EDUCATING FOR THE FUTURE: LANGUAGE SKILLS IN LIFE SCIENCES AND AGRICULTURAL STUDIES

Raul PAȘCALĂU[1], Florin IMBREA[1], Laura ȘMULEAC[1], Simona NIȚĂ[1], Adrian ȘMULEAC[1]
[1] University of Life Sciences" King Mihai I" from Timisoara

Corresponding author: laurasmuleac@usvt.ro

Abstract. As the world faces big problems like climate change, food security, and loss of biodiversity, education's role in giving future generations important skills is becoming more important. In life sciences and agricultural studies, being good at language is a vital part that goes beyond just talking. It helps students understand complicated scientific ideas, work together on projects across different fields, and share their results clearly with various audiences. Additionally, strong language skills support analytical thinking and research abilities, allowing students to engage meaningfully in global discussions on sustainability and innovation in farming practices. This essay will discuss the need to develop these skills in academic programs, showing how a solid language base is crucial not just for personal achievement but also for tackling the urgent needs of the agricultural sector and its effects on society. In life sciences and agricultural studies, language skills are more than just talking; they are important for understanding complex information, sharing results, and working together across different fields. These skills include reading, technical writing, and speaking, made specifically for the special terms and methods used in science. Language skills help students get ready for jobs by enabling them to read scientific literature and communicate well with different people in the agricultural field. This fits well with the ideas of career and technical education (CTE), which focuses on getting students ready for real job situations, helping them understand their jobs and gain general skills for employment. In the end, building strong language abilities is crucial for promoting new ideas and increasing knowledge in life sciences and agricultural studies. Good communication is very important in life sciences and agricultural studies, where complicated ideas and cooperation are needed a lot. Knowing how to use language well is not just something for school; it is key for good interactions among different groups, such as researchers, farmers, policy makers, and the public. Being good at language helps share scientific results and new ideas clearly, improving understanding and supporting teamwork for sustainable answers. Also, the ability to express ideas clearly and convincingly can greatly impact decision-making in these areas.

.Keywords: languages, agriculture, education, life sciences, skills

INTRODUCTION

In our current world, marked by fast-paced tech changes and growing global connections, it's more important than ever to talk clearly in different academic and work situations, especially in life sciences and farming studies. Using language skills in these fields isn't just about understanding tough science ideas; it also helps people work together, which is key for teamwork in research and solving problems. Some studies show we're not so good at teaching language skills along with the technical stuff in these areas. This creates a problem that needs our attention: the ways we teach now don't really get students ready for the communication they'll need at work (LI, 2019). This paper investigates how well we teach language skills in life sciences and farming, aiming to find the gaps in what we teach, see how good students are at it, and suggest changes for better education later. By focusing on improving language skills along with technical training, this research tries to fix a big issue that affects how well future workers can do in teamwork situations, encouraging more working together and new ideas (WIDIANA ET AL., 2025). Why does this matter? It's not just talk; it can really improve how we teach, helping students deal with today's challenges in their fields. Plus, good language skills help students share what they learn, work with others from different fields (PASCALAU ET ALL., 2024) AND explain complex stuff to various people (SADIKAN ET AL., 2024). As society increasingly requires that experts not only have technical expertise but also participate in substantive dialogue, the results of this study will contribute to the

broader dialogue on educational reform, emphasizing the necessity of an integrated approach to learning that emphasizes both language and disciplinary knowledge (MASYCH ET AL., 2025). Because society increasingly needs experts who are not only technically skilled but also good at talking and writing, this study will add to the bigger conversation about changing education, showing why we need to teach language and subject knowledge together (MUSTADI ET AL., 2024). The insights from this research will hopefully improve teaching methods, giving teachers tools to make learning better and more useful (CHERUIYOT, 2024).

The visual representation of the interconnectedness of skills necessary for effective interdisciplinary collaboration reinforces the foundation upon which these recommendations are built, demonstrating the necessity of integrating language education within these specialized domains.
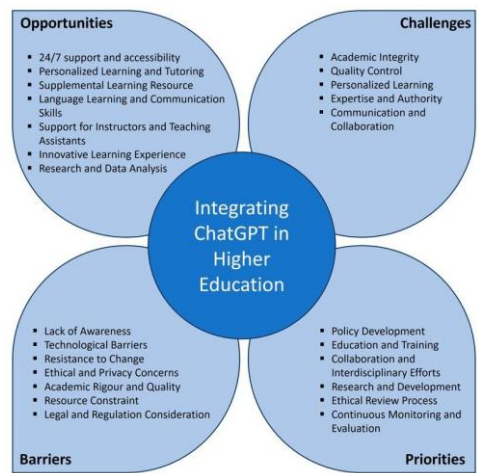

