

PHD STUDENTS' INTERDISCIPLINARY COLLABORATION IN EAP

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Abstract

In recent years, science has become increasingly interdisciplinary and collaborative due to the complex global challenges that must be addressed in the 21st century. Interdisciplinary collaboration in research leads to creativity and innovation by combining various perspectives, areas of expertise, and approaches from different scientific fields. For PhD students conducting their doctoral research, learning to collaborate across disciplines is crucial. The present research aims to investigate the role of interdisciplinary collaboration integration into the study course of English for Academic Purposes (EAP) for PhD students. The article describes the main peculiarities and aims of the EAP course in higher education, outlines strategies for integrating interdisciplinary collaboration, examines the benefits and challenges within the curriculum. The authors conducted qualitative interviews with PhD students from various disciplines. The results of the interviews presented both the advantages and challenges of interdisciplinary collaboration. Based on these findings, a survey was conducted with PhD students to assess whether interdisciplinary collaboration during classroom activities facilitated learning outcomes in the EAP course. The results of this survey demonstrated an overwhelmingly positive students' opinion, and the majority of respondents agreed that it benefited their learning outcomes, for example, it helped them discuss research ideas more effectively in English, improved problem-solving, developed academic English oral and writing skills, and increased confidence in working with peers from different disciplines. Thus, the study suggests that to prepare the next generation of researchers for academic success in the modern research environment, interdisciplinary collaboration should be integrated into an EAP course.

Keywords: English for Academic Purposes (EAP), interdisciplinary collaboration, academic communication skills, research skills development.

Introduction

Collaboration is widely acknowledged as one of the most important skills of the 21st century as there is a growing need for society to think and work collectively for common goals to strive for success and achieve high results (Riaz & Marium, 2023).

Learning through collaboration or Collaborative Learning (CL) is an educational approach that has gained significant attention in the last few decades. It involves creating an environment for students where they work together in small groups, mutually searching for understanding and meaning, sharing knowledge, and exchanging multiple perspectives to achieve a common goal, complete a task, or find a solution to a problem (Smith & MacGregor, 1992).

The underlying principle of collaborative learning is reaching consensus through cooperation, as opposed to competition in which group members try to outperform each other (Slavin, 2014; Gijlers et al., 2009). Collaboration is a 'philosophy of interaction' and a personal lifestyle that suggests a way of dealing with people that respects and highlights individual group members' abilities and contributions (Laal, 2013).

The impact of collaborative learning in the higher education context is thoroughly discussed in scientific literature. Scholars consider it a promising pedagogical approach in tertiary education instruction and they highlight that collaborative work on an academic task can be more powerful than traditional methods of pedagogy because it motivates students to become more active and more involved in participation in the learning process (Quenee, 2017; Lin, 2015; Ruijuan et al., 2023).

Collaborative learning represents a move away from the traditional teacher-centered or lecture-based environment. Educators who use a collaborative

approach view themselves not as experts and knowledge transmitters, but as facilitators, guides, and creators of active learning experiences for their students. Students, in contrast, take a central role, they actively construct their knowledge through participation in group work and collaboration (Baloche & Brody, 2017).

Collaborative learning in essence is a constructivist approach that incorporates the principles of Cognitive Constructivism and Social Constructivism (Taggart & Wheeler, 2023). Cognitive constructivism emphasizes the role of individual experience in the process of meaning-making. Students actively construct knowledge based on their present stage of cognitive development, integrating new information into their existing understanding of the world and their past experiences (Piaget, 2002). Social Constructivism focuses on learning through social interactions. According to this theory, learners encounter a variety of viewpoints when they participate in discussion and collaboration, and this process stimulates them to engage with new ideas and refine their understanding. Consequently, knowledge is developed by relationships, culture, and environment (Vygotsky, 1980).

