

The Role And Functions Of Communicative Competence In The Professional Activity Of Future Agricultural Engineers

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Abstract: The article examines the role and functions of communicative competence in the professional activity of future agricultural engineers. It identifies typical occupational communication situations and systematises information-communicative, interactive-coordinating, social-perceptual, regulatory-managerial, conflictological, and reflective-corrective functions. Occupational activity analysis, functional modelling, comparative analysis, and pedagogical interpretation were employed. A functional map based on the sequence ‘professional situation – communicative task – function – observable outcome’ is proposed. Communicative competence is shown to support not only the transmission of technical content but also teamwork, safety, mutual understanding among stakeholders, and socially responsible engineering decisions.

Keywords: agricultural engineer, communicative competence, professional activity, communication function, teamwork, technical information, reflection.

Introduction

In the field of agricultural mechanization, an engineer manages complex interactions among machinery, people, and production processes. The engineer analyzes the operating condition of machines and equipment, proposes technological solutions, provides instructions to operators, justifies results to management, and conducts negotiations with farmers and service representatives. Each of these tasks requires not only technical knowledge but also the ability to express information clearly, listen effectively, reach agreements, and assign responsibilities precisely. Therefore, communicative competence is not an external or supplementary component of engineering activity; rather, it is a mechanism through which a technical decision is transformed into a practical outcome.

The ABET criteria identify the ability to communicate effectively with a range of audiences, establish leadership and collaboration within a team, and consider the social, environmental, and economic implications of engineering decisions as important student outcomes [1]. These requirements are particularly significant for agricultural engineers because their decisions directly affect occupational safety, resource efficiency, productivity, and the environment. Incorrect or ambiguous communication may intensify technical errors and lead to losses of time and resources.

The aim of this article is to identify typical communicative situations in the professional activities of future agricultural engineers and to systematize the functions of communicative competence from a pedagogical perspective. In this study, the term “function” is understood as the purposeful effect of communicative competence manifested in the performance of a professional task. Such an approach makes it possible to design educational content not around abstract rules of communication, but around real professional tasks that future specialists are expected to solve.

Literature Review

Although engineering has traditionally been perceived as a profession primarily associated with individual technical calculations, modern production processes involving design, maintenance, operation, and management are increasingly carried out within multidisciplinary teams. ABET’s reference to a “range of audiences” implies that communication takes place not only among colleagues but also with stakeholders who have different levels of technical expertise [1]. An engineer must therefore be able to transform a technical term into a clear explanation, numerical data into a decision, an observation into a recommendation, and a risk into a precise instruction.

D. Hymes associated communicative ability with the social appropriateness of speech [2]. In the model proposed by M. Canale and M. Swain, grammatical accuracy is complemented by sociolinguistic appropriateness and strategic competence [3]. In professional engineering communication, these ideas are manifested in the need to use technical terminology correctly, adapt communication to the audience, select

appropriate explanatory strategies when communication breaks down, and present ideas within a coherent system of arguments. Thus, communicative competence serves as a connecting system between the accuracy of content and its effective reception and understanding.

The CEFR conceptualizes communicative language activities in terms of reception, production, interaction, and mediation [5, 6]. Although this framework was originally developed for language education, the concept of mediation has considerable explanatory potential when applied to engineering practice. An engineer transforms complex technical information into practical instructions for an operator or farmer, connects the perspectives of different specialists, and facilitates the construction of shared meaning for collective decision-making. This process extends beyond the simple transmission of information.

According to the theory of contextual learning, knowledge becomes a practical tool when students' cognitive activity is connected with the substantive and social content of professional activity [7]. Therefore, lectures "about communication" alone are insufficient for developing communicative competence. Students should make communicative decisions in professionally relevant situations, such as collaboratively analyzing machinery malfunctions, explaining safety instructions, justifying the selection of alternative equipment, or responding to a client's objections.

