies in the teaching process.

Overall, the integration of active learning strategies is important to create a stimulating learning environment that engages learners and improves the quality of their education.

In order to involve students more effectively in the learning process and to integrate active learning strategies into various educational programmes, it is advisable to use the "flipped classroom" method - a learning principle according to which the main assimilation of new material by students takes place at home, and class time is devoted to the practical part of work - completion of tasks, exercises, laboratory and practical research, and individual consultations with the teacher.

Key learning principles include - active learning, feedback, motivation and practice.

- Active learning emphasises practical experience and participation in the learning process.
- Feedback provides information about performance to guide improvement.
- Motivation plays a crucial role in stimulating learning and perseverance.
- Practice helps to reinforce learning and develop mastery.

Each individual perceives these principles differently, so it is important to consider different forms and methods of learning.

How can technology be used to improve teaching and learning outcomes?

The modern socio-economic development of society requires the use of new innovative methods and technologies for teaching students in higher education institutions, which will allow future professionals to be more competitive in the labour market. Today, the most popular innovative teaching methods that allow the use of new teaching technologies are contextual learning, simulation learning, problem-based learning, modular complete knowledge acquisition and distance learning.

- Contextual learning is based on the integration of different types of student activities: pedagogical, scientific, practical.
- Simulation learning is based on the modelling of simulation games in the conditions of learning processes taking place in a real system.
- Problem-based learning is based on the initiation of the student's independent search for knowledge through the problematisation (by the teacher) of the educational material.
- Modular learning is a type of programmed learning, the essence of this is that the content of the educational material is rigidly structured for its maximum complete assimilation, accompanied by obligatory blocks of exercises and control over each fragment.
- The complete acquisition of knowledge is developed on the basis of the ideas of J. Carroll and B. S. Bloom on the need to fix the results of learning and at the same time to optimally change the parameters of learning conditions depending on the student's abilities.
- Distance learning is a form of distance learning using the latest information and communication technologies and tools.

The above methods can be effectively used individually in the educational process, but a more effective result can be achieved by comprehensive and systematic use of some methods, for example, modular learning can be combined with problem-based learning.

Therefore, taking into account the current active use of innovative teaching methods, the innovative way of development and use of innovative teaching technologies in higher education institutions of Ukraine is the key to their competitiveness.

5 Recommendations for Implementation

The educational process is an important aspect of society that involves the transfer of knowledge, skills, values and attitudes from one generation to the next, plays a crucial role in personality formation, helps develop critical thinking, problem solving, communication and other important skills necessary for personal growth and success in the modern world.

The teacher training process is key to the successful delivery of new modules and courses. For effective teacher training, it is recommended to combine different teaching methods such as workshops, training sessions, webinars and mentoring. It is also important to provide opportunities and wide access to materials and resources so that teachers can deepen their knowledge and skills.

It is also important to create a conducive learning environment where teachers can exchange ideas and good practices.

It is important to provide teachers with opportunities for self-development and continuous learning through participation in conferences, seminars and other educational events. These approaches will help teachers to be better able to teach new modules and courses.

The effectiveness of teaching by scientific and pedagogical staff involved in the educational process in different educational programmes depends primarily on their motivation. In order to increase the motivation of teachers, it is advisable to carry out internships in leading enterprises in Ukraine and abroad, to adopt international

experience of project partners, to participate in conferences and seminars held in different countries of the world.

Teachers' professional development includes a number of key opportunities, such as continuously improving their knowledge and skills in the field in which they work, participating in seminars, conferences and training on pedagogy and teaching methods, as well as studying and implementing the latest technologies in the educational process.

A special place is given to improving qualifications, updating pedagogical and scientific knowledge and introducing the latest teaching methods through participation in seminars, training and conferences.