Collaborative learning in higher education comprises a wide range of instructional methods that can be adapted to meet different learning goals and contexts. They include cooperative learning, problem-based learning, team-based learning, peer tutoring, study groups, project-based learning, game-based learning, and learning communities. All these methods focus on student active engagement in the learning process and encourage exploration and practical application of the course content, rather than merely relying on teacher-led instruction (Barkley et al., 2014, Kuwabara et al., 2020). Based on constructivist principles, these

approaches highlight the importance of student interaction, exploration, and reflection as integral components of the learning process (Suthers, 2012).

The main elements of collaborative learning are broadly defined and thoroughly described in the research literature, they include: positive interdependence (students rely on each other to achieve a common goal), face-to-face promotion of interactions (students help and encourage one another to learn), individual accountabilities or personal responsibilities (every student contributes meaningfully), interpersonal or small-group skills (such as effective social skills, conflict resolution, leadership, trust-building) and group processing (where groups reflect on their performance and evaluate it to facilitate further collaboration) (Johnson & Johnson, 1999, 2018). By incorporating these elements into the learning process, the teacher can prepare students for collaborative work in academic, professional, and research environments.

Interdisciplinary collaboration in research

Numerous studies have highlighted the value of interdisciplinary collaboration in research. It is defined as addressing 'an issue from a range of disciplinary perspectives, where the contributions from the various disciplines are acknowledged and integrated to provide a holistic or systemic outcome' (Lyll et al., 2011). Interdisciplinary collaboration is acknowledged as the cornerstone of contemporary research, which is vital for addressing the complex global challenges faced by society today (Gaikwad, 2024; Baker, 2015; Cheruvilil & Soranno, 2018).

Modern real-world problems are multifaceted, their understanding and solving require the integration of the collective intelligence of diverse experts from various disciplines into research (Rask & Shin, 2024). Incorporating knowledge and experience from diverse fields enables researchers to contribute unique insights, uncover new dimensions, and address complex issues from multiple perspectives (Carr et al., 2018). This collaborative approach surpasses the boundaries of individual domains, enriches problem analysis with quality and depth, and enhances creativity, and new insights. Consequently, interdisciplinary research often leads to innovation, groundbreaking discoveries, and transformative solutions and drives scientific progress (Wagner, 2019; Warren & Warren, 2023).

Despite its importance, there is little research on how interdisciplinary collaboration can be integrated into the EAP course at the university to enhance learning outcomes and advance students' research. Therefore, the present research aims to investigate the role of interdisciplinary collaboration integration into the study course of English for Academic Purposes (EAP) for PhD students. This article describes the main peculiarities and aims of the EAP course in higher education, outlines strategies for integrating interdisciplinary collaboration, examines the benefits and challenges within the curriculum, and presents

students' views on its impact on their learning outcomes.

Materials and Methods

Peculiarities and aims of the EAP course

In contrast to general English courses, the study course 'English for Academic Purposes' at Latvia University of Life Sciences and Technologies focuses on developing linguistic and communicative skills necessary for research. This course is designed for local and international PhD students from diverse disciplines and programs at LBTU, such as Agricultural Engineering, Agriculture, Food Science, Landscape Architecture, Agrarian and Regional Economics, Environmental Engineering, Civil Engineering, and Information Technologies. English proficiency levels of PhD students range from B2 to C1.

This one-term course (6 ECTS) takes place at the beginning of doctoral studies and emphasizes oral presentations, scientific writing, research vocabulary building, and the search and selection of relevant information using authentic research literature. Throughout the EAP course, doctoral students become familiarised with the European Research Area and acquire the formal styles used in journal publications and conference contributions. Different forms of writing, including literature reviews, research proposals, conference submissions, formal correspondence, and annotated bibliographies are covered, and students actively acquire a specialised vocabulary of 250 key terms in English.

The EAP course includes practical classes, seminars, and workshops. Various teaching methods, including case studies, debate, discussion, textual and vocabulary work encourage student collaboration, communication, creativity, and critical thinking. This course focuses on the practical application of academic English in research and professional settings, fostering not only knowledge and skills but also confidence and autonomy in English-speaking academic contexts, as well as the capability to plan and execute research activities in an English-speaking environment.