An empirical study involving engineering students has demonstrated a significant positive influence of verbal and non-verbal communication skills on employability [10]. This finding confirms that communication is an important requirement in the labor market. However, a more important question for higher education concerns the specific professional functions through which this competence is manifested. Without clearly identifying these functions, educational tasks and assessment criteria remain overly general.

Pedagogical and psychological literature distinguishes such aspects of communication as information exchange, interpersonal interaction, and mutual perception [8, 11]. From the perspective of professional activity, these aspects are manifested in the functions of communicating information clearly, coordinating collaborative actions, understanding interlocutors, regulating behavior and professional activities, resolving conflicts constructively, and reflectively evaluating outcomes. Such differentiation makes it possible to establish observable indicators for each function and, consequently, to develop more precise criteria for assessing the communicative competence of future agricultural engineers.

Research Methodology

The methodological framework of the study was based on competency-based, activity-oriented, contextual, integrative, and systemic approaches. The competency-based approach defined communicative outcomes as abilities manifested in real professional situations. The activity-oriented approach analyzed communication as a system of actions directed toward specific goals and outcomes. The contextual approach brought the situations under consideration closer to the future professional activities of agricultural engineers. The integrative and systemic approaches combined technical, pedagogical, and psychological content within a unified functional framework.

Five types of situations were selected for the analysis of professional activity: discussing the results of technical diagnostics; providing safety instructions to an operator; justifying the choice of machinery or a repair option; coordinating tasks within a production team; and resolving a problematic situation with a customer or farmer. For each situation, the communicative goal, participants, content, potential barriers, required function, and observable outcome were identified.

Three criteria were applied to distinguish the functions: professional necessity, pedagogical differentiation, and diagnostic observability. For example, while the information-communicative function ensures the transmission and comprehension of content, the regulatory-managerial function serves to guide professional actions on the basis of that content. Although these functions may occur simultaneously in the same situation, they differ in terms of their purposes and assessment indicators. The functional framework represents a product of theoretical modeling and is intended to be further refined through expert evaluation and the results of experimental testing.

Results and Discussion

The analysis revealed that the principal role of communicative competence in professional activity is to transform technical content from individual knowledge into coordinated action and well-founded decision-making. Even if an engineer correctly solves a technical problem, the practical effectiveness of that technical

knowledge remains limited if the solution cannot be clearly explained to an operator, manager, or customer. In this sense, communicative competence functions as a system-forming component of an engineer's professional competence, mediating the transformation of professional knowledge into practical activity. In this study, the manifestation of future agricultural engineers' communicative competence in professional activity was systematized through six interrelated functional dimensions: information-communicative, interactive-coordinative, social-perceptive, regulatory-managerial, conflict-management, and reflective-corrective functions. Argumentation, presentation, mediation, and communicative adaptation were interpreted not as separate core functions but as methods or forms through which these functions are manifested in specific professional situations.

The information-communicative function ensures the accurate, complete, and comprehensible transmission of information concerning technical conditions, measurement results, risks, requirements, and decisions, as well as verification of understanding through feedback. An agricultural engineer records signs of malfunction, interprets technical documentation, explains operating instructions, and reports on completed work. The effectiveness of this function is measured not by the volume of information transmitted, but by the recipient's ability to perform the required action correctly and without error. Its indicators include terminological accuracy, logical sequence, completeness of content, audience appropriateness, and the presence of feedback. The interactive-coordinative function ensures the coordination of the goals, roles, timing, and actions of team members. In mechanized agricultural processes, the decisions of agronomists, mechanics, operators, suppliers, and managers are interdependent. An engineer must clearly distribute tasks, coordinate the sequence of operations, and establish feedback channels. Ambiguous instructions may lead to a diffusion of responsibility, whereas effective coordination clarifies who is responsible for what, when a task must be completed, and according to which criteria it should be performed.

The collaborative manifestation of this function transforms communication from one-way instruction into joint problem-solving. It involves asking questions, gathering opinions, discussing alternative options, formulating a common goal, and reaching agreement. Students should be able not only to defend their own proposals but also to incorporate the arguments of others into the decision-making process. This contributes to collaborative creativity and the sharing of professional responsibility.