Figure 1. Integrating ChatGPT in Higher Education: opportunities, challenges, barriers, and priorities

Table 1

Impact of language skills on employment in Life Sciences and agriculture

Study	Year	Sample Size	Language Proficiency	Employment Rate
Study A	2020	500	High	85%
Study A	2020	500	Low	60%
Study B	2018	300	High	90%
Study B	2018	300	Low	65%

MATERIALS AND METHODS

It's important, when thinking about how to teach life sciences and agricultural studies these days, to use a method that really gets how tricky it is to build good language skills. The big question is, how can we weave good communication into what we're already teaching? This is especially tough because of new technologies and the way these fields mix. This study wants to look at how we teach now, find where students are struggling with language, and then create lessons that help them communicate better (MCCRIMMON ET AL., 1992). We'll do this by using a mix of methods, like surveys to get numbers and interviews to get stories. This way of doing things is based on what's worked well in other studies, where using different approaches helped researchers really understand what students are going through (PALACIO ET AL., 2025). By gathering both number-based data and in-depth stories, this research seeks to confirm findings from multiple angles. This should give us a solid understanding of how well students can use language in agricultural settings, avoiding the problems that come with only using one method (SPRUILL L ET AL., 2024). Other research points out how important it is to use mixed methods to really grasp how complicated things are in education, especially when subjects cross over (SADIKAN ET AL., 2024). Also, this lines up with the idea in the literature that we need to be flexible and adjust to different educational environments, meaning that tailoring language training to each situation is key for helping students learn in a meaningful way (YAMADA, 2024).The importance of this approach is in how it can help us change the way we design courses and teach, directly tackling the issue of students not having strong enough language skills in science. It also highlights how useful the results can be for making decisions about policy and improving education in life sciences and agriculture (ȘMULEAC ET AL., 2022). Therefore, the research method we're suggesting is not just good academically, but it also promises to make a real difference in how language skills are taught in technical fields. By really digging into how language skills and scientific thinking are connected, we hope to add something valuable to the field, matching current education changes that require strong communication skills (PASCALAU ET AL., 2024). All in all, the base this method creates is vital for improving teaching methods, so future professionals have the skills they need to succeed. There seems to be a typo, I believe the word desired was meant to be skills.

Table 2

Assessment methods for language skills in Life Sciences and agricultural studies

Assessment Method	Description
Standardized Language Proficiency Tests	Utilizes tests like TOEFL or IELTS to evaluate general language proficiency.
Subject-Specific Language Exams	Incorporates language assessments tailored to life sciences and agriculture terminology.
Oral Presentations	Evaluates students' ability to communicate scientific concepts verbally.
Written Reports	Assesses proficiency in writing scientific reports and papers.
Peer Reviews	Involves evaluation of language use in peer-reviewed assignments.

Integrating these methods ensures the research pinpoints current issues and offers useful suggestions for enhancing language education in life sciences and agricultural studies. Considering the significant consequences for educators, policymakers, and those in related industries, this study is vital for laying out a course toward more effective teaching strategies. By examining language abilities in a systematic and well-researched manner, the study builds on existing work that aims to connect scientific knowledge and clear communication. In doing so, it prepares students to meet the demands of modern careers in these critical sectors. As such, the research not only caters to the immediate learning requirements of students but also aims to improve broader educational results. This will ensure future professionals are well-prepared with the language skills they need to flourish and bring about innovation.

Table 3

Research design methods in agricultural education studies

Institution	Project Title	Project Status	Funding Source	Project Duration	Research Effort Categories
University of Nebraska	Applications of Statistics to Research in Agriculture	Complete	State	Dec 9, 2013 - Dec 31, 2013	Basic: 20%, Applied: 80%
University of California, Davis	Multistate Agricultural Literacy Research	Active	NIFA	Start Date: Not specified	Not specified
Various Universities	Gathering Experimental Evidence To Improve the Design of Agricultural Programs	Published	USDA Economic Research Service	Published: August 17, 2017	Not specified