The effectiveness of teachers' professional development depends on the following key strategies

- Ensuring ongoing, continuous professional development, as this helps to keep abreast of the latest teaching methods, technologies and trends in education, which is essential for improving skills;
- Implementing a mentoring programme: pairing young teachers with more experienced ones who can provide support and feedback;
- Ensuring a cooperation programme: exchange of experiences, ideas, developments;
- Digitalisation: use of digital tools and resources in pedagogical activities to improve the motivation of learners to learn;
- Providing constructive feedback on lesson plans, classroom management and learners' outcomes;
- Supporting teachers' wellbeing in terms of managing stress, improving work-life balance and preventing teacher burnout.

Implementing and supporting these strategies within the teaching staff increases the opportunity for professional development.

The following strategies can be used to encourage educators to engage in peer learning:

1. Create a supportive learning environment where each participant feels equal and important. This can be done through joint business games, competitions or projects that encourage cooperation and mutual support.

2. Promoting inclusive education that takes into account the individual needs of each pupil. This may be through the development of individualised curricula or the use of a variety of teaching methods to accommodate different learning styles.

3. Promoting a culture of mutual support and understanding among educators. This can encourage participants to care for each other, to share knowledge and experience, and to support and motivate each other.

4. Involvement in learning management, where participants can contribute their suggestions and ideas for improving the learning process and cooperation. This will encourage participants to feel valued.

These approaches will help to create an atmosphere of mutual respect and cooperation that encourages educators to learn from each other.

What strategies can be used to promote interdisciplinary collaboration in higher education on sustainable livestock production?

The following strategies can be used to promote interdisciplinary collaboration within higher education institutions on sustainable livestock production.

1. Organising joint projects and research between faculties aimed at finding innovative solutions in the field of sustainable livestock production:

2. Organisation of interdisciplinary seminars, conferences and round tables with the participation of students and teachers from related disciplines/specialisations to jointly solve the problem of sustainable livestock production.

3. To organise meetings, seminars and conferences where teachers from different disciplines have the opportunity to exchange ideas and experiences in this field.

4. Implementation of integrated curricula and courses covering aspects of sustainable livestock production from different disciplines to ensure a comprehensive approach to the problems of sustainable livestock production.

5. Involving students in practical projects from different livestock sectors to promote interdisciplinary development.

6. Establishing a network of cooperation between educational institutions, research institutions and industrial enterprises for internships, exchange of knowledge and resources.

These strategies will help to strengthen cooperation between teachers and students from different fields of knowledge and contribute to a more effective development of the field of sustainable livestock production in higher education institutions.

6 Evaluation and Feedback Mechanisms

The effectiveness of the modules, courses and training materials developed can be assessed using various indicators, such as

1. User satisfaction: User surveys, feedback and reviews can be used to measure their satisfaction and enjoyment in using the training materials.

2. Usage indicators: You can measure the number of visits and usage of modules, courses or materials to understand how popular and used they are by users.

3. Test results: Conducting tests or knowledge assessments after the training materials have been used will help to determine their effectiveness in achieving the objectives set.

4. Growth in knowledge and skills: Measuring changes in users' knowledge and skills before and after using modules or courses can provide evidence of their effectiveness.

5. Peer feedback: Obtaining feedback from partners or clients using the developed modules or courses can also be a useful indicator of effectiveness.

Overall, a combination of these indicators will help to assess the effectiveness of the developed modules, courses and training materials.

External stakeholders such as industry experts and non-governmental organisations (NGOs) can play an important role in providing feedback to improve the quality of educational services. They can provide valuable advice and recommendations on how to improve higher education standards, educational programmes, curricula, and point out possible problems and shortcomings that can only be identified during actual use.

This interaction can benefit all parties: educational institutions to improve the educational process, education seekers to receive quality educational services, and external stakeholders to participate in the development of pedagogical and methodological support for the educational process.

The effectiveness of the developed training modules will be assessed through a survey of all stakeholders - students, academic staff, guarantors of training programmes, employers who are members of the Employers' Councils of higher education institutions, as well as experts from the National Agency for Quality Assurance in Higher Education during the accreditation examination of various training programmes at universities.

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