

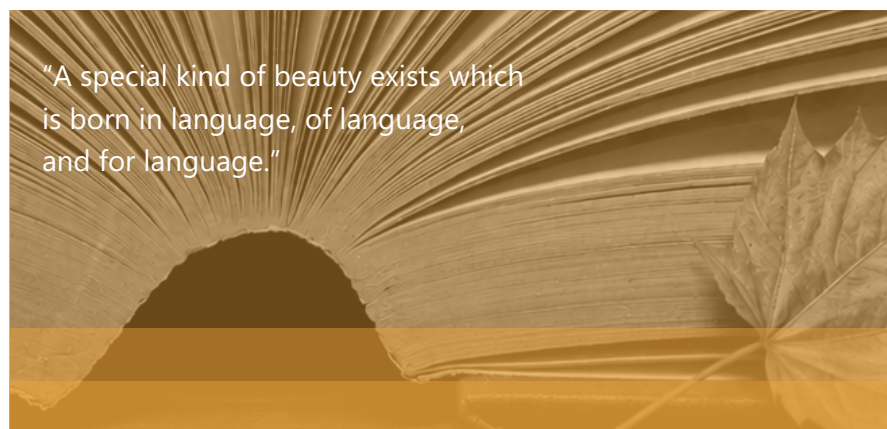


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"A special kind of beauty exists which
is born in language, of language,
and for language."



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Task-based teaching of genetic engineering-related vocabulary to medical students in ESP classes: a linguodidactic approach

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Annotation

The rapid development of genetic engineering, gene therapy, genome editing, and molecular medicine has increased the need for medical students to acquire specialized English vocabulary in these fields. This article examines the linguodidactic foundations of teaching genetic engineering-related terminology within English for Specific Purposes (ESP) courses. The study focuses on lexical and communicative competence, principles of terminology selection, and the use of task-based instruction. A qualitative descriptive and analytical approach is used to synthesize key ESP, vocabulary-learning, CEFR, and task-based learning principles and to develop a pedagogical model for classroom application. The proposed model integrates pre-task preparation, a professionally oriented task cycle, and post-task language analysis. Authentic scientific texts, visual materials, case-based discussions, information-gap activities, role plays, simulations, and project work are presented as means of contextualizing terminology. The analysis suggests that specialized vocabulary is more effectively developed when it is taught as part of conceptual networks, collocations, and communicative functions rather than as isolated word-definition pairs. The article concludes that combining medical content, systematic lexical instruction, and professionally oriented communicative tasks provides a coherent framework for developing medical students' ESP lexical competence.

Keywords

English for Specific Purposes, genetic engineering, medical students, vocabulary teaching, gene therapy, inherited genetic disorders, lexical competence, task-based learning

Tibbiyot talabalariga ESP darslarida gen injeneriyasiga oid leksikani o'qitishning lingvodidaktik asoslari

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Annotatsiya

Mazkur maqolada tibbiyot talabalariga maxsus maqsadlarga yo'naltirilgan ingliz tili (ESP) mashg'ulotlarida gen injeneriyasi, gen terapiyasi, genomni tahrirlash va irsiy kasalliklarga oid terminologiyani o'rgatishning lingvodidaktik asoslari tahlil qilinadi. Tadqiqot leksik va kommunikativ kompetensiyani rivojlantirish, terminlarni tanlash tamoyillari hamda vazifaga asoslangan ta'limdan foydalanishga qaratilgan. Sifat-tavsifiy va tahliliy yondashuv asosida ESP, leksikani o'qitish, CEFR hamda task-based learning tamoyillari umumlashtirilib, amaliy dars modeli taklif etiladi. Model topshiriqdan oldingi tayyorgarlik, kasbiy yo'naltirilgan asosiy vazifa va topshiriqdan keyingi til tahlili bosqichlarini qamrab oladi. Autentik ilmiy matnlar, vizual

materiallar, klinik vaziyatlar, axborot bo'shlig'i topshiriqlari, rolli o'yinlar, simulyatsiyalar va loyiha ishlari terminlarni kontekstda o'rgatish vositalari sifatida tavsiya etiladi. Tahlil natijasida maxsus leksikani alohida so'z-ta'rif juftliklari ko'rinishida emas, balki konseptual tarmoqlar, kollokatsiyalar va kommunikativ funksiyalar tarkibida o'rgatish maqsadga muvofiqligi asoslanadi.

