SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF GLOBAL TRANSFORMATIONS: INNOVATION, EDUCATION AND THE DEVELOPMENT OF NEW COMPETENCIES

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DOI: https://doi.org/10.30525/978-9934-26-715-4-23

Abstract. The article examines the development of critical thinking of students majoring in agricultural disciplines in the process of ESP learning, with particular emphasis on professionally oriented communication, innovative teaching methods, and authentic professional materials. *The subject* of the research is the methodological potential of ESP as an educational environment for developing students' ability to analyze, interpret, evaluate and use English competently and confidently for professional communications, formulate evidence-based judgments, communicate their professional position and reflect on their own learning and decision-making. The study focuses particularly on students of the specialties "Water Bioresources and Aquaculture" and "Technology of Production and Processing of Livestock Products", whose professional activities require the ability to work with scientific and professional information, evaluate alternative technological solutions, consider environmental and ethical factors, and communicate within an international professional environment. *Methodology.* The methodological framework of the research is based on the cognitive-discursive approach, the ESP principles, CLIL, Problem-Based Learning, dialogic and interactive learning, authentic professional communication, and reflective learning. The study also employs the theoretical principles of critical thinking formulated by J. Dewey, D. Halpern, R. Ennis, P. Facione, R. Paul and L. Elder, alongside the cognitive levels of Bloom's taxonomy. Particular attention focuses on the integration of cognitive, communicative and reflective components of critical thinking into professionally oriented foreign-language activities.

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The research logic comprises two interconnected stages: a theoretical consideration of the essence and structure of critical thinking; an analysis of ESP as an environment for its development in agricultural education; and the methodological substantiation of pedagogical conditions, teaching methods and assessment criteria. *The aim* of the research is to substantiate the potential of professionally oriented English-language training for the development of critical thinking of students majoring in agricultural disciplines and to identify effective methodological approaches and educational practices that integrate language learning with the resolution of professional tasks. *Results.* The theoretical and methodological analysis demonstrates that ESP can provide conditions for developing students' ability to analyse professional information, identify problems, assess the reliability and relevance of evidence, compare alternative approaches, formulate arguments, negotiate solutions, and consider the consequences of professional decisions. The study identifies a range of instructional practices relevant to these processes, including authentic professional texts, problem situations, case studies, discussions, debates, role-playing activities, Socratic dialogue, SWOT analysis, the "5 Whys" method, the Eisenhower Matrix, the "Six Thinking Hats" technique, KWL strategy, CLIL tasks, and reflective writing. Particular methodological attention is given to the three-phase model "challenge – comprehension – reflection", which structures learning from activation of prior knowledge and formulation of hypotheses through analysis of new professional information to evaluation and reconsideration of students' own positions. The study also substantiates four assessment dimensions: analytical, evaluative, communicative, and reflective. *Practical implications.* The developed framework can be integrated into ESP courses for agricultural students through professionally oriented tasks that require learners to interpret authentic information, analyze professional problems, justify decisions, discuss alternative approaches, and reflect on their decisions. The three-phase model can serve as a practical structure for designing classroom activities, while the four assessment dimensions can support the development of criteria for monitoring students' progress in critical thinking. The framework is applicable to English-language training in agricultural specializations, particularly "Water Bioresources and Aquaculture" and "Technology of Production and Processing of Livestock Products". *Value/originality.* The value of the study lies in the combination

of English for Specific Purposes (ESP), agricultural subject matter, and critical thinking development methodology within an integrated pedagogical system. Its originality is associated with treating professionally oriented English-language learning as a space in which language development and higher-order cognitive processes can be developed simultaneously. The integration of the "challenge – comprehension – reflection" model with professionally oriented foreign-language activities provides a coherent methodological basis for connecting professional communication, critical analysis, decision-making, and reflection within the system of higher agricultural education. *Conclusion.* The study concludes that the integration of ESP, professional content, and critical-thinking methodology creates an educational environment conducive to preparing agricultural specialists for independent analysis, evidence-based decision-making, and professional communication in a globalized environment. Further research should focus on the empirical validation of the proposed methodological framework, the development of diagnostic tools for measuring changes in students' critical-thinking skills, and the design of comprehensive ESP materials for different agricultural specializations.

INTRODUCTION

Contemporary higher education is undergoing significant transformations driven by globalization and digitalization of the educational space and rapid development of science and technology. These processes considerably change the requirements for the professional training of specialists. Modern agricultural specialists are supposed to have specialized knowledge and practical skills but also to analyze rapidly changing information, evaluate its reliability, compare alternative solutions, predict potential consequences and make well-grounded professional decisions. Thus, the development of critical thinking has become an integral component of the professional competence.

The relevance of this study is determined by the growing need to integrate professional training with the development of students' ability to work independently with diverse information sources, including scientific and professional materials in foreign languages. For specialists in the fields of animal husbandry, livestock production and processing, aquatic bioresources, and aquaculture, professional activity increasingly entails international

scientific communication, access to foreign professional publications, the implementation of innovative technologies, and the consideration of environmental, economic, and ethical factors. Consequently, the English language is no longer a subject within the curriculum; it serves as a tool for professional learning, information analysis, communication, and integration into the international professional environment. The potential of English for Specific Purposes (ESP) to foster critical thinking is particularly significant, as professionally oriented foreign-language activities simultaneously engage linguistic, cognitive, communicative, and reflective processes.