To explore the role of interdisciplinary collaboration within the EAP course, the authors employed qualitative and quantitative sociological research methods to collect and analyse data, including semi-structured qualitative interviews and a quantitative survey.

Integrating interdisciplinary collaboration into EAP

For PhD students working on their PhD thesis, learning to collaborate across various disciplines is especially important. Integrating interdisciplinary collaboration into the EAP course presents an opportunity not only to improve PhD students' academic English language skills but also to enhance their ability to engage in productive and meaningful discussions about research within diverse scientific fields. Since group work is an integral part of the study process, working in small, diverse groups, students can

explore interdisciplinary connections, deepen their understanding of how research fields intersect, and contribute to solving complex problems.

In order to promote interdisciplinary collaboration, several instructional strategies were integrated into the EAP curriculum, such as Interdisciplinary Insights, Research Proposal Presentations and Interdisciplinary Feedback, Interdisciplinary Case Study, and Reflection on Interdisciplinary Collaboration. PhD students were deliberately assigned to groups with diverse academic fields, each group consisted of 4-6 participants. Below is a description of these strategies.

Interdisciplinary Insights

Students brainstormed and explored how advancements in their fields overlap and contribute to solving shared problems. Identifying connections between their fields, they explained how combining knowledge from various disciplines could lead to innovative solutions. Students discussed the mutual benefits of interdisciplinary collaboration and how combining different perspectives can enhance their research. For example, students found out that Landscape Architecture and Civil Engineering can collaborate to design urban environments that integrate natural landscapes with infrastructure to create sustainable, resilient cities; students also came up with a solution that Food Science and Environmental Engineering can work together to solve food waste issues by creating sustainable food processing techniques and waste management solutions.

Research Proposal Presentations & Interdisciplinary Feedback

Each student presented their research, after which the groups analysed all proposals and discussed common themes and approaches. Then, using the Questions, Praise, Suggest format group members provided their feedback to their peers. They prepared three open-ended questions for clarification. Then the group discussed the strengths of each presentation and offered constructive suggestions for improvement or alternative approaches. Finally, students summarised and presented their group work for the whole class using a table or a mind map in order to represent the diversity of ideas visually.

Interdisciplinary Case Study

The cases that students worked on required opinions from multiple fields. Examples of cases included: reducing city traffic jams with smart technology, designing a sustainable urban agriculture system, and creating a zero-waste restaurant concept. Groups analysed a case they were assigned, brainstormed solutions, and created a plan, employing ideas from various fields. Then groups presented their solutions to the whole class showing the integration of various disciplines, receiving feedback and suggestions. Finally, each group reflected on how the interdisciplinary approach enhanced problem-solving and summarised key takeaways.

Reflection on Interdisciplinary Collaboration

Students wrote a reflective paragraph in which they

explored whether interdisciplinary collaboration benefitted their research. Students analysed if working with colleagues from different fields provoked new perspectives on their work and if answering questions from groupmates with different expertise led to deeper insights and enhanced their research. This process encouraged them to think outside their specific academic fields and fostered a more holistic approach to their work.

Results and Discussion

The present research aimed to investigate the role of interdisciplinary collaboration integration into EAP. The study was conducted in two stages. First, students' opinions about the benefits and challenges of interdisciplinary collaboration in the EAP course were explored. Second, the impact of interdisciplinary collaboration on students' learning outcomes was investigated. Below is a detailed description of these stages.

Identifying advantages and challenges of interdisciplinary collaboration in EAP

To explore students' views on the benefits and challenges of interdisciplinary collaboration in the EAP course, qualitative interviews were conducted in 2024 and 2025 with PhD students of various disciplines, including Agricultural Engineering, Agriculture, Food Science, Landscape Architecture, Agrarian and Regional Economics, Environmental Engineering, Civil Engineering, and Information Technologies. In total, 60 PhD students were involved in interdisciplinary collaboration as part of the EAP course and then reflected on their experiences. The most common benefits identified were grouped into five categories: broadening perspectives and exploring interdisciplinary connections, facilitating creativity and innovative solutions, receiving feedback for improvement, improving communication skills, and enhancing presentation skills. Students' comments provide valuable insights into each of these aspects.

