

EFFECTIVE TECHNIQUES FOR TEACHING GENETICS-RELATED VOCABULARY TO MEDICAL STUDENTS IN ESP COURSES

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Annotatsiya. Mazkur maqolada tibbiyot yo'nalishidagi talabalarga ESP kurslarida genetika va genetik muhandislikka oid lug'at birliklarini o'rgatishning samarali usullari yoritiladi. Tadqiqot "nimani o'rgatish?", "kimga o'rgatish?" va "qanday o'rgatish?" kabi asosiy didaktik savollar asosida tashkil etilgan. Genetika terminlarini tanlash mezonlari, tibbiy kontekstga moslashtirish, task-based learning, klinik vaziyatlarni modellashtirish, munozara va loyiha ishlaridan foydalanish imkoniyatlari tahlil qilinadi. Maqolada terminologik kompetensiyani rivojlantirish uchun kontekst, takrorlash, kollokatsiya, so'z yasash va kommunikativ faoliyatni integratsiyalash zarurligi asoslanadi.

Kalit so'zlar: ESP, tibbiy ingliz tili, genetika terminologiyasi, lug'at o'qitish, task-based learning, simulyatsiya, munozara, loyiha ishi.

Abstract. This article examines effective techniques for teaching genetics- and genetic-engineering-related vocabulary to medical students within English for Specific Purposes (ESP) courses. The discussion is structured around three fundamental didactic questions: what to teach, whom to teach, and how to teach. Particular attention is paid to principles of terminology selection, contextualized presentation, task-based learning, simulations of medical situations, discussion, and project work. The article argues that durable lexical competence develops when terminology is connected with authentic professional situations, recurrent retrieval, word formation, collocation, and purposeful spoken and written communication.

Keywords: ESP, medical English, genetics-related vocabulary, lexical competence, task-based learning, simulation, discussion, project work.

Аннотация. В статье рассматриваются эффективные методы обучения студентов медицинских специальностей лексике, связанной с генетикой и генетической инженерией, в рамках курса ESP. Материал организован вокруг трех основных дидактических вопросов: чему учить, кого учить и как учить. Анализируются принципы отбора терминов,

контекстуализированное введение лексики, обучение на основе заданий, моделирование медицинских ситуаций, дискуссии и проектная работа. Обосновывается необходимость сочетать профессиональный контекст, повторное извлечение лексики из памяти, словообразовательный анализ, коллокации и коммуникативную практику.

Ключевые слова: ESP, медицинский английский, генетическая терминология, лексическая компетенция, task-based learning, симуляция, дискуссия, проектная работа.

Introduction

English has become an essential medium for reading research, participating in international medical education, interpreting clinical guidelines, and communicating scientific results. For medical students, however, general English vocabulary is not sufficient. They also need a controlled and functional command of specialized lexical units that name biological structures, genetic mechanisms, laboratory procedures, inherited disorders, diagnostic processes, and emerging therapeutic technologies. Genetics-related vocabulary is especially demanding because many terms are semantically dense, morphologically complex, and closely connected with rapidly developing scientific knowledge. Words such as genotype, phenotype, mutation, allele, gene expression, genome sequencing, carrier screening, gene therapy, and CRISPR-associated terminology cannot be learned effectively as isolated equivalents.

In an ESP course, vocabulary teaching must therefore be organized as purposeful preparation for professional communication. The teacher does not simply explain definitions; the teacher selects terminology that is relevant to the students' field, creates situations in which the terminology is needed, and helps learners move from recognition to accurate and fluent use. This process can be clarified through three classical didactic questions: what to teach, whom to teach, and how to teach. Together, these questions connect content selection, learner analysis, and instructional procedure.

The first didactic principle concerns the content of instruction. In a medical ESP course, vocabulary should be selected according to professional relevance rather than according to frequency in general English alone. The lexical syllabus should include high-utility technical terms, semi-technical academic vocabulary, common collocations, abbreviations, and word families that learners repeatedly encounter in lectures, research articles, case reports, laboratory descriptions, and clinical communication. A practical lexical set may cover the structure and

function of DNA and RNA, chromosomes and genes, patterns of inheritance, mutations, genetic testing, sequencing technologies, congenital and inherited disorders, pharmacogenomics, gene editing, and gene therapy.