Kalit so'zlar *ESP, gen injeneriyasi, tibbiyot talabalari, leksik kompetensiya, gen terapiyasi, irsiy kasalliklar, terminologiya, vazifaga asoslangan ta'lim*

Лингводидактические основы обучения студентов-медиков лексике в области генной инженерии на занятиях ESP

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Аннотация В статье рассматриваются лингводидактические основы обучения студентов медицинских специальностей англоязычной терминологии в области генной инженерии в рамках курса английского языка для специальных целей (ESP). Основное внимание уделяется формированию лексической и коммуникативной компетенции, принципам отбора терминологии и применению обучения на основе заданий. На основе качественного описательного и аналитического подхода обобщаются положения ESP, методики обучения лексике, CEFR и Task-Based Language Teaching и предлагается педагогическая модель для практического использования. Модель включает предварительный этап, цикл профессионально ориентированных коммуникативных заданий и последующий языковой анализ. Аутентичные научные тексты, визуальные материалы, кейсы, информационно-разрывные задания, ролевые игры, симуляции и проектная работа рассматриваются как средства контекстуализации терминологии. Анализ показывает, что специальная лексика усваивается более системно, когда она представлена через понятийные связи, коллокации и коммуникативные функции, а не как изолированные пары «слово – определение».

Ключевые слова *ESP, генная инженерия, студенты-медики, профессиональная лексика, генная терапия, наследственные заболевания, лексическая компетенция, обучение на основе заданий*

Introduction

The internationalization of medical science has increased the importance of English

as a professional and academic language for medical students. Contemporary medical specialists are expected not only to understand

general medical English but also to work with rapidly developing fields whose terminology is predominantly disseminated through English-language research articles, clinical guidelines, databases, and professional communication.

Genetic engineering is one such field. It lies at the intersection of molecular biology, biotechnology, genetics, and medicine and is increasingly relevant to diagnosis, prevention, and treatment. Terms such as gene, genome, gene expression, mutation, inherited disorder, gene therapy, genetic variation, genome editing, and CRISPR-Cas9 therefore form part of the professional lexical environment of future medical specialists.

From a linguodidactic perspective, however, introducing terminology is insufficient if students merely memorize isolated word-definition pairs. Medical students need to recognize specialized terms in authentic texts, explain concepts, describe biological and therapeutic processes, interpret scientific information, participate in professional discussions, and reformulate complex information for different audiences.

The purpose of the article is to substantiate the linguodidactic principles of teaching genetic engineering-related vocabulary to medical students in ESP classes and to propose a task-based model for developing professional lexical and communicative competence.

The study addresses the following objectives:

- to characterize ESP in the context of medical education;
- to examine lexical competence as a component of professional communication;
- to identify major categories of genetic engineering-related vocabulary and principles for their selection;
- to describe task-based techniques for contextualized terminology learning;
- to formulate methodological recommendations for ESP teachers.

Literature review

English for Specific Purposes is generally understood as an approach in which course objectives, content, materials, and activities are determined by learners' academic or professional needs. Hutchinson and Waters (1987) emphasize learners' reasons for learning a foreign language, while Dudley-Evans and St John (1998) connect ESP with the language, discourse, and communicative practices required in specific disciplines and professions.

In medical education, ESP involves more than knowledge of anatomical and clinical terminology. Learners must read scientific texts, understand lectures and presentations, describe mechanisms, discuss disease and treatment, interpret findings, explain technical concepts to different audiences, and present research in English. Genetic medicine is especially suitable for such instruction because learners move between basic science, laboratory research, clinical medicine, ethics, and patient communication.

Vocabulary is a fundamental component of communicative competence. Nation (2001) describes vocabulary knowledge in terms of form, meaning, and use. In medical ESP, these dimensions include pronunciation, spelling, morphology, semantic relationships, collocations, grammatical behaviour, register, and contextual appropriateness. Specialized combinations such as gene therapy, genome editing, genetic screening, inherited mutation, and targeted therapy cannot always be learned effectively through literal translation alone.

The CEFR Companion Volume (Council of Europe, 2020) emphasizes communicative activities and the learner as a social agent. This orientation is particularly relevant to ESP, where specialized vocabulary should support the completion of professional and academic tasks. Task-Based Language Teaching likewise treats language as a resource for achieving meaningful outcomes. Ellis (2003) and Long (2015) associate task-based instruction with purposeful language use, interaction, and outcome-oriented activity.