Broadening perspectives and exploring interdisciplinary connections

Collaborating with peers from different academic fields encouraged students to view their research from new angles and find connections between disciplines. It helped them relate their research to broader themes and real-world issues, and thus they enhanced its significance, practical application and made it more accessible to a wider audience. Students' comments: S23: 'Interdisciplinary collaboration has broadened my perspective on my research, highlighting aspects like economic viability, sustainability, and risk-sharing mechanisms'.

S7: 'Listening to research from colleagues in other fields helped me see how my work connects to broader themes like environmental stewardship and social cohesion'.

S15: 'Engaging with peers from diverse disciplines widened my viewpoint and inspired me to consider factors I hadn't thought about before'.

S43: 'Peers from environmental sciences helped me

connect my work on sustainable practices with broader ecological goals'.

S58: 'Comments from colleagues underscored aspects such as economic resilience, ecotourism potential, and enhanced resource management - an angle I hadn't initially considered'.

S60: 'Suggestions about considering societal impacts made my research more comprehensive and aligned with real-world issues'.

Facilitating creativity and innovative solutions

Working in interdisciplinary groups created an environment that promoted creativity and the generation of fresh ideas. The students were encouraged to combine knowledge and experience from diverse academic fields and explore unconventional solutions to complex problems more effectively. Students' comments:

S2: 'The best deals often come from people who worked in other industries on a daily basis. We just have to listen to each other and find an opportunity to answer the questions asked'.

S13: 'When different people come together with their unique experience and knowledge, they can contribute to the common work'.

S27: 'Sometimes, working in one field for a long time makes the big picture disappear. Outsiders can give a fresh perspective or come up with a new idea'.

S14: 'Interdisciplinary collaboration encourages creative problem-solving, as it integrates multiple viewpoints into innovative approaches'.

S6: 'Interdisciplinary teamwork motivated me to approach my research creatively and explore unconventional solutions'.

Receiving feedback for improvement

Receiving constructive criticism from peers with different expertise students were inspired to review and evaluate their work critically. This feedback often pointed out areas for improvement they overlooked, helping refine such aspects as research focus, methodology, and presentation. Students comments:

S3: 'Suggestions to incorporate more visual data helped me improve the clarity of my research presentations'.

S12: 'Constructive feedback made me realize that my presentation lacked clarity in certain areas, encouraging me to refine my arguments'.

S27: 'Answering questions from peers prompted me to revisit and improve my methodology and focus'.

S1: 'Questions from colleagues made me step back for a moment and reflect on the importance of the topic to myself'.

S4: 'Interdisciplinary feedback revealed areas of my research that needed further exploration and refinement'.

S59: 'Answering questions helped me identify weaknesses and rethink the scope of my study'.

Improving communication skills

Collaborating with peers from various academic disciplines enhanced students' ability to communicate their research to an audience unfamiliar with their

specific field. They were forced to simplify language, define terms, and explain concepts in an understandable way. This process not only improved students' ability to engage with diverse audiences but also improved their overall communication skills. Students' comments:

S13: 'Questions from the audience allow you to look at your topic from the outside and try to explain things that you know in a simple and understandable way to others'.

S34: 'Answering questions from colleagues with different expertise forced me to explain my research more clearly, revealing gaps in my knowledge'.

S45: 'Discussing my work with students from other disciplines taught me to use more accessible language and focus on clarity'.

S28: 'This collaboration challenged me to articulate complex ideas in ways that could be understood by non-specialists'.

Enhancing presentation skills

Students were encouraged to improve their presentation style and focus on clarity, engagement, and effective visual design. Also, listening to others' presentations inspired students to improve their own delivery and enhance the impact of their research. Students' comments:

S2: 'Observing and evaluating others' presentations was particularly beneficial, both in terms of presentation design and presentation skills'.