The research novelty focuses on substantiation the role of professionally oriented English-language education as an integrated environment for the development of critical thinking of agricultural specialists. The research combines the principles of ESP with cognitive-discursive, problem-based, dialogic and reflective approaches and applies them to professionally relevant contexts in aquaculture and livestock education. Particular attention is given to the practical implementation of the three-phase model of critical-thinking development "challenge – comprehension – reflection" through English-language professionally oriented activities. The research proposes a system of analytical, evaluative, communicative and reflective criteria for assessing students' critical-thinking abilities in professionally oriented English-language tasks.

The research aim substantiates the methodological potential of ESP in developing critical thinking for students of agricultural specialties and identifies pedagogical conditions, innovative methods and professionally oriented practices that contribute to the formation of students' analytical, evaluative, communicative and reflective abilities. To achieve the aim, the following research objectives are defined:

– to analyze the essence and structure of critical thinking in the context of contemporary higher education;

– to substantiate the role of ESP as an environment for developing critical thinking of agricultural specialists;

– to identify pedagogical conditions that facilitate the integration of foreign-language learning and professional problem-solving;

– to characterize innovative and interactive methods applicable to developing critical thinking in ESP classes;

– to substantiate the potential of the "challenge – comprehension – reflection" model in organizing critical-thinking activities;

– to propose criteria and professionally oriented tasks for assessing the development of students' critical-thinking abilities.

The methodological basis of the research comprises the cognitive-discursive approach, the ESP principles, Content and Language Integrated Learning (CLIL), Problem-Based Learning, dialogic and interactive learning, authentic professional communication and reflective learning. The theoretical framework incorporates the conceptions of critical thinking developed by J. Dewey, R. Ennis, D. Halpern, P. Facione, R. Paul and L. Elder, and the cognitive levels of Bloom's taxonomy. The analysis focuses on the integration of cognitive, communicative and reflective components of critical thinking into professionally oriented foreign-language activities.

The logic of presenting the research material aligns with the research objectives. The first part examines the essence and structure of critical thinking and establishes its connection with foreign-language professional communication. The second part explores English as an educational environment for developing critical thinking and analyses the potential of ESP, authentic professional materials, CLIL, Problem-Based Learning, interactive methods and the three-phase model "challenge – comprehension – reflection". It focuses on the practical implementation of these approaches in the training of students specializing in "Water Bioresources and Aquaculture" and "Technology of Production and Processing of Livestock Products", covering pedagogical conditions, professionally oriented learning activities and assessment criteria.

The research is theoretically and practically relevant because it demonstrates the possibility of transforming English-language education from reproductive language practice into an intellectually active process in which students analyze professional information, discuss complex problems, justify decisions and reflect on their own reasoning. This approach aligns with the demands of contemporary professional education and contributes to the preparation of specialists capable of effective communication, independent thinking and responsible decision-making in a rapidly changing agricultural sector.

1. Theoretical Principles of Developing Students' Critical Thinking in the Process of Professionally Oriented English Language Teaching

1.1. The Essence and Structure of Critical Thinking in the Contemporary Educational Paradigm

Scholars identify the development of critical thinking as a key condition for shaping a competent individual capable of acting effectively in non-standard situations, as well as amidst information overload and rapid socio-technological changes. The shift in the role of education, moving from the transmission of knowledge to fostering the ability to apply it practically, has focused scholarly attention on the issue of developing critical thinking. Critical thinking is a complex cognitive-communicative process that enables the conscious perception, analysis, interpretation, and evaluation of information conveyed through language. The concepts of critically evaluating information are not new. The ancient Greek philosopher Socrates is considered one of the earliest proponents of a critical approach to inquiry. Through a system of questioning and dialogue, he encouraged his interlocutors to analyze their own beliefs, identify contradictions, and arrive at more well-founded conclusions. The Socratic method became the foundation of dialogic learning, in which knowledge is not imparted in a ready-made form but is instead shaped through reflection, the posing of challenging questions, and the search for reasoned answers. Socrates believed that dialogue was more effective for self-development than monologue. Ideas regarding the development of critical thinking have been further elaborated in the research of philosophers, psychologists, and educators. Modern approaches to organizing educational systems focused on developing critical thinking are grounded in the research of John Dewey [1], which demonstrates that learning occurs when an individual thoroughly investigates a phenomenon, asks questions, analyzes the information obtained, and forms their own perspective on the issue based on that process. Dewey defined critical thinking as an active process of analyzing, evaluating, and re-evaluating information.

