Analysis of the Current State of Developing Professional Lexical Competence among Mathematics Students

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Abstract
This study examines the current organization of English language instruction in mathematics education programs, focusing on pedagogical approaches to developing students' lexical competence and the adequacy of instructional materials used in the classroom. The analysis was conducted across three universities in Uzbekistan: Gulistan State University (GulSU), Tashkent University of Applied Sciences (TASU), and Navoi State University (NavSU). Findings reveal that the course content often does not align with the official curriculum and prioritizes the development of general English skills rather than professional, field-specific language competence. Additionally, the textbooks in use are largely oriented toward improving grammar and general vocabulary, offering limited support for the acquisition of mathematical terminology and professionally relevant lexis. The results highlight the need for curriculum adjustment and the integration of authentic, discipline-specific materials to enhance lexical competence in ESP courses for mathematics students.
Keywords: curriculum, analysis, instructional materials, mathematics education, professional lexical competence, professional English.

Introduction

A survey, interviews, and analytical work were conducted to identify mathematics students' English language experience, including their proficiency level, purpose for learning the language, learning difficulties, and the essential skills they need. According to the survey results, students justify the necessity of learning English for several reasons. First, most students stated that they study English as a means of preparing for internationally recognized exams such as SAT and GRE. Obtaining these certificates, in turn, provides them with professional advantages, opportunities to continue their studies at foreign universities, access to grants and scholarships, and the ability to become competitive specialists in the global labor market. Second, students aim to understand the language of foreign scientific articles, monographs, textbooks, and international conference materials in the field of mathematics, allowing them to follow new developments, modern scientific advancements, and expand their academic worldview and professional competence.

Third, English is seen as a tool for future mathematics specialists to adopt foreign methodologies and educational resources, engage in academic exchange, conduct international research, and present their findings in conferences and journals. Based on these real needs, it can be concluded that learning English for mathematics students requires not only general communicative skills but also the ability to read field-specific texts, write in academic genres, think critically, and construct scientific arguments in professional and academic contexts. A key component of developing these skills is building a strong foundation in professional vocabulary—knowing mathematical terminology, understanding its meaning in context, analyzing it, and using it accurately in oral and written communication.

Problem statement

These concrete needs and professional goals show that learning English for mathematics students is not merely a matter of personal development but an integral part of their professional and scientific activity. From this perspective, recent years in Uzbekistan have seen significant reforms and state policies aimed at improving English language teaching, integrating it with professional disciplines, and aligning it with international standards.

Research and analaysis

To analyze the practical implementation of state policy and methodological innovations in teaching English to mathematics students in Uzbekistan, three higher education institutions located in different geographical regions were selected: Gulistan State University (GulSU), Navoi State University (NavSU), and the Tashkent Applied Sciences University (TASU). This selection makes it possible to comparatively study regional characteristics, available resources, curricula, class hours, and similarities and differences in teaching approaches and methodologies. To gain insight into and compare the quality and current state of education in both state and non-state higher education institutions, part of the research was carried out at the private university TASU. It is worth noting that this university was established in accordance with the Resolution of the Cabinet of Ministers (ID-29637) as part of the implementation of the Presidential Decree PF-5847 of October 8, 2019, which approved the “Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030.” The university was founded with the aim of expanding access to higher education, developing public-private partnerships in the sector, and establishing state and non-state higher education institutions across different regions.

The current state of English language courses for mathematics students in the selected higher education institutions, as well as their content and alignment with students’ real needs, was thoroughly analyzed. Notably, in recent years English language instruction has been organized not only as a general foreign-language course but also in a profession-oriented format. Specifically, while foreign language courses for non-philological majors were previously taught under the title “Foreign Language,” starting from the 2023–2024 academic year they have been offered under the name “Foreign Language for Professional Purposes.” The main goal of teaching a foreign language is now defined as training future specialists to confidently use the language in their daily, academic, and professional activities; conduct independent research; write scientific articles on global and field-specific topics; and develop logical and critical thinking skills. In addition, such curricula encourage students to develop independent learning skills beyond classroom hours and even after graduation, ultimately preparing them as competitive professionals in the modern international labor market. The 2022–2023 academic year curriculum for the subject “Foreign Language” (English) was designed for third-year students of the study programs “60540200 – Mathematics” and “60110100 – Mathematics and Informatics,” intended for the second (autumn and spring) semesters. In this curriculum, English is a compulsory subject with a total of 240 academic hours allocated for practical and independent learning, equating to 4 credits. The weekly workload is set at 4 hours.