S27: 'I realized the importance of being clearer and speaking more slowly when I present'.

S34: 'Watching how passionate others were about their research inspired me to present my own work in a more engaging way'.

S55: 'Feedback on my presentation design and delivery helped me create more visually appealing and impactful slides'.

However, engaging in interdisciplinary collaboration about research in EAP the students also faced several challenges such as uneven contributions, stress and anxiety, language barriers, time and effort, and difficulties in finding common ground.

Uneven contributions

Some students noted that not all team members were equally engaged in providing feedback or participating in discussions:

S18: 'Sometimes, some team members didn't participate much, which slowed down our discussions and made the collaboration less effective'.

S55: 'It was frustrating when some peers did not contribute as much, and the workload was not evenly shared'.

Stress and anxiety

Presenting research in an interdisciplinary setting was stressful for some students, especially when they felt their work was less advanced or when they faced criticism:

S14: 'During the presentation, due to anxiety, I found myself reading the whole script of my speech'.

S26: 'It was slightly stressful, as I had to present my

research, which is still in its early stages compared to some of my colleagues’.

S43: ‘I felt nervous presenting my ideas in front of peers with more experience. Sometimes, I had difficulty expressing my thoughts clearly, and this led to misunderstandings during discussions’.

Language barriers

Language barriers added difficulty in both presenting research and understanding feedback:

S3: ‘Due to my limited knowledge of a foreign language, I pay more attention in class to preparing for a presentation with as few mistakes as possible rather than focusing on others’ ideas and advice’.

S22: ‘I often felt unsure when listening to complex feedback in the foreign language. It was hard to respond appropriately’.

Time and effort

Interdisciplinary collaboration required additional time and effort to bridge knowledge gaps and understand diverse perspectives:

S4: ‘Answering questions from colleagues unfamiliar with veterinary medicine challenged me to clarify my research aims and methodologies, which was time-consuming’.

S7: ‘As an economist, I often use terms that I consider understandable without providing sufficient explanations, and my colleagues sometimes struggled to fully grasp my presentation’.

S35: ‘In a short time, I had to evaluate their work, in which they are experts, despite having limited information on the subject’.

Despite the challenges of interdisciplinary collaboration integration into EAP, most students acknowledged its overall benefits and viewed this experience as valuable for personal and academic and professional growth.

Investigating the impact of interdisciplinary collaboration on learning outcomes in EAP

Based on these findings, a survey was conducted in 2025 involving 40 PhD students to investigate the impact of interdisciplinary collaboration on their learning outcomes. The respondents completed a Likert-type questionnaire in which they ranked 15 suggested statements about the EAP course as SA (strongly agree), A (agree), N (neutral), D (disagree), and SD (strongly disagree). The results obtained were analysed by SPSS, they are shown in Table 1 below.

Table 1
Student perceptions on the impact of interdisciplinary collaboration on their learning outcomes in EAP

#	Statement	Valid percent					Mean	St. dev. (σ)
		SA	A	N	D	SD		
1	Interdisciplinary collaboration made problem-solving easier.	51.7	25.0	21.7	1.7	0.0	1.7333	.86095
2	The collaborative experience was meaningful to me.	18.3	51.7	28.3	1.7	0.0	2.1333	.72408
3	Collaborating with peers has boosted my English oral presentation skills.	40.0	46.7	13.3	0.0	0.0	1.7333	.68561
4	I have enhanced my ability to discuss research ideas effectively in English.	43.3	45.0	11.7	0.0	0.0	1.6833	.67627
5	I am more confident collaborating with individuals from diverse disciplines now.	28.3	38.3	33.3	0.0	0.0	2.0500	.79030
6	I have developed stronger communication and interpersonal skills through teamwork.	5.0	66.7	25.0	3.3	0.0	2.2667	.60693
7	Collaborating with others inspired me to explore new ideas and directions in my research.	20.0	51.7	23.3	5.0	0.0	2.1333	.79119
8	I have developed more effective academic writing skills in English.	41.7	41.7	16.7	0.0	0.0	1.7500	.72778
9	My ability to use discipline-specific vocabulary in English has improved.	21.7	53.3	25.0	0.0	0.0	2.0333	.68807
10	Peer questions constructively challenged my assumptions.	30.0	43.3	20.0	6.7	0.0	2.0333	.88234
11	Discussions with peers inspired critical thinking about my research.	15.0	28.3	40.0	13.3	3.3	2.6167	1.00998
12	Collaboration helped me understand my strengths and weaknesses in English.	13.3	58.3	20.0	6.7	1.7	2.2500	.83615
13	I feel more capable of reading and analyzing academic texts in English.	11.7	28.3	40.0	13.3	6.7	2.7500	1.05163
14	I am now better at managing time and coordinating tasks in a research team.	0.0	8.3	20.0	55.0	16.7	3.8000	.81926
15	I feel more comfortable taking leadership roles in collaborative projects.	5.0	15.0	28.3	31.7	20.0	3.4667	1.12697