Contemporary international and domestic educators define critical thinking as a complex intellectual activity encompassing the processes of analyzing, interpreting, and evaluating information, as well as forming judgments and making decisions. Notably, R. Ennis [2] views critical thinking as rational, reflective thought focused on determining what to believe or

what actions to take. The scholar notes that critical thinking entails both the possession of specific cognitive skills and the readiness to apply them in practice. According to D. Halpern [3], critical thinking involves the use of cognitive strategies and skills that increase the likelihood of identifying solutions to problematic situations. These concepts are particularly relevant in the context of language training, as any communicative activity involves not only the transmission of information but also its analysis, evaluation, and interpretation.

Facione [4] defines critical thinking as a purposeful process of forming judgments that encompasses interpretation, analysis, evaluation, inference, explanation, and self-regulation. The scholar emphasizes that an individual capable of critical thinking can independently evaluate their own thought process. Paul R. and Elder L. [5] identify a set of interrelated universal intellectual standards for evaluating the quality of reasoning: clarity, accuracy, precision, logical consistency, depth, breadth, and fairness. Integrating these principles into the educational process fosters students' ability to independently process information, substantiate their positions, and make well-founded decisions.

Study [6] presents findings on methods for developing critical thinking among students majoring in non-linguistic disciplines during English language instruction. The modern higher education system emphasizes the development of universal, interdisciplinary competencies, particularly critical thinking. Critical thinking is viewed as a cognitive ability involving the objective analysis of information, the assessment of its reliability, the formulation of well-founded conclusions, and the making of reasoned decisions. Furthermore, scholars identify English as a universal medium for intercultural communication; in the context of globalization, it provides access to up-to-date information from foreign-language sources and opportunities to participate in international conferences, thereby helping to shape professionals who are competitive in today's labor market. Study [6] identifies English classes as an effective means of fostering critical thinking, as they involve analyzing socially significant issues and authentic materials, as well as solving communicative tasks that mirror professional activities. Of particular value to our research are the results of a detailed analysis regarding modern scholarly approaches to defining critical thinking, as well as the methodological principles and tools for developing this skill in

students. Tools for fostering and developing critical thinking include the use of open-ended questions, discussions, debates, communicative scenarios, and role-playing games; these methods stimulate the development of cognitive, analytical, and collaborative skills within a supportive learning environment. Scholars emphasize the importance of the step-by-step development of thinking skills, progressing from the reproductive to the creative level, and substantiate the rationale for integrating critical thinking into English language instruction for non-linguistic majors in order to enhance the quality of training for modern professionals.

In [7], critical thinking is viewed as a complex cognitive process involving the ability to evaluate the reliability of information, compare diverse viewpoints, substantiate one's own position, and make well-founded decisions. Critical thinking constitutes a multi-component structure comprising motivational, content-related, intellectual-procedural, and emotional-volitional elements that ensure the integrity of an individual's cognitive activity. Researchers regard foreign language classes as an effective environment for developing critical thinking. We concur with the view that organizing the educational process according to the three-phase critical thinking model is effective, as this approach fosters active mental engagement among learners at every stage of working with the educational material.

The research [8] demonstrate the potential of integrating critical-thinking instruction into second language acquisition. This study therefore explores the viability of exploratory talk and WebQuests for critical-thinking development in learners of English as a second language. The scientists examined the use of exploratory talk and WebQuests as tools for fostering critical thinking among learners of English as a second language. Drawing on quantitative and qualitative data, the findings indicated that students were able to demonstrate critical-thinking skills through explicit reasoning and exploratory dialogue during group discussions. The study highlights the pedagogical value of incorporating structured critical-thinking strategies into language classrooms and emphasizes the potential of language learning to support both communicative and higher-order cognitive development.

Ukrainian society requires professionals capable of thinking critically and outside the box, individuals who possess not only hard skills (professional competencies) but also soft skills (interdisciplinary abilities). The research

[9; 10] demonstrates the significant role of foreign language instruction in fostering critical thinking and outlines methods for developing soft skills, specifically critical thinking, during language learning, such as working with authentic texts, brainstorming, the project method, the case study method, and the use of online platforms (e.g., Kahoot! Quizlet, Mentimeter). A detailed comparison between conventional and critical thinking is also provided. A professional with critical thinking skills is able to identify problems, articulate well-reasoned opinions, draw logical conclusions, classify information, evaluate, formulate hypotheses, and devise effective solutions.

The methodological foundation for understanding critical thinking in the process of foreign language learning is the cognitive-discursive approach, which views language as a means of forming and representing knowledge. When working with foreign-language texts, students acquire linguistic units while simultaneously engaging in complex intellectual activity: identifying the main idea of a message, analyzing information, discerning cause-and-effect relationships, comparing different viewpoints, and formulating their own position. For this reason, the development of critical thinking is an integral component of the modern linguodidactic paradigm.

In the context of contemporary higher education, critical thinking is viewed as an integral component of a specialist's foreign-language professional communicative competence [11; 12]. The development of critical thinking is of particular importance in the training of students in agricultural disciplines, as the work of specialists in livestock farming, the processing of livestock products, and aquaculture involves analyzing technological processes, evaluating information quality, working with scientific sources (including those in foreign languages), forecasting the outcomes of production decisions, and considering the environmental and social aspects of professional activity.