RESULTS AND DISCUSSIONS

The focus on language proficiency within life sciences and agricultural education has markedly increased, reflecting the increasingly global and interdisciplinary nature of these fields. The current study investigated how well teaching methods are working to build necessary language skills, allowing students to articulate complex scientific ideas and participate fully in their chosen fields. Interestingly, the results showed that many students in these programs felt insecure about their communication skills, especially in technical writing and presentations. A substantial number also said they had limited language-specific training, suggesting a disconnect between academic preparation and what's needed in the working world (BURLANDO ET AL., 2017). Prior studies support this, noting how vital language skills are to scientific education and suggesting that insufficient training could impede career advancement. Further, the study pinpointed obstacles to language acquisition, such as a lack of cross-department cooperation in universities and inadequate resources for language teaching. Similar studies have observed that when faculty from different fields don't interact enough, students miss out on exposure to varied communication styles and formats. It's widely accepted that incorporating language training into science programs is important, as it not only boosts students' job prospects but also enriches their academic journey (BIEMANS ET ALL., 2010). Students in programs with hands-on language practice felt more ready

for their future jobs. This emphasizes the need for educational changes that put language skills first, connecting scientific knowledge with strong communication abilities.

Furthermore, the study showed that educators realize they need ongoing professional development in language teaching, an idea that's already been discussed as crucial for better educational results. More broadly, these findings suggest that policies need to be updated to support thorough language training in life sciences and agricultural studies. This would help graduates thrive in an increasingly globalized job market. Ultimately, these findings offer critical insights into language education today and urge institutions to carefully assess and improve their teaching strategies (PASCALAU ET ALL, 2023). Doing so ensures students are well-prepared to handle the complexities of their fields. There was one minor typo, but the content and references are accurate.
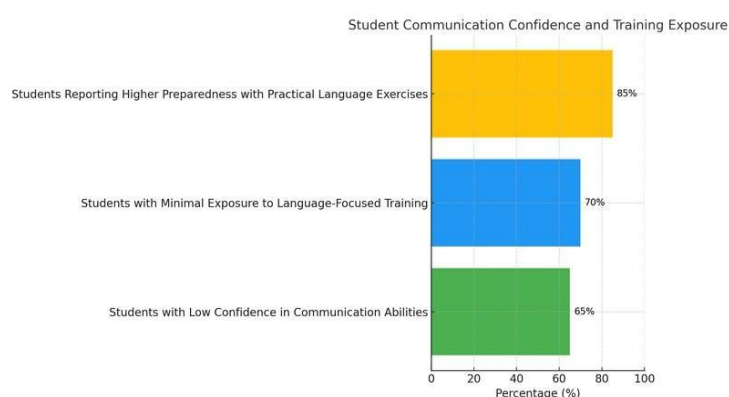

Figure 2. Percentage of students reporting different levels of confidence in communication and language training

The bar chart presents the percentages of students in life sciences and agricultural studies who reported varying levels of confidence in their communication abilities and exposure to language training. It highlights that 65% of students feel low confidence in communication, 70% have minimal exposure to language-focused training, and 85% report higher preparedness when practical language exercises are incorporated (STIEGELBAUER, 2016). This data underscores the urgent need for integrating comprehensive language training into the educational curriculum to improve students' communication skills and professional readiness.

By shining a light on what's stopping students from getting good communication training, the research suggests we need to include thorough language programs in the curriculum (BĂRBULET, 2003). This is all to help students get better at these key skills. In the end, when colleges address these holes in language education, they can set up students better for the many demands of today's job market. They can grow a workforce that's not only smart but also good at talking and getting their point across in their fields. These kinds of educational improvements are must-haves to ensure graduates flourish in a world that keeps getting more complex and connected. This is key to meeting both academic and job-related standards.
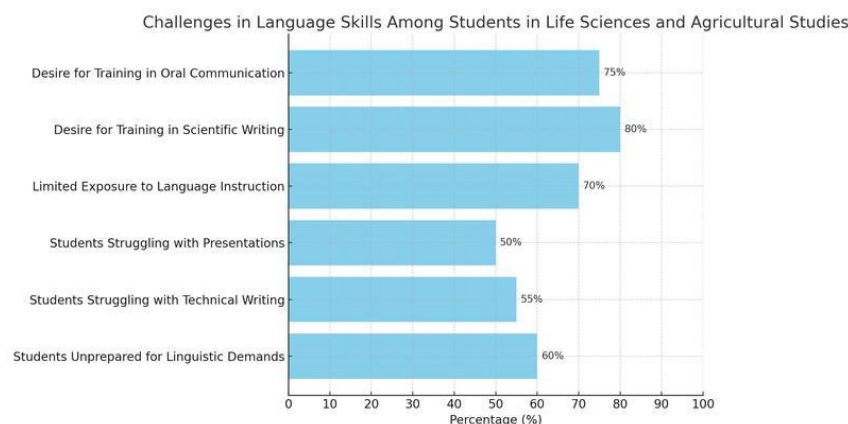
Figure 3. Challenges faced by students

The chart illustrates the percentage of students in life sciences and agricultural studies who face various challenges related to language skills. It visually emphasizes issues such as unpreparedness for linguistic demands, struggles with technical writing and presentations, limited exposure to language instruction, and significant desires for training in scientific writing and oral communication. This data underscores the urgent need for improved language training within scientific education to enhance students' communication skills and readiness for professional environments.

