



TEACHING ENGLISH TO BIOLOGY STUDENTS THROUGH CLIL TO IMPROVE SCIENTIFIC WRITING SKILLS

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Abstract

This study investigates the impact of Content and Language Integrated Learning (CLIL) on the development of scientific writing skills in biology students. The research examines how integrating English language instruction with biology content enhances students' academic writing, vocabulary acquisition, and communication competencies. A mixed-method approach was employed, including pre- and post-tests, classroom observations, and semi-structured interviews. Findings indicate that CLIL significantly improves students' ability to write coherent lab reports, summaries, and research assignments. Pedagogical implications suggest that integrating CLIL in higher education can strengthen both language proficiency and subject knowledge, preparing future biology teachers for bilingual educational environments.

Keywords: CLIL, Scientific Writing, Biology Education, English for Specific Purposes, Academic Competence



Introduction

In recent years, the demand for English-medium instruction (EMI) and bilingual education in science has increased globally. In Uzbekistan, biology programs are gradually shifting toward curricula that require students to master not only disciplinary knowledge but also English proficiency. Future biology teachers are expected to communicate complex scientific ideas clearly and effectively in English. Traditional ESP courses often focus on general grammar and vocabulary, which limits students' ability to express scientific concepts in written form.

Content and Language Integrated Learning (CLIL) is a dual-focused pedagogical approach that combines content learning with language development. In biology education, CLIL allows students to learn scientific concepts while improving academic English, particularly writing skills. This study investigates how CLIL can enhance scientific writing in biology students by embedding language instruction within subject-specific contexts, thereby providing a more meaningful and authentic learning experience.

Literature Review

CLIL has been widely studied in European and Asian higher education contexts. Coyle, Hood, and Marsh (2010) describe CLIL as integrating four dimensions: Content, Communication, Cognition, and Culture. This framework encourages the simultaneous development of disciplinary knowledge and language proficiency. Dalton-Puffer (2011) and Lasagabaster & Sierra (2010) report that CLIL students demonstrate superior academic vocabulary, reading comprehension, and subject-specific written communication compared to peers in traditional language courses.



Scientific writing is a critical skill for biology students, encompassing clarity, coherence, proper terminology, and analytical reasoning. Ruiz de Zarobe (2013) and Martín del Pozo (2014) emphasize that integrating language and content instruction facilitates deeper understanding of scientific concepts and promotes academic literacy. Moreover, students engaged in CLIL programs tend to show increased motivation, engagement, and confidence in expressing scientific ideas in English.

However, challenges exist. Teachers often lack sufficient CLIL training, resources specific to biology are limited, and students' language proficiency levels vary (Banegas, 2012; Pavón & Ellison, 2013). Overcoming these challenges requires careful curriculum design, professional development, and tailored assessment strategies.

Methodology

This study employed a mixed-method research design combining quantitative and qualitative approaches. Participants included 32 second-year students enrolled in the Biology Teaching Methodology program at Chirchik State Pedagogical University.

Data collection instruments comprised pre- and post-tests to measure improvements in scientific writing, classroom observation checklists to assess engagement and English usage, and semi-structured interviews to gather student perceptions and attitudes toward CLIL.

The study was conducted over one academic semester. CLIL lessons integrated biology topics such as cell structure, genetics, evolution, ecology, and experimental methods into English language instruction. Activities included:

- Writing laboratory reports and research summaries
- Project-based learning and group discussions



- Peer review and collaborative writing tasks
- Presentations of experimental results in English

Quantitative data from tests were analyzed using descriptive statistics, while qualitative data from observations and interviews were analyzed using thematic coding to identify patterns and student experiences.

Results

Quantitative findings demonstrated significant improvements in students' scientific writing proficiency. Average scores on writing tasks increased from 56% in pre-tests to 85% in post-tests. Key areas of improvement included:

- Grammar and sentence structure
- Disciplinary vocabulary usage
- Coherence and logical flow in scientific arguments

Classroom observations indicated increased engagement and participation. Students actively discussed biological concepts in English, collaborated on writing tasks, and demonstrated higher confidence in presenting their research.

Interviews revealed positive perceptions of CLIL. Students reported that integrating language with content made writing tasks more meaningful, improved their vocabulary retention, and prepared them for academic writing in international contexts.

Discussion

The findings suggest that CLIL effectively bridges content and language learning, promoting both scientific understanding and English proficiency. Students not only improved in academic writing skills but also developed critical thinking, problem-solving abilities, and collaborative competencies. The integrated approach



provided authentic contexts for learning, allowing students to apply biological knowledge in writing tasks while simultaneously practicing English.

These outcomes support previous research (Dalton-Puffer, 2011; Martín del Pozo, 2014) highlighting the benefits of CLIL in higher education. Additionally, the positive student feedback underscores the motivational advantages of this methodology, as students felt more confident and engaged compared to traditional ESP courses.

Pedagogical Implications

Based on the study findings, several pedagogical recommendations are proposed:

1. **Integration of CLIL Modules:** Incorporate CLIL-based lessons systematically into biology curricula to strengthen both language and subject knowledge.
2. **Professional Development:** Provide teacher training on CLIL methodology and its application in scientific disciplines.
3. **Resource Development:** Create discipline-specific materials, including scientific texts, lab manuals, and vocabulary lists tailored to students' proficiency levels.
4. **Assessment Strategies:** Employ integrated assessments evaluating both scientific content mastery and academic writing proficiency.
5. **Active Learning Approaches:** Encourage project-based learning, collaborative writing, and peer review to enhance engagement and communication skills.



Limitations and Future Research

This study was limited to one institution and a single semester, which may affect the generalizability of the findings. Future research could explore:

- CLIL implementation across multiple universities
- Long-term impact on scientific writing skills
- Integration of digital tools, online labs, and technology-enhanced learning
- Teacher perspectives and classroom management strategies in CLIL settings

Conclusion

CLIL is an effective approach for improving scientific writing skills in biology students.

It enhances vocabulary, coherence, critical thinking, and engagement while preparing future biology teachers for bilingual and international academic contexts. Institutions are encouraged to integrate CLIL systematically, provide professional development, and develop discipline-specific resources to maximize its effectiveness in higher education.

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