The social-perceptive function enables an engineer to understand the level of knowledge, needs, positions, and emotional states of communication participants. Communication with an experienced mechanic may require the use of technical terminology, whereas communication with a novice operator may require step-by-step instructions. When communicating with a farmer, attention should be given to economic outcomes and ease of operation. Understanding the interlocutor does not mean oversimplifying the content; rather, it means presenting the content in a form that is appropriate and comprehensible to the recipient.

Argumentation is an important manifestation of the information-communicative and regulatory-managerial functions when an engineering decision needs to be justified. When selecting machinery or a technological operating mode, a balance must be achieved among cost, productivity, reliability, safety, and environmental impact. An engineer should substantiate a position using facts, calculations, standards, and experimental results while responding respectfully to alternative viewpoints. Persuasion should not be understood as exerting pressure; rather, it involves presenting arguments in an order appropriate to the audience's criteria and clearly explaining the consequences of the proposed decision.

Map of Professional Communicative Situations and Functions
Table 1

Professional Situation	Leading Function	Observable Outcome
Explaining the technical condition	Information-communicative	Clear message, comprehensible conclusion, and responses to questions
Organizing teamwork	Interactive-coordinative	Agreed roles, deadlines, criteria, and feedback

Justifying a technical option	Information-communicative and regulatory-managerial	Evidence, analysis of alternatives, and a well-founded decision
Providing safety instructions	Regulatory-managerial	Unambiguous instruction and confirmation of understanding
Conflict of interests	Social-perceptive and conflict-management	Identified interests and constructive agreement
Reviewing the outcome	Reflective-corrective	Identified cause of the error and an improvement plan

The regulatory-managerial function governs professional actions on the basis of standards, instructions, and agreed procedures. In safety-related situations, the accuracy of communication is directly associated with human life and health. An order or warning should be concise, unambiguous, and verifiable, while the recipient should confirm that the instruction has been understood. When combined with ethical responsibility, this function is based not on the engineer's authority as such, but on professional standards and the common interest of ensuring safety.

The conflict-management function ensures the constructive resolution of disagreements concerning technical views, resource allocation, or responsibility without allowing them to develop into personal confrontation. The engineer separates the problem from the person, identifies the interests of the parties, asks neutral questions, establishes common criteria, and compares possible solutions. The aim is not to eliminate conflict completely, but to make constructive use of its informational and developmental potential.

Mediation is a manifestation of the interactive-coordinative function that creates a bridge between different professional languages and interests. The engineer translates a manufacturer's complex technical specifications into the farmer's practical needs, converts agronomic requirements into mechanical settings, and transforms management's economic objectives into the operator's everyday tasks. The CEFR concept of mediation emphasizes the reformulation of content and the collaborative construction of meaning [6]. In agricultural production, this skill constitutes an essential prerequisite for interdisciplinary coordination.

Presentation and representation are manifestations of the information-communicative function in communicating a project, result, or proposal to a team and other stakeholders. Oral communication, written reports, tables, diagrams, drawings, and digital presentations should complement one another. Professional credibility is established not by increasing the amount of information presented, but by making the main conclusion visible, demonstrating the relationship between evidence and conclusions, and being prepared to respond to questions.

The reflective-corrective function ensures the analysis of communication outcomes and the adjustment of subsequent actions. The engineer evaluates whether the message has been received, whether the task has been correctly understood, whether a decision has been made, and whether constructive professional relationships have been maintained. Feedback is regarded not as a means of exposing mistakes, but as information for improving and refining the system. Without reflection, communicative experience does not automatically develop into competence.

The functions do not operate in isolation; rather, they are manifested in different configurations depending on the professional situation. For example, when troubleshooting a combine harvester malfunction, information is first collected and explained, after which the participants' positions are understood, actions are coordinated, safety instructions are provided, potential disagreements are managed constructively, and the outcome is evaluated reflectively. Thus, a single professional situation may require an interconnected combination of all six functions.