For genetic engineering terminology, a conceptual-network approach is particularly useful. Related forms such as gene, genetic, genetics, genome, genomic, and genotype should be differentiated semantically and grammatically and then connected to recurrent professional collocations such as genetic disorder, genetic testing, genomic medicine, genome editing, gene expression, and gene therapy. Morphological awareness of recurring elements such as bio-, geno-/gene-, -genic, -therapy, -ology, -ome, and -omics may also help learners interpret unfamiliar scientific terms.

Methodology

The article employs a qualitative descriptive and analytical methodology. It synthesizes established principles from ESP, vocabulary acquisition, communicative language teaching, CEFR-oriented pedagogy, and Task-Based Language Teaching in order to

formulate a linguodidactic model for genetic engineering-related vocabulary instruction.

The analysis is organized around four dimensions: (1) the professional relevance of target vocabulary; (2) lexical characteristics such as form, meaning, word formation, semantic relations, and collocation; (3) communicative functions required in medical and scientific contexts; and (4) pedagogical sequencing from initial lexical support to professionally oriented communication.

Terminology is selected according to professional relevance, conceptual importance, communicative usefulness, frequency in disciplinary discourse, learnability, and correspondence to students' subject knowledge and language proficiency. Core lexical fields include genetic material, molecular processes, genetic variation, inheritance, genetic technologies, therapeutic applications, diagnosis, clinical genetics, and bioethics.

Terminological field	Examples
Genetic material	DNA, RNA, gene, genome, chromosome
Molecular processes	replication, transcription, translation, gene expression
Genetic variation	mutation, variant, deletion, insertion
Inheritance	hereditary, inherited disorder, dominant, recessive
Genetic technologies	genetic engineering, genome editing, sequencing, CRISPR-Cas9
Therapeutic applications	gene therapy, vector, targeted therapy
Diagnosis and clinical genetics	genetic testing, screening, carrier, genetic counselling
Bioethics	informed consent, privacy, germline editing

Table 1.

The proposed instructional sequence follows three task-based stages. The pre-task stage activates background knowledge and provides lexical scaffolding. The task cycle requires learners to use target terminology to solve a professionally oriented problem or communicate information. The post-task stage focuses on language analysis, correction, consolidation, and revision. Because the present article develops a pedagogical model rather than reporting completed experimental

teaching, no invented quantitative outcomes are presented.

Results

The analytical synthesis produced a three-component model for teaching genetic engineering-related vocabulary in medical ESP: specialized medical content, systematic lexical instruction, and professionally oriented communicative tasks. The model treats vocabulary not as a list of terms but as a network of concepts, lexical

relations, collocations, and communicative functions.

1. *Lexical organization of specialized terminology.* Target terms should be presented through interconnected lexical sets and professional combinations. For example, students may work with the sequence gene – genetic – genetics – genome – genomic – genotype and then apply the items in combinations such as genetic disorder, genetic mutation, genetic testing, genetic counselling, genomic medicine, genome editing, gene expression, and gene therapy. This organization reduces confusion between morphologically related terms and strengthens conceptual links.

2. *Task-based instructional sequence.* At the pre-task stage, learners examine a visual sequence such as DNA – gene – mutation – inherited disorder – diagnosis – treatment, identify familiar terminology, match selected terms with definitions, and classify them into categories such as structure, process, disease, diagnosis, treatment, and technology.

During the task cycle, learners use terminology for a communicative purpose. A case-based discussion may present a fictional patient with a family history of an inherited condition and a genetic test indicating a potentially pathogenic variant. Students explain the meaning of the finding, identify what additional information would be required, and discuss possible management strategies. An information-gap task may require two students to exchange complementary information about conventional treatment and a hypothetical gene-therapy approach and complete a comparison chart.

At the post-task stage, learners analyze the language they used, focusing on distinctions such as genetic / genetically / genetics and inherit / inherited / hereditary, as well as collocations such as undergo genetic testing, carry a genetic variant, modify DNA,

alter gene expression, and develop gene therapy. Students then revise their oral or written output.

3. *Authentic materials and mediation.* Suitable materials include adapted scientific abstracts, short biomedical articles, genetics-related diagrams and infographics, educational videos, patient information texts, simplified genetic reports, scientific posters, and excerpts from professional guidelines. Authenticity should be balanced with accessibility: materials may be adapted linguistically while retaining their professional character.