Selection should also consider conceptual relationships. Students remember terminology more successfully when words are organized in meaningful networks. For example, gene, genome, genotype, genetic, genomic, and genetics can be taught as a word family; dominant, recessive, homozygous, heterozygous, allele, and inheritance can be presented within one conceptual map. Such organization reduces fragmentation and helps students understand how medical concepts are linguistically encoded. Teachers should also highlight Greek and Latin roots and productive affixes such as hypo-, hyper-, poly-, mono-, -genic, -ase, and -ome, because morphological awareness enables learners to interpret unfamiliar biomedical terms.

Another important element is phraseology. Medical communication depends not only on single terms but also on recurrent combinations such as carry a mutation, inherit a variant, undergo genetic testing, identify a pathogenic variant, sequence a genome, express a gene, assess genetic risk, and respond to gene therapy. Teaching these combinations helps learners produce language that is both grammatically accurate and professionally natural. Abbreviations should also be taught carefully, because forms such as DNA, RNA, PCR, SNP, and CRISPR frequently appear in authentic materials but may be misunderstood if learners know only their expanded forms.

The second didactic question focuses on the learner. Medical students are not a homogeneous group. Their English proficiency, scientific background, clinical experience, learning strategies, and immediate professional goals may differ considerably. Before planning a genetics vocabulary unit, the teacher should conduct a simple needs analysis through questionnaires, diagnostic tasks, short interviews, or analysis of the students' curriculum. The purpose is to identify what terminology students already understand, which communicative situations they are likely to face, and which lexical gaps interfere with comprehension or professional expression.

For pre-clinical students, instruction may emphasize conceptual accuracy and comprehension of textbooks, lectures, diagrams, and simplified research texts. For senior students, the same terminology can be extended through case discussion, interpretation of test results, explanation of genetic risk, research presentation, and simulated doctor-patient communication. This progression is important because the pedagogical value of a term depends on the communicative

task in which it is used. The learner must eventually be able not only to define a term but also to explain it in accessible language, compare related concepts, interpret data, and use the term appropriately with different audiences.

Medical ESP learners are adult or near-adult specialists-in-training, so teaching should respect their disciplinary knowledge and encourage professional autonomy. Genetics content can be cognitively demanding even in the students' first language. Consequently, linguistic difficulty and conceptual difficulty should not be introduced simultaneously without support. Visuals, diagrams, structured glossaries, short pre-reading activities, and teacher modeling can reduce cognitive load and allow students to focus on the language needed for the task.

The third didactic question concerns instructional procedure. An effective sequence usually moves from noticing and comprehension to controlled practice, retrieval, and communicative use. New terms should first appear in a meaningful professional context: a short clinical vignette, a laboratory report, an infographic, a research abstract, or a patient-information text. Students can infer meaning, match terms with definitions, identify word parts, classify vocabulary by function, and notice collocations. After this initial encounter, the same items should reappear in speaking, reading, listening, and writing tasks.

Task-based learning is particularly appropriate for medical ESP because it gives vocabulary an immediate communicative purpose. Instead of asking learners to memorize a list, the teacher can assign a problem that requires the target terminology. For example, students may examine a short family history, construct a simple pedigree, identify possible inheritance patterns, and present their reasoning to classmates. Another task may require learners to compare two genetic testing methods and recommend the more appropriate one for a given scenario. During the task, students negotiate meaning, retrieve terminology, ask for clarification, and reformulate explanations. The teacher can then provide focused feedback on lexical accuracy, pronunciation, and collocation.

Simulation adds a further level of professional authenticity. In a simulated medical situation, one student may act as a clinician, another as a patient or relative, and a third as a laboratory specialist or genetic counselor. The linguistic objective is not to reproduce real clinical decision-making but to practice communication around genetic information. For instance, learners can explain what a genetic test is designed to detect, distinguish risk from certainty, or summarize laboratory findings using appropriate terminology. Simulation develops not only vocabulary but also register awareness: students learn that

highly technical language suitable for a research discussion may need to be reformulated when speaking to a non-specialist.