In contrast, in the private higher education institution, the subject “Foreign Language” is planned to be taught to third-year students during the 5th and 6th semesters of the academic year. The total workload assigned to the course is 240 hours, of which 120 hours are allocated to classroom instruction and 120 hours to independent learning. The weekly class time is 4 hours, and the course is valued at 8 credits. The primary goal of foreign language instruction is to prepare future specialists who can effectively use one or more foreign languages in their daily life, scientific activities, and professional communication. Since the curriculum is designed for two semesters, the first semester aims to develop students’ general English proficiency, while the second semester is intended for teaching academic and profession-oriented topics. For independent learning, a total of 120 hours is allocated per academic year—60 hours per semester—consisting of six topics and tasks per semester, each requiring approximately ten hours to complete. However, the tasks presented in the curriculum are general in nature and lack specific learning objectives. For example, the task “learning and practicing vocabulary connected with the specialization” is broad and requires clarification regarding whether it targets narrow specialist terminology or general academic vocabulary to increase task effectiveness. Similarly, the task “working on texts” is not clearly defined, as it does not specify the types of texts, whether students should read, translate, summarize, or analyze them. Tasks such as “writing formal and informal letters” and “making presentations” may potentially be

adapted to mathematical topics, but specifying the exact thematic scope would make them clearer and more purposeful. Creative tasks like “preparing sample articles” and “preparing videos” can be engaging and interactive; however, without clear pedagogical guidelines—such as specifying the genre of the article (academic, opinion-based, informative), the target audience, or the task format— they may not produce effective learning outcomes.

Discussion

The curriculum includes principles that must be taken into account when teaching foreign languages in various fields, modern approaches, effective teaching and learning methods, assessment procedures, and guidelines for selecting and developing learning materials based on the curriculum. The main task of the course is to cultivate learners’ understanding of the importance of learning a foreign language in a multicultural world, develop their ability to communicate in a foreign language, work independently, and enhance their communicative (reading, writing, listening comprehension, speaking), linguistic (lexical, grammatical), sociocultural, and pragmatic competencies in accordance with state educational standards.

In the ESP teaching context, two types of materials are commonly used: commercially published materials and in-house materials specifically designed for the course. Textbooks fall under both categories and serve as the main source of instructional content. In analyzing these materials, we focused on their structure, content, compatibility with students’ language proficiency levels, goals, and needs, as well as their degree of authenticity. Among the tools used for textbook evaluation, checklists, internal evaluation, external evaluation, and registers are widely applied. Among these, the checklist method is the most frequently used for analyzing textbooks. Using the checklist method, we examined the textbooks “Scale Up,” “Destination B1,” “Headway,” and “Michael Vince’s Grammar,” which were presented as instructional materials. The results showed that although these resources are effective for learning general English, they cannot be considered authentic materials. First, these textbooks were written not by subject specialists but by language instructors. Moreover, they are designed for level-based language teaching rather than for reading or completing subject-specific tasks. Instead of promoting real-life communication, they rely on a limited vocabulary set, grammar explanations, and simplified exercises intended for classroom use. Most importantly, these materials do not introduce learners to the vocabulary or academic texts they will encounter in their academic or professional activities.

The majority of the textbook content consists of language-based tasks and exercises. Each unit includes the lesson topic, objectives, key concepts, text passages with accompanying exercises, homework tasks, and a list of references used. Every topic is supported with texts and activities. However, content and methodological analysis of the textbook revealed that in some cases the texts are overly complex relative to students’ language proficiency levels and their length is not clearly regulated. In certain units, exercises intended to reinforce text comprehension are either missing or insufficiently developed. Additionally, some tasks are presented outside the units to which they belong, appearing instead in other sections, which disrupts the logical flow and structure of the material. The overall volume of instructional content allocated to topics is often insufficient for deepening students’ knowledge and ensuring complete mastery of the material.

Conclusion

Conducted analysis of the English language curricula, teaching methods, and instructional materials used in higher education institutions selected as the research object demonstrates that the current system provides certain opportunities for developing mathematics students’ professional lexical competence; however, these opportunities are not fully utilized. The findings reveal both strengths and shortcomings in existing programs, showing that while general English and introductory professional topics are incorporated, the integration of subject-specific mathematical terminology, authentic materials, and CLIL-based approaches remains limited. Therefore, the analysis highlights the necessity of modernizing curricula,

enriching them with discipline-oriented lexical content, and aligning teaching practices with international standards and contemporary methodological frameworks. Strengthening these components will ensure a more effective development of mathematics students' professional lexical competence and better prepare them for academic and professional communication in a foreign language.

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