Thus, in the context of foreign language training, the components of critical thinking include cognitive, communicative, and reflective elements. The cognitive component encompasses intellectual operations such as analyzing, comparing, classifying, and synthesizing information, identifying cause-and-effect relationships, and making decisions. For students majoring in agricultural fields, this component is realized through the analysis of operational scenarios and enterprise activities, the monitoring of production

and processing workflows, the evaluation of domestic and international research findings, the comparison of technological approaches, and the search for optimal solutions to production-related problems.

The communicative component of critical thinking entails the ability to listen to an interlocutor, share one's views with others, defend one's position, acknowledge mistakes, engage in constructive dialogue, and consider diverse perspectives. In the process of learning professional English, the communicative component is pivotal, as it directly links critical thinking to the development of foreign-language professional communicative competence.

The reflective component refers to an individual's ability to evaluate their own knowledge, analyze the outcomes of their activities, acknowledge their mistakes, and identify areas for further growth. Reflection enables students to assess the effectiveness of their learning strategies, recognize and analyze their errors, critically evaluate the information they receive, and adjust their professional position.

The theoretical foundation for developing critical thinking within the educational process is B. Bloom's taxonomy of educational objectives, which identifies analysis, synthesis, evaluation, and the creation of a new product as the higher levels of cognitive activity [13]. Analysis entails the ability to break information down into its constituent parts for a deeper understanding, grasping the interrelationships and structure, as well as identifying errors, contrasting, classifying, experimenting, testing, and drawing conclusions. Synthesis involves the ability to generalize, combine parts into a whole, integrate, plan, and reconstruct elements to form something with new systemic properties. Evaluation is the capacity to assess the importance or quality of specific knowledge in relation to achieving a particular goal, as well as to make predictions and decisions. These levels align with the objectives of modern professional education, specifically the training of competitive specialists, as they prioritize the meaningful, conscious application of information to solve professional problems and tasks, rather than relying on ineffective rote memorization. A study conducted in an Iranian EFL context investigated the effectiveness of a critical-thinking intervention based on Bloom's Taxonomy and implemented through three stages: exposure, exploration, and evaluation. The findings showed that the intervention positively influenced students'

critical-thinking skills, reading comprehension, and perceptions of the classroom climate, highlighting the value of integrating critical-thinking instruction into English language curricula [14].

Thus, within the modern educational paradigm, it is appropriate to view critical thinking as an integrated personal attribute that combines cognitive, communicative, and reflective skills. For specialists in the agricultural sector, the development of critical thinking is a prerequisite for academic and professional mobility, the ability to utilize foreign information resources, and the capacity to make effective decisions in various professional contexts. Consequently, integrating critical thinking development techniques into professional English language instruction represents a promising approach to enhancing the foreign-language professional training of higher education students.

1.2. English as an Environment for Developing Critical Thinking in Agricultural Professionals

The role of foreign language training for future professionals within the context of their professional activities is being gradually re-evaluated. Amidst the globalization, digitalization, and internationalization of the educational landscape, the English language is becoming a tool for professional learning, intercultural communication, and the integration of future professionals into the international scientific and professional sphere [15].

Ukraine's agricultural sector is a priority area of the economy. The country's most powerful agricultural companies include major international agro-industrial holdings such as Kernel (a leading exporter and processor of oilseeds), MHP (a private joint-stock company specializing in poultry, grain, and oilseeds), Ukrlandfarming (an international holding company specializing in grain and oilseeds), and Agroprosperis (specializing in grain and oilseeds). This is by no means an exhaustive list; in total, there are over 100 such enterprises. Consequently, the globalization of agricultural science, advancements in livestock production and processing technologies, the adoption of modern aquaculture methods, and the need to integrate international best practices create a demand for specialists capable of working with foreign-language sources, critically evaluating information, and applying it in their professional activities.

In this context, ESP, which is based on the principle of integrating language training with the needs of a specific professional field, takes on particular significance. Unlike a general foreign language course, ESP entails integrating language instruction with professionally oriented content: the use of specialized subject matter, field-specific terminology, authentic professional texts, and communicative situations that closely mirror actual professional practice. This approach aligns language instruction with the needs of the learner and the professional sector where the language will be applied. Consequently, the role of English in professional training shifts; it becomes a tool for acquiring new knowledge, analyzing information, and solving professional problems. For students in agricultural disciplines, ESP provides an effective educational environment for developing foreign-language professional communicative competence and critical thinking, as working with professional materials in a foreign language requires active cognitive engagement. Analyzing specialized texts, identifying key ideas, evaluating the reliability of information, comparing different approaches, and formulating one's own position are processes that involve both linguistic and intellectual operations [16].

Working with authentic professional texts plays a pivotal role in developing critical thinking. Unlike adapted educational texts, authentic sources contain real professional information, current terminology, diverse viewpoints, and complex issues that require analysis and reflection, thereby stimulating the search for truth. For instance, when working with texts on aquaculture, students can analyze issues such as the sustainable use of water resources, the impact of pollution on aquatic ecosystems, and modern technologies for rearing aquatic organisms. Within the framework of professional training in livestock production and processing technology, topics subject to critical analysis might include animal welfare, product quality, production sustainability, and the implementation of innovative technologies.