Discussion activities are equally valuable because genetics contains many scientific, clinical, and ethical questions that require precise expression. Structured discussions can address the potential benefits and limitations of gene therapy, privacy in genetic testing, direct-to-consumer testing, or the role of genomic data in personalized medicine. To keep the activity linguistically focused, the teacher can provide a small target list of terms and collocations that students must use accurately. Sentence frames for agreeing, qualifying, contrasting evidence, and expressing uncertainty can support learners who are less confident speakers. The goal is not to lead students toward a particular ethical position but to enable them to use professional language for evidence-based discussion.

Project work allows vocabulary to be recycled over a longer period. Small groups may create a poster, glossary, patient-information leaflet, infographic, or short presentation on a genetics topic. A project on inherited disorders, for example, may require students to define key terms, describe causes and mechanisms, summarize diagnostic procedures, and explain current management or research directions. Because the final product has an audience and purpose, learners have a reason to check terminology, revise wording, and improve clarity. Project work also integrates information literacy: students learn to distinguish reliable scientific sources from oversimplified or inaccurate online material.

Digital tools can support these techniques when used as part of a clear pedagogical design. Spaced-repetition platforms, shared glossaries, interactive quizzes, corpus examples, and collaborative documents can help students encounter and retrieve the same vocabulary repeatedly. However, digital tools should not replace contextual learning. Their value lies in extending practice, providing rapid feedback, and supporting individual review. The central unit of instruction remains the meaningful medical task in which the vocabulary performs a communicative function.

A 90-minute lesson on genetic testing can illustrate how the three didactic principles work together. At the pre-task stage, students examine a short case and predict the meaning of eight target expressions: family history, genetic variant, carrier, inherited disorder, screening, diagnostic test, pathogenic mutation, and genetic risk. The teacher checks conceptual understanding, pronunciation, and common collocations. Students then read a short adapted text and complete a

classification task that separates testing purposes, possible results, and follow-up actions.

During the main task, groups receive different patient scenarios. They decide what information is relevant, prepare a short explanation of the testing process, and present it to another group. A simulation follows in which one learner explains the purpose and possible outcomes of testing to a patient. The listener is encouraged to ask clarification questions, forcing the speaker to paraphrase technical vocabulary. In the post-task stage, the class reviews lexical errors, reformulates awkward combinations, and records useful expressions in a shared glossary. A brief retrieval quiz at the beginning of the next lesson strengthens retention.

This sequence shows that vocabulary learning becomes more effective when the same lexical items are encountered several times in different cognitive and communicative operations. Students first recognize the terms, then analyze them, retrieve them, use them to solve a problem, explain them to another person, and finally review them after feedback. Such recycling is especially important in genetics because a superficial one-time encounter rarely produces reliable professional use.

Assessment should reflect the communicative goals of the course. Traditional matching or multiple-choice items are useful for checking recognition, but they do not show whether students can use terminology in professional discourse. Therefore, assessment should combine receptive and productive measures. Receptive tasks may include identifying terms in context, interpreting word parts, or choosing an appropriate definition. Productive tasks may require learners to complete a case summary, explain a concept orally, use target collocations in a discussion, or write a short professional paragraph.

Useful criteria include accuracy of meaning, appropriate form, correct collocation, pronunciation where relevant, contextual appropriateness, and the ability to paraphrase technical concepts. Delayed assessment is also important. If students can use the terminology only immediately after instruction, learning has not yet become stable. Short cumulative checks and repeated inclusion of genetics vocabulary in later tasks provide a better picture of durable lexical development.

Conclusion

Teaching genetics-related vocabulary to medical students is most effective when it is guided by the interconnected questions of what to teach, whom to teach, and how to teach. The lexical content should be professionally relevant,

conceptually organized, and rich in collocations and word families. The learners' language level, medical background, stage of study, and communicative needs should determine the depth and form of instruction. Methodologically, vocabulary should be presented in context and repeatedly recycled through tasks that require comprehension, retrieval, explanation, problem solving, and professional interaction.

Task-based learning, medical simulations, structured discussions, and project work provide especially productive conditions for this development because they transform terminology from an object of memorization into a tool for communication. When these techniques are combined with systematic feedback, spaced review, and meaningful assessment, students are better prepared to read scientific literature, discuss genetic concepts, interpret professional information, and communicate specialized knowledge accurately and responsibly.

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