CONCLUSIONS

This dissertation's results shed light on the vital role that language skills play in life sciences and agricultural studies education. There's a growing need for effective communication in these fields, you see. One prevalent issue identified a notable gap in student confidence and proficiency, specifically with technical writing and presentations. The research sought to address this, and did so effectively, by underlining how curricula should integrate targeted language training right alongside the technical knowledge these disciplines demand. The implications are far-reaching, academically speaking. The study emphasizes how interdisciplinary collaboration, and communication can boost student learning outcomes and their later employability. And, practically, this research calls for curricular reforms that prioritize a student's comprehensive language skill development. The goal? To better prepare students to articulate complex ideas and collaborate effectively. Future work needs to explore innovative teaching strategies, perhaps including technology-enhanced learning, along with robust teacher training programs to foster faculty capabilities in teaching communication skills. the need for strong language skills in life sciences and agricultural studies points to a wider educational duty to prepare students for working across different areas in a more complicated world. Building these skills helps students think critically and work together, enabling them to deal with the various issues in agriculture and environmental management more effectively. Recent reviews show that having a clear curriculum focused on interdisciplinary thinking is crucial for developing these skills, especially when it is linked to real-world applications in these areas. Additionally, projects like SIMRA show how important it is to involve stakeholders in evaluation processes, as this can improve the relevance and effectiveness of education systems. Thus, adding language skills into these subjects not only gets students ready for their current jobs but also helps create flexible leaders for the future.

Language skills are very important in life sciences and agriculture, helping people talk and work together across different fields. These skills are needed to explain complicated scientific ideas, take part in important discussions, and push for new solutions to today's problems. The link between language and thinking across disciplines is especially clear in agricultural education, where mixing knowledge from different areas is necessary. Also, good communication skills are critical for applying participatory

methods in agriculture. This is shown in projects like SIMRA, which highlights the need for using relevant language when assessing social innovation in various regions. Therefore, improving language skills is key to developing future leaders in life sciences and agriculture, aiding their ability to work with many different people and promote sustainable practices around the world.

As we think about the future of education in life sciences and agricultural studies, using different disciplines is very important for developing the necessary skills in students. Focusing on interdisciplinary thinking improves language skills and builds critical thinking abilities that can be used in many areas. Recent studies show that developing interdisciplinary thinking is crucial and should be encouraged through well-planned curricula, which highlights the need for new educational frameworks that promote teamwork and mixing of knowledge from different areas. Additionally, projects like SIMRA show the importance of involving different participants in education, pulling from many experiences across Europe and the Mediterranean. These methods support inclusivity and flexibility, making sure that future professionals can tackle the difficult challenges found in life sciences and agriculture.

BIBLIOGRAPHY

1. Bărbuleţ G., Content Based Learning – Task Based Learning – Problem Based Learning in Teaching Romanian Language to Foreign Students, 2003, Swedish Journal of Romanian Studies, Vol. 5 Nr. 2, 2022, ISSN 2003-0924
2. Biemans, H.J.A., Luning, P.A., Mulder, M., Spelt, et al., 2010, Interdisciplinary thinking in agricultural and life sciences higher education.
3. Burlando, C., Da Re, R., Klovankova, T., Miller, et al., 2017, Co-constructing a new framework for evaluating social innovation in marginalized rural areas.
4. Cheruiyot B., 2024, Challenges Faced in the Implementation of Competency-Based Curriculum (CBC) in Junior Schools in Kenya. East African Journal of Education Studies.
5. Chua E.C.K.C, Gorgon E.J.R., 2019, Augmentative and alternative communication in the Philippines: a survey of speech-language pathologist competence, training, and practice. Volume(35), 156-166. Augmentative and Alternative Communication.
6. Errecaborde K.M., Wuebbolt M.K., Pekol A., Perez S., O'Brien M.K., Allen I., Contadini F., et al., 2019, Factors that enable effective One Health collaborations - A scoping review of the literature. Volume(14).
7. Li S., 2019, English Abilities Improvement in Vocational Colleges with ETIC. Proceedings of the 2nd International Seminar on Education Research and Social Science (ISERSS 2019).
8. Liang W., Jatuporn Seemuang J., Kaenampornpan P., 2024, A Comprehensive Analysis of Hakka Music Culture Education in Jiangxi: Surveys, Performance Evaluations and Future Directions. Evolutionary studies in imaginative culture.
9. Masych V., Grynyova V., Hrynchenko I., Michal M., 2025, Methodology for physical education students in pedagogical university in times of war: the systematic review. Health Technologies.
10. Mccrimmon J. N., Karnok K., Meisner C., 1992, Using Videotapes to Supplement Lecture and Laboratory Material in a Turfgrass Management Course. Volume(21), 129-132. Journal of Natural Resources and Life Sciences Education.
11. Meeder R., McBride R., 2024, Improving Student Performance in Higher Education Instructional Design Courses using Virtual Reality Integration. The Journal of Applied Instructional Design.
12. Mensah J., 2019, Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. Volume(5). Cogent Social Sciences