An important aspect of ESP is the shift from a reproductive learning model to an activity-based one, in which the student is an active participant in the educational process. The English language instructor not only organizes the acquisition of language material but also designs learning situations that stimulate information seeking, the analysis of professional issues, the reasoned expression of ideas, and reflection. Thus, foreign language

activity transforms into a process of intellectual analysis and professional interpretation of information.

Working with authentic, professionally oriented sources fosters the development of critical thinking. The use of contemporary industry articles and professional journals “Dairy Global”, “The Poultry Site”, and “Global Aquaculture Advocate” alongside specialized websites, videos, professional reports, materials from international organizations (e.g., the Food and Agriculture Organization, World Farmers' Organisation, International Fund for Agricultural Development), international farming forums and exhibitions (e.g., Agritechnica, SIMA, World Grain Forum, World Agri-Tech Innovation Summit), thematic case studies, and specialized information resources, enables students to explore current issues facing the agricultural sector within a global context. Students focus not on the mechanical translation of texts but on their critical analysis: evaluating the text, analyzing its structure, assessing the evidence, identifying cause-and-effect relationships, and formulating well-reasoned conclusions.

When teaching English for professional purposes, the problem-based learning method proves effective; it entails clearly defining a problem, gathering and evaluating data, generating ideas, justifying solutions, developing and implementing them, and analyzing the consequences. For instance, when studying topics related to aquaculture, students might analyze the causes of declining fish farm productivity, the consequences of aquatic ecosystem pollution, or the conflicts between intensive production and sustainable development principles. Within the scope of livestock farming, subjects for critical analysis could include animal welfare, the use of antibiotics in production, feed optimization, or the impact of housing technologies on animal productivity. Students independently devise solutions by drawing on previously mastered material as well as newly acquired knowledge and skills, thereby gaining new experience. This type of learning fosters the development of critical and creative thinking, as well as the ability to apply knowledge in practice. Employing the problem-situation method during foreign language training boosts students' motivation to learn professional English, as it convincingly demonstrates that the language is an effective tool for achieving professional success. In our view, the Eisenhower Matrix method is effective for addressing specific problems; it helps prioritize tasks, delegate responsibilities, and

plan activities. The "5 Whys" method aims to identify the root causes of a problem, analyze those causes, and resolve the issue. The SWOT analysis method (a strategic planning and analysis technique) helps assess strengths, weaknesses, opportunities, and threats, that is, to comprehensively analyze the state of the internal and external environments.

A dialogic approach to instruction, specifically, the use of interactive teaching methods, proves effective for developing critical thinking and communication skills during foreign language training. Through discussions, role-playing games, debates, and Socratic dialogues, students formulate their own viewpoints, articulate their perspectives on problem-solving, analyze alternative opinions, and reach compromises. For instance, discussing topics such as "Should antibiotic use in animal farming be restricted?" or "Is intensive aquaculture sustainable?" requires not only a command of relevant English vocabulary but also the ability to evaluate various facets of the issue economic, environmental, technological, and ethical. In this context, professional English serves a dual function: as a means of communication and as a tool for shaping professional thinking. Engaging in English-language discourse encourages students to articulate their thoughts with greater precision, identify pertinent arguments, and employ professional terminology consciously. Explaining professional concepts in a foreign language fosters a deeper understanding of the subject matter itself, cultivates professional logic, and ensures the correct use of terminology, as it necessitates a structured presentation of information and argumentation aligned with global professional standards.

The CLIL method aims to create a favorable environment for learning the profession. For instance, when assigning reading tasks based on professionally oriented texts, it is advisable to include comprehension checks alongside questions requiring higher-order thinking skills: "What evidence supports the author's opinion?", "What are the possible consequences of this decision?", or "How would you solve this problem as a specialist?" Such tasks foster analytical and evaluative thinking while simultaneously developing professional communication skills in a foreign language.

Applying the three-phase critical thinking development model "evocation, realization of meaning, and reflection" ensures a logical structure for the learning process and creates conditions for the gradual development of critical thinking through foreign language activities. For instance, the

goal of the lesson “Sustainable aquaculture vs. traditional livestock farming: environmental impact and economic viability” is to develop skills in critical analysis, comparison, and argumentation in English within a professional context. During the evocation phase, students watch a video comparing resource consumption in the production of 2 kg of pork versus 2 kg of carp. They answer the question “Which sector is more sustainable for the future global food demand: aquaculture or animal husbandry? Why?” in pairs, thereby activating prior knowledge, brainstorming, and formulating hypotheses. In the realization of meaning phase, students work with a specialized academic article covering modern environmental innovations in livestock farming as well as the risks and challenges associated with aquaculture; they analyze the texts and exchange information. The objective here is to acquire, systematize, and critically evaluate new information. The reflection phase aims to consolidate new knowledge, formulate a reasoned conclusion, and assess changes in the students' perspectives on the issue through discussion and written reflection: by writing a short report titled “How has my understanding of sustainable protein production changed during this lesson?”