The functional model establishes specific requirements for educational content. During lectures, students may analyze communication theory and its functions through professional examples, while seminars may enable them to test communicative decisions through case studies, problem-based tasks, debates, collaborative analysis, and coaching questions. Even when no separate training hours are allocated, the communicative orientation of existing seminar tasks can be strengthened by incorporating the audience, roles, constraints, expected communication product, and assessment criteria into the task requirements.

Assessment should be multi-source and aligned with the identified functions. For the information-communicative function, accuracy and comprehensibility should be assessed; for the interactive-coordinative function, the clarity of roles, tasks, and feedback; for the social-perceptive function, listening skills and adaptation to the audience; for the regulatory-managerial function, the unambiguity of instructions; for the conflict-management function, the identification of interests and achievement of constructive agreement; and for the reflective-corrective function, recognition of errors and development of a corrective plan. Diagnostic reliability can be enhanced by combining teacher observation, peer assessment, self-assessment, and analysis of activity outcomes.

The proposed framework is interconnected with five components of communicative competence. The motivational-axiological component provides the internal foundation for cooperation and responsibility; the cognitive component provides knowledge of situations and communication tools; the speech-and-activity component enables the actions required to perform the functions; the social-perceptive component ensures understanding of the audience; and the reflective component supports the evaluation and correction of outcomes. Thus, the components represent the internal structure of competence, whereas the functions represent its external manifestation in professional activity.

The practical significance of the model lies in the fact that it provides a framework for linking existing topics in pedagogy and psychology with the professional tasks of agricultural engineers. The topic of “Psychology of Communication” can be integrated with the social-perceptive and conflict-management functions, “Group and Team” with the interactive-coordinative function, and “Teaching Methods” with the task of explaining technical content to different audiences. In this approach, the disciplinary content itself does not change; rather, its professional context is strengthened.

The theoretical nature of the study constitutes its main limitation. The proposed system of functions should be validated through expert assessment involving engineers from agricultural enterprises, employers, and teachers in the field, and the relative priority of individual functions should be determined. At the subsequent empirical stage, the results of situational tasks should be compared between control and experimental groups, and the relationships between the components and functions should be examined statistically.

When teaching the information-communicative function, it is important to distinguish between completeness of a message and information overload. An engineer organizes not all available information, but the information required for a specific decision. For example, when reporting a machinery malfunction, a manager may require information about the economic consequences and expected downtime; a mechanic may need diagnostic signs and measurement data; while an operator may need instructions for safely shutting down the equipment. The ability to present the same event in three different forms for three different audiences, while maintaining consistency of meaning, serves as a practical criterion of communicative adaptation.

The success of the interactive-coordinative function is determined not by the number of meetings held, but by the clarity of coordinated action. In a seminar task, students may plan a production-related activity in small groups and, at the end, record the objective, roles, resources, deadlines, control points, and expected output in a one-page protocol. Assessment should focus not on allowing the most verbally active student to dominate all decisions, but on making effective use of each participant’s knowledge and distributing responsibilities clearly.

The development of argumentation skills begins with distinguishing evidence from opinion. Instead of simply describing a machinery option as “good,” students should justify their assessment according to such criteria as productivity, fuel consumption, maintenance possibilities, availability of spare parts, and safety. Defending an opposing position in a debate helps students recognize the limitations of their own arguments. The ultimate goal is not to defeat an opponent, but to select the most appropriate professional decision on the basis of available evidence.

In regulatory-managerial communication, the principle of closed-loop communication is particularly important: the sender formulates the instruction clearly, the recipient repeats it in their own words, and the sender then confirms or corrects the interpretation. Applying this algorithm in safety-related seminar situations demonstrates the difference between a message being delivered and actually being understood. In addition to using an appropriate directive tone, students should be able to explain the rationale for an instruction and the criteria for its successful implementation.