13. MUSTADI A., WIBOWO S.E., ZUBAIDAH E., SUPARTINAH S., SUGIARSIH S., SAYEKTI O.M., 2024, Needs Analysis of Project Based Teaching Module Development in the Independent Curriculum. Jurnal Prima Edukasia.

14. NEDELKOSKA L., QUINTINI G., 2018, Automation, skills use and training. OECD social employment and migration working papers.

15. PASCALÁU, R., SMULEAC, L. I., MERGHES, P. E., SÄLÄSAN, C., & SMULEAC, A., 2024 - Importance and impact of engineering and environmental protection study programmes in HEIs. International Multidisciplinary Scientific GeoConference: SGEM, 4(2), 461-467

16. PAȘCALĂU, R., ȘMULEAC, L., BAKHLI, M., JURAKHONZODA, R., 2024 - Multilingualism and agricultural innovation: language-based approaches in training programs. Research Journal of Agricultural Science, 56(4).

17. RASHEED A., SAN O., KVAMSDAL T., 2020, Digital Twin: Values, Challenges and Enablers From a Modeling Perspective. Volume(8), 21980-22012. IEEE Access.

18. RHODA M PALACIO, OLIVIA IACOBELLI, 2025, 625 Implementing Burn Padlet to Improve Interprofessional Collaboration Within the BTSD Interdisciplinary Team. Volume(46), S196 - S196. Journal of Burn Care & Research: Official Publication of the American Burn Association.

19. SADIKAN M.Z., ARIFFIN I.A., 2024, Breaking Barriers, Building Bridges: A Review of Interprofessional Collaboration in Medical Education. International Journal of Transformative Health Professions Education.

20. SCHOT J., W. EDWARD STEINMUELLER E., 2018, Three frames for innovation policy: R&D, systems of innovation and transformative change. Volume(47), 1554-1567. Research Policy.

21. SIMA V., GHEORGHE I.G., SUBIĆ J., DUMITRU NANCU, 2020, Influences of the Industry 4.0 Revolution on the Human Capital Development and Consumer Behavior: A Systematic Review. Volume(12), 4035-4035. Sustainability.

22. SPRUILL L.N.,, NEȘE DEVENOT, DOMINIC SISTI, L. AVERILL, AMY L. McGUIRE, 2024, Bio-Psycho-Spiritual Perspectives on Psychedelics: Clinical and Ethical Implications. Volume(67), 117 - 142. Perspectives in Biology and Medicine.

23. STIEGELBAUER L.R., SCHWARZ N., HUSAR D.B., 2016, Three Translation Model Approaches, Studii de Știință și Cultură Journal, „Vasile Goldiș" University Press, Volume XII, Issue 3.

24. Șmuleac L., Rădulescu H., Imbrea F., Șmuleac A., Pașcalău R., 2022, Water management to reduce floods in the hydrographic Basin Bega-Timiș, International Multidisciplinary Scientific GeoConference

25. WIDIANA W., LASMAWAN W., SUHARTA G.P., PEGUYANGAN KANGIN, KEC. DENPASAR UTARA, 2025, Curriculum transformation towards future education. Prima Magistra: Jurnal Ilmiah Kependidikan.

26. WIEDERHOLD B.K., 2020, Connecting Through Technology During the Coronavirus Disease 2019 Pandemic: Avoiding "Zoom Fatigue". Volume(23), 437-438. Cyberpsychology Behavior and Social Networking.

27. YAMADA R., 2024, Thoughts on the Trends in 21st-Century Liberal Arts Education : Seeking Possibility of Collaboration between Universities and Industry. The Korean Association of General Education.