Therefore, English for professional purposes serves not only as a means of developing foreign-language professional communicative competence but also as an innovative educational environment for fostering critical thinking among students in agricultural fields. Integrating language instruction with professional content makes it possible to shape a specialist capable of not only communicating effectively in a foreign language but also critically analyzing professional information, making well-considered decisions, and rapidly adapting to the modern challenges of the global professional environment.

2. Methodological Approaches to Developing Students' Critical Thinking

2.1. Pedagogical Conditions for Developing Students' Critical Thinking Through Professionally Oriented English Language Learning

In the modern system of foreign language training for agricultural specialists, English language instruction aims to develop linguistic competence and the ability to engage in professionally oriented analytical

work. Instructors create an educational environment where foreign language communication serves as a tool for analyzing professional issues, gathering information, evaluating alternative solutions, and formulating well-reasoned positions. Students learn to critically assess and resolve complex operational challenges, for example optimizing technological processes, ensuring product quality, preserving biodiversity, maintaining environmental safety and animal welfare, and implementing innovative technologies. Establishing appropriate pedagogical conditions is essential to create an educational environment that fosters the development of critical thinking.

First and foremost, this involves a professional focus in foreign language instruction. In line with the principles of ESP, the curriculum content must align with students' needs and their future professional tasks. For students majoring in ”Aquatic Bioresources and Aquaculture,” it is appropriate to use professionally oriented topics: Sustainable Aquaculture, Water Pollution and Environmental Protection, Fish Diseases and Prevention, Aquatic Ecosystems, and Responsible Fisheries Management. For students specializing in “Livestock Production and Processing Technology,” relevant topics include Animal Welfare, Modern Livestock Production, Feeding Technologies, Food Safety, and Sustainable Animal Farming. Discussing real-world professional issues stimulates students to engage in analytical thinking. For instance, when studying “Sustainable Aquaculture,” students analyze the conflict between the need to increase fish production and the necessity of preserving natural ecosystems. Students master specialized terminology and learn to define a problem, analyze its causes, assess potential negative consequences, propose solutions, and defend their positions using well-reasoned arguments in English. Thus, integrating foreign language instruction with professional content serves as a motivating factor for developing critical thinking, as it enables students to recognize the practical value of their foreign language skills.

The second pedagogical condition is the use of Problem-Based Learning. It involves organizing educational activities around a specific professional problem. The purposeful integration of problem-oriented tasks, discussions, the analysis of authentic sources, role-playing games, group projects, and written reflective assignments into the language training of students majoring in non-linguistic fields fosters the development of an intellectually

active, independent, and communicatively competent individual capable of effectively processing information and solving professional tasks.

For example, consider the professional scenario “Fish Mortality in an Aquaculture Farm”: a fish farm reports a sudden increase in fish mortality, and the farm manager asks specialists to identify possible causes and suggest solutions. Students discuss questions such as: What factors may cause fish mortality? What information should specialists collect? Which solution would be the most effective? How can similar problems be prevented? They analyze factors including water quality, temperature conditions, fish diseases, rearing conditions, and operational issues. The outcome of this interaction is the formulation of a professional recommendation in English. There are various types of problem-based tasks. For specific types of problem situations, one should select the methods most effective for resolving the issue. For instance, the Eisenhower Matrix method helps prioritize tasks, delegate responsibilities, and plan activities. The “5 Whys” method aims to identify the root causes of a problem, analyze those causes, and resolve the issue. The core idea behind the three-phase model of critical thinking development, comprising the stages of evocation, realization of meaning, and reflection, is that effective learning entails not merely the assimilation of new information, but an active process of comprehending, analyzing, and integrating it with the student's prior experience. The SWOT analysis method (a strategic planning and analysis technique) helps assess strengths, weaknesses, opportunities, and threats, in other words, to comprehensively analyze the internal and external environments. Edward de Bono’s “Six Thinking Hats” method is effective for discussing a problem from various perspectives by sequentially focusing on available information, feelings and intuition, risk assessment, identifying positive aspects, generating new ideas, and managing the process. This method fosters structured thinking and enables the rapid making of effective decisions. Applying the KWL strategy helps students become aware of their own learning process.

Another condition for developing critical thinking in professionally oriented English language instruction is the organization of dialogic interaction among students. Employing the Socratic dialogue method fosters students' ability to analyze information and articulate their own positions. When discussing the topic “Is Intensive Farming Sustainable?”,

the instructor guides students to analyze the issue independently by asking open-ended questions: “Why do you think so?”, “What evidence supports your opinion?”, “Are there alternative explanations?”, and “What are the possible consequences?” These questions facilitate the development of professional discourse. Students simultaneously develop language competencies and skills for critically interpreting professionally oriented material. The instructor's role is to organize the cognitive process, not by providing ready-made information, but by encouraging students to engage in analysis and evaluation.