A productive sequence is authentic source – terminology identification – text adaptation – comprehension task – communicative task – professional output. For example, students may read an adapted explanation of gene therapy, identify key terms and cause-and-effect relationships, and then produce a one-minute explanation for another medical student. At a more advanced level, they may reformulate the same information for a patient, thereby developing mediation skills as well as lexical competence.

4. *Role play, simulation, and project work.* Professional roles may include doctor and patient, genetic counsellor and patient, researcher and clinician, medical student and professor, or members of a multidisciplinary team. Useful functional language includes: This condition may be associated with...; The genetic test indicates...; This variant affects...; Gene therapy aims to...; One potential advantage is...; A possible limitation is...; Further testing would be necessary to.... Such expressions connect terminology knowledge with communicative competence.

Project work can consolidate terminology across several lessons. Small groups may investigate Gene Therapy, Inherited Genetic Disorders, CRISPR-Cas9, Genetic Testing, or Personalized Medicine and prepare a

terminology list, definitions, a visual representation, a short scientific explanation, a clinical application, and a three- to five-minute presentation followed by peer questions.

Discussion and Analysis

The proposed model confirms the value of integrating lexical form, conceptual meaning, and communicative use. In medical ESP, knowing the definition of a term does not guarantee the ability to use it accurately in a scientific explanation, case discussion, consultation, or presentation. Therefore, terminology instruction should move from recognition toward productive professional use.

A major linguodidactic issue is the relationship between conceptual complexity and linguistic complexity. Terms such as gene therapy and genome editing may appear linguistically transparent but represent distinct biomedical concepts. Similarly, closely related forms such as genetic, genomic, and genotype may be confused unless learners examine their grammatical roles, semantic boundaries, and typical collocations. Explicit lexical analysis therefore remains necessary even within a communicative and task-based framework.

The model also highlights the role of repeated encounters across modes. Students should meet target terminology through reading and listening, retrieve it during discussion, use it in writing and presentation, and reformulate it for different audiences. This multimodal recycling can support both

receptive and productive lexical competence while increasing contextual flexibility.

Authentic and semi-authentic materials contribute professional relevance but must be selected carefully. An unmodified research article may be conceptually and linguistically too dense for undergraduate learners. Pedagogical adaptation should therefore reduce unnecessary difficulty without removing essential disciplinary content, genre features, or professional vocabulary.

Task-based activities are particularly appropriate because they create a communicative need for specialized language. Case discussions, information-gap tasks, simulations, and project work require learners to use terminology to achieve an outcome rather than merely reproduce definitions. At the same time, the post-task stage preserves attention to linguistic accuracy by allowing focused work on word formation, collocation, grammar, and register.

For future experimental validation, the model may be examined through diagnostic, formative, and control stages with experimental and comparison groups. Assessment criteria can include vocabulary recognition, vocabulary production, lexical accuracy, collocational competence, fluency, and the ability to use terminology appropriately in professional tasks. Any quantitative results should be reported only after actual classroom implementation and data collection.

Criterion	Possible indicator
Vocabulary recognition	Correct identification of target terms
Vocabulary production	Correct retrieval and production of target terminology
Lexical accuracy	Appropriate use of specialized terms
Collocational competence	Correct use of professional lexical combinations
Fluency	Ability to explain concepts without excessive hesitation
Communicative use	Ability to apply terminology in professionally oriented tasks

Table 2.

Conclusion

Teaching genetic engineering-related vocabulary to medical students is a relevant area of contemporary ESP. The increasing importance of genomics, genetic testing, gene therapy, and genome-editing technologies requires future medical professionals to understand and use specialized English terminology accurately in academic, clinical, and research contexts.

The analysis indicates that effective terminology instruction should move beyond memorization of isolated lexical items. Medical students need to develop specialized vocabulary as part of interconnected conceptual, lexical, and communicative networks. Attention to word formation, semantic relationships, collocations, register, and contextual use is therefore essential.

A task-based approach provides a coherent methodological framework because it

allows learners to use terminology for meaningful professional purposes. Pre-task lexical support, case-based discussions, information-gap activities, role plays, simulations, authentic materials, visual support, mediation tasks, and collaborative projects can create conditions in which vocabulary functions as a communicative instrument.

Thus, the proposed linguodidactic model integrates three components: specialized medical content, systematic lexical instruction, and professionally oriented communicative tasks. Their interaction can support the development of both lexical competence and broader ESP communicative competence. Future classroom-based research should empirically test the model and report actual pre-test/post-test data, statistical treatment, and representative learner performance.

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