In developing the conflict-management function, it is effective to distinguish between the positions and interests of the parties. “The equipment must be replaced immediately” and “the equipment should continue to be repaired” are positions, whereas continuity of production, cost reduction, and safety are the underlying interests. Once students identify common interests, the range of possible solutions expands. Coaching questions such as “What evidence is missing?”, “What would a third party observe?”, and “What is the minimum safe agreement?” encourage reflective thinking.

Mediation, as a manifestation of the interactive-coordinative function, is also a practical form of interdisciplinary integration. When an agricultural engineer converts an agronomic requirement into a technical parameter, the engineer does not merely translate concepts mechanically between two fields of knowledge, but explains the causal relationships between them. In an educational task, a student may transform a single technical text into a brief summary for a specialist, a recommendation for a farmer, and step-by-step instructions for a novice operator. Comparing these three products makes it possible to assess the quality of audience adaptation.

In developing these functions, the teacher’s own communicative behavior also acts as an implicit didactic factor. The way a teacher responds to questions, comments on mistakes, accepts objections, justifies assessments, and reacts to diverse opinions in the classroom provides students with a practical model of professional communication. If the content of a lesson promotes dialogue while the teaching process itself is based solely on one-way directives, a contradiction emerges between declarative principles and practical experience. Therefore, the methodological system should also establish requirements for the teacher’s communicative practice.

The complexity of professional communicative situations should be increased gradually. Initially, students may work with a situation involving a single objective and a familiar audience; this can be followed by situations involving two parties with different interests, and subsequently by complex cases involving time constraints, incomplete information, and safety risks. Such progression enables students to move from following a predetermined algorithm to independently selecting a communication strategy. At the final stage, students should not only present a solution and communication product but also justify which functions they selected and why.

By the end of the process of mastering communicative functions, students should progress beyond reproducing ready-made expressions toward independently analyzing situations and selecting appropriate strategies. To achieve this, they should consider the objective, audience, risks, time constraints, available evidence, and potential resistance, and then determine the leading and supporting functions. For example, in an emergency safety situation, the regulatory-managerial function becomes dominant, while information exchange and feedback serve supporting roles. In a discussion concerning technical investment, argumentation, mediation, and presentation become more prominent. Conscious selection of functions ensures that communicative behavior is professionally grounded rather than accidental.

The functional framework also makes it possible to organize meaningful cooperation with employers. Industry professionals can evaluate the authenticity of typical situations, identify relevant risks and constraints, and assess real-world requirements for communicative products. Their feedback can be used to update case studies, refine assessment descriptors, and bring classroom activities closer to production needs. At the same time, higher education should not merely reproduce current workplace practices; it should also provide future engineers with opportunities to develop ethical judgment, adaptability, and reflective growth.

To integrate communicative functions into the educational process, a task profile can be developed for each assignment. It may specify the professional situation, problem, audience, student’s role, available information, constraints, expected communicative product, and assessment criteria. For example, the task “As a service engineer, explain to a farmer the cause of a recurring malfunction and recommend one of three possible solutions” integrates information-communicative, perceptive, and argumentation skills. Such a task profile prevents the assignment from becoming an unstructured conversation.

The relationship between lectures and seminars can also be reorganized according to the functional approach. During lectures, the function itself, its psychological mechanism, professional significance, and implementation algorithm are explained. At the beginning of a seminar, students may conduct a brief situational analysis; the main part may involve a group decision or presentation; and the final stage may

include criterion-based feedback and reflection. In this way, theory remains connected with practical tasks, while seminars do not simply repeat lecture content. Each session contributes communicative experience required for handling increasingly complex professional situations.

The functional approach is also useful for interpreting the results of a pedagogical experiment. An increase in an overall communication score does not fully reveal which professional ability has actually improved. Analysis by individual functions may show that students perform successfully in communicating information accurately but experience difficulties in conflict management or adapting communication to an audience. Such information can be used to adjust the methodological system, select additional cases, and direct teacher feedback more effectively. As a result, diagnostics becomes not merely a form of final assessment but a mechanism for managing the educational process.