Digital resources are an integral component of innovative ESP training [17]. Online platforms, gamified platforms (e.g., Kahoot!), industry-specific dictionaries (e.g., Merriam-Webster, Cambridge Dictionary, Terminology Dictionary in Fisheries), interactive flashcards (e.g., Quizlet), electronic text corpora (e.g., COCA), authentic industry portals (e.g., The Fish Site), specialized video materials (e.g., FAO of the UN), LMS systems (e.g., Moodle), multimedia materials, and professional video resources expand the possibilities for foreign language learning. Upon gaining access to diverse information sources, students must be able to evaluate their reliability, relevance, and practical value. Integrating innovative technologies into the ESP training of future agricultural professionals enables a shift from traditional language instruction to the development of the comprehensive competencies required for professional practice in a globalized environment.

Thus, the methodology for developing critical thinking is grounded in the principles of the professional orientation of ESP, problem-based learning, dialogic interaction, the use of authentic materials, reflective practice, and the integration of language and professional training. The “Evocation-Realization of Meaning-Reflection” three-phase model, the case method, and the Socratic dialogue create a favorable educational environment for shaping students into active participants in the learning process, individuals capable of analyzing information, substantiating decisions, and applying the knowledge they have acquired to their future professional practice. The following learning activities are employed: analysis of professional texts in English, discussion of current industry issues, case studies, role-playing games, debates, the creation of professional presentations, and the drafting of analytical conclusions.

The application of the specified principles of organizing instruction and teaching methods creates conditions for shaping an individual capable of interacting effectively within the international educational and professional sphere.

2.2. Criteria for Assessing the Development of Students' Critical Thinking

Academic literature presents various approaches to defining the criteria, indicators, and levels of critical thinking development. We find the developed system of criteria appealing. [18]:

1) motivational (goal-orientation in achieving objectives; a positive emotional state; a value-based attitude toward one's own views and the views of others);

2) cognitive (knowledge of the concept of critical thinking, its structure, and one's own thinking style; knowledge of rational and effective methods for learning, self-learning, self-monitoring, and self-correction of activity and thought);

3) communicative (expressing one's own thoughts, orally and in writing, supported by arguments and evidence; the ability to conduct a conversation while adhering to communication norms);

4) action-oriented (applying knowledge of critical thinking to problem-solving; applying skills to monitor mental activity);

5) reflective (the ability to evaluate one's own thoughts and those of others; the ability to propose and generate original ideas).

To assess the level of critical thinking development, we have devised a system of criteria and indicators comprising analytical, evaluative, communicative, and reflective criteria. The analytical criterion measures the student's ability to identify the core problem, analyze causes, and establish cause-and-effect relationships. The evaluative criterion assesses the student's ability to evaluate the reliability of information, compare alternative solutions, and identify advantages and potential risks. The communicative criterion gauges the ability to substantiate one's point of view, use professional terminology, and engage in discussion. The reflective criterion measures the student's ability to evaluate the outcomes of their own activities, acknowledge errors, demonstrate a

willingness to revise their opinion in light of convincing evidence, and identify directions for further professional and personal growth.

We propose assessing the level of critical thinking among students majoring in "Aquatic Bioresources and Aquaculture" and "Technology of Livestock Production and Processing" through the use of integrated, professionally oriented tasks. This approach allows for the evaluation of both language proficiency and critical thinking skills. Regarding the analytical criterion, we assess the ability of "Aquatic Bioresources and Aquaculture" students to evaluate ecosystem risks and identify effective solutions to problems. We ask students to consider the following scenario: "A private company proposes constructing a large-scale open-pen Atlantic salmon farm in a local estuary. Assess the environmental and economic risks vs. benefits. Write 3 pros and 3 cons in English. Conclude with your official recommendation." The evaluative criterion involves students preparing a report on an Environmental Impact Assessment. The communicative criterion tests the ability to express professional ideas in English and employ a compromise-oriented communication strategy. Students may participate in role-playing exercises or debates, for example: "An outbreak of Ichthyophthiriasis (White spot disease) has occurred at a sturgeon hatchery. Roleplay a crisis meeting in English."

Role 1: Chief Ichthyopathologist (advocates for immediate chemical treatment).

Role 2: Organic Certification Inspector (warns about losing the "organic"status).

Role 3: Financial Director (worried about immediate costs). Negotiate a consensus solution within 7 minutes".

The reflective component involves writing a reflective essay to assess the ability to acknowledge and analyze one's own mistakes. Example of the task: "Review a case study where an aquaculture farm went bankrupt due to a sudden summer hypoxia event (oxygen depletion). Write a short reflective journal entry: If I were the lead technologist of this failed farm, what systematic errors in my own thinking or monitoring protocols would I look for first? How does this case change my approach to risk management?".

Characterizing the criteria, indicators, and levels of an individual's critical thinking development enables the modeling of a system for the effective development of critical thinking.

CONCLUSIONS

The conducted theoretical and methodological analysis makes it possible to formulate the following conclusions.

1. Critical thinking should be considered an integral component of the professional competence of future agricultural specialists. It combines cognitive, communicative and reflective abilities and enables students to analyse information, identify problems, compare alternative solutions, evaluate evidence, formulate reasoned judgments and reconsider their own conclusions. For specialists in animal husbandry, livestock production and processing, water bioresources and aquaculture, these abilities are directly connected with the analysis of technological processes, quality and safety of products, environmental risks, animal welfare, sustainable use of natural resources and implementation of innovative technologies. The proposed understanding corresponds to the structure of critical thinking presented in the theoretical part of the study.