Research findings highlight that respondents agreed that interdisciplinary collaboration in the EAP course

positively affected their learning outcomes, assessments strongly agree and agree are domineering.

For example, almost 90% of students strongly agreed or agreed that interdisciplinary collaboration helped them discuss research ideas more effectively in English (43.3% strongly agree, 45.0% agree), which resulted in the lowest mean score (1.68) and a standard deviation of 0.68. Also, most of the students either strongly agreed or agreed that interdisciplinary collaboration made problem-solving easier (51.7% strongly agree, 25.0% agree), which resulted in a low mean score of 1.73 and a standard deviation of 0.86. Over 85% of students strongly agreed or agreed that collaborating with peers boosted their English oral presentation skills (40.0% strongly agree, 46.7% agree), with a mean of 1.73 and a standard deviation of 0.69. Almost 85% of respondents strongly agreed or agreed that they developed stronger academic writing skills in English (41.7% strongly agree, 41.7% agreed), which led to a low mean score (1.75) and a standard deviation of 0.72. Also, most students acknowledged improved confidence in collaborating with individuals from diverse disciplines (28.3% strongly agree, 38.3% agree), with a mean of 2.05 and a standard deviation of 0.79. However, some statements showed less agreement. For example, responding to the statement 'I am now better at managing time and coordinating tasks in a research team' only 8.3% agreed, while over 70% either disagreed or strongly disagreed, which resulted in the highest mean of 3.8 and standard deviation of 0.82. Also, responses to the statement 'I feel more comfortable taking leadership roles in collaborative projects' showed less consensus: 5% strongly agreed, 15% agreed, and 51.7% disagreed or strongly disagreed. The mean for this statement was 3.47 with a standard deviation of 1.13, which shows that there were different opinions.

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Conclusions

1. Interdisciplinary collaboration in the EAP course plays a crucial role in developing PhD students' academic English language skills and preparing them for complex research challenges.
2. Students can approach complex problems with a wider perspective when they participate in interdisciplinary discussions, exchange alternative viewpoints, present research proposals, and collaborate on case studies. Consequently, their research quality is enhanced and their ability to communicate effectively in English in an academic environment is promoted.
3. The benefits of interdisciplinary collaboration in EAP were identified in the study, they include: broadening perspectives and exploring interdisciplinary connections, facilitating creativity and innovative solutions, receiving peer feedback for improvement, improving communication skills, and enhancing presentation skills. However, there were also some challenges such as uneven contributions, stress and anxiety, language barriers, time and effort, and difficulties in finding common ground.
4. Research findings highlight that interdisciplinary collaboration in the EAP course positively affected students' learning outcomes. It helped them discuss research ideas more effectively in English, enhanced problem-solving, boosted academic English oral and writing skills, and increased confidence in working with peers from different disciplines, which is crucial for conducting research in interdisciplinary contexts. However, the limited impact on time management and taking leadership roles in interdisciplinary collaborative research show areas for further EAP curriculum improvement.

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