The ethical dimension of professional communication integrates all of these functions. An engineer should not conceal information, underestimate risks, manipulate evidence, or disregard the dignity and experience of an interlocutor. The engineer should also clearly explain the social and environmental consequences of a decision. Effective communication is therefore not merely about reaching an agreement quickly, but about reaching a well-founded and responsible agreement. For this reason, assessment rubrics should include not only accuracy and persuasiveness but also indicators of professional ethics, transparency, prioritization of safety, and respect for the opinions of others.

Conclusion

The communicative competence of a future agricultural engineer is a system-forming component of professional competence that transforms technical knowledge into coordinated action, safe behavior, and well-founded professional decisions. Its significance is not limited to the transmission of information. The information-communicative, interactive-coordinative, social-perceptive, regulatory-managerial, conflict-management, and reflective-corrective functions jointly ensure the effectiveness of professional communication. Argumentation, mediation, presentation, and situational adaptation, in turn, can be regarded as forms through which these core functions are manifested in specific professional situations.

The proposed “professional situation – communicative task – function – observable outcome” framework makes it possible to align educational content and assessment criteria with professional practice. These functions can be developed progressively by integrating professionally oriented case studies, problem-based tasks, debates, and reflective questions into existing lectures and seminars in pedagogy and psychology.

References

1. ABET. Criteria for Accrediting Engineering Programs, 2025–2026. Baltimore: ABET, 2024. URL: <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2025-2026/>
2. Hymes D. On Communicative Competence // *Sociolinguistics* / eds. J. B. Pride, J. Holmes. Harmondsworth: Penguin, 1972. P. 269–293.
3. Canale M., Swain M. Theoretical Bases of Communicative Approaches to Second Language Teaching and Testing // *Applied Linguistics*. 1980. Vol. 1, No. 1. P. 1–47. DOI: 10.1093/applin/I.1.1.
4. Canale M. From Communicative Competence to Communicative Language Pedagogy // *Language and Communication* / eds. J. C. Richards, R. W. Schmidt. London: Longman, 1983. P. 2–27.
5. Council of Europe. Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Cambridge: Cambridge University Press, 2001.
6. Council of Europe. Common European Framework of Reference for Languages: Learning, Teaching, Assessment – Companion Volume. Strasbourg: Council of Europe Publishing, 2020.
7. Verbitskiy A. A. Aktivnoe obuchenie v vysshey shkole: kontekstnyy podkhod. Moscow: Vysshaya shkola, 1991. 207 p.
8. Zimnyaya I. A. Klyuchevye kompetentsii — novaya paradigma rezultata obrazovaniya // *Vysshee obrazovanie segodnya*. 2003. № 5. P. 34–42.
9. Khutorskoy A. B. Klyuchevye kompetentsii kak komponent lichnostno-orientirovannoy paradigmy obrazovaniya // *Narodnoe obrazovanie*. 2003. № 2. P. 58–64.

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10. Wu Y., Philbin S. P., Ma Y. et al. Evaluating the Role of the Communication Skills of Engineering Students on Employability According to the Outcome-Based Education Theory // Sustainability. 2023. Vol. 15. Art. 9711. DOI: 10.3390/su15129711.
 11. Andreeva Г. М. Социальная психология. Moscow: Aspekt Press, 2001. 384 p.
 12. Passow H. J., Passow C. H. What Competencies Should Undergraduate Engineering Programs Emphasize? A Systematic Review // Journal of Engineering Education. 2017. Vol. 106, No. 3. P. 475–526. DOI: 10.1002/jee.20171.
 13. Mamurova, F. T., Abdullayeva, N. K., & Qahhorovna, S. M. (2020). Innovative approach and modern trends in the development of science and education. *Journal of Critical Reviews*, 7(7), 1061-1063.