2. English for Specific Purposes has considerable potential for developing critical thinking. Professionally oriented English transforms language learning into a process of professional cognition. Working with authentic texts and other professional sources requires students not merely to understand or translate information but to identify key ideas, analyse evidence, establish cause-and-effect relationships, compare different positions and formulate their own professional judgments. Thus, language learning and critical-thinking development can be implemented as interconnected educational processes.

3. Professional relevance is a key pedagogical condition for effective critical-thinking development. Learning materials and communicative tasks should correspond to students' future professional activities. For aquaculture students, relevant contexts include sustainable aquaculture, water pollution, fish diseases, aquatic ecosystems and responsible fisheries management. For students specialising in livestock production and processing, productive contexts include animal welfare, modern livestock production, feeding technologies, food safety and sustainable animal farming. Professionally meaningful problems increase the cognitive value of English-language activities and demonstrate the practical relevance of foreign-language competence.

4. Problem-Based Learning creates favourable conditions for the integration of professional knowledge, English-language communication and critical thinking. Professionally relevant cases such as sudden fish mortality, environmental risks, animal welfare issues, antibiotic use or optimisation of feeding technologies require students to identify a problem, collect and evaluate information, establish possible causes, compare solutions and formulate recommendations. The use of methods such as the "5 Whys", SWOT analysis and the Eisenhower Matrix provides students with structured tools for analysing professional situations and making decisions.

5. Dialogic and interactive methods strengthen both the communicative and cognitive dimensions of critical thinking. Discussions, debates, role plays and Socratic dialogue encourage students to express and defend their opinions, consider alternative perspectives, ask questions, evaluate arguments and reach compromise solutions. In this context, the English language becomes simultaneously an instrument of communication and a means of developing professional reasoning. Open-ended questions such as "What evidence supports your opinion?", "Are there alternative explanations?" and "What are the possible consequences?" encourage students to move from simple expression of an opinion to evidence-based professional argumentation.

6. The three-phase model "challenge – comprehension – reflection" provides a coherent methodological framework for developing critical thinking through foreign-language activities. The challenge stage activates students' prior knowledge, creates a cognitive problem and encourages hypotheses. The comprehension stage involves obtaining, organising and critically analysing new professional information. The reflection stage enables students to formulate an evidence-based conclusion, evaluate changes in their understanding and reconsider their initial position. Its application to topics such as sustainable aquaculture and sustainable livestock production demonstrates the possibility of integrating professional content, English-language communication and critical reflection within a single learning cycle.

7. The proposed assessment framework makes it possible to evaluate critical thinking through professionally oriented English-language tasks. The analytical criterion focuses on identifying problems, analysing causes

and establishing causal relationships; the evaluative criterion concerns the assessment of information, comparison of alternatives and identification of risks; the communicative criterion reflects the ability to argue and discuss professional issues using appropriate terminology; and the reflective criterion concerns the ability to assess one's own performance, recognise mistakes and reconsider conclusions when new evidence becomes available. Such assessment can simultaneously reveal students' language performance and their ability to apply critical-thinking strategies.

8. The methodological approach proposed in the study supports the transition from reproductive to activity-based English-language learning. The teacher acts primarily as an organiser of cognitive and communicative activity rather than as the sole provider of ready-made information. Students become active participants who search for and evaluate information, cooperate with peers, solve professional problems, present arguments and reflect on the results of their activities. This corresponds to the contemporary understanding of the educational process as a space for independent knowledge construction and professional development.

9. The integration of ESP, critical-thinking strategies and professional content contributes to the preparation of agricultural specialists for an international professional environment. The ability to work with authentic English-language sources, evaluate their reliability and relevance, communicate professional ideas and justify decisions is increasingly important in conditions of globalisation, internationalisation and rapid technological change. Therefore, critical-thinking development should not be treated as an additional element of English-language instruction but as an integral dimension of professionally oriented foreign-language education.

10. The main theoretical and methodological result of the study is the substantiation of an integrated model in which professional content, English communication and critical-thinking development are implemented simultaneously. The combination of ESP, authentic professional materials, CLIL, Problem-Based Learning, case studies, dialogic interaction, interactive methods and the "challenge – comprehension – reflection" model creates conditions for the development of analytical, evaluative, communicative and reflective abilities of future agricultural specialists.

Further research should focus on the empirical verification of the proposed methodological model, the development of diagnostic

instruments for measuring changes in students' critical-thinking abilities, the establishment of clearly operationalised levels and indicators of their development, and the experimental comparison of different ESP teaching strategies. Another promising direction is the development of profession-specific English-language educational materials for students of aquaculture, livestock production and processing, including digital resources, authentic case studies, interdisciplinary CLIL modules and assessment tools. Particular attention should also be paid to the use of digital technologies and AI-supported learning environments for developing students' ability to critically evaluate professional information and distinguish reliable evidence from inaccurate or insufficiently substantiated claims.

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