



ISSN: 3060-4613



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O'zbekiston
Milliy Pedagogika
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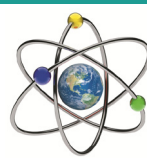
№10(3)
2026

- 13.00.00 Pedagogika fanlari
- 13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
- 13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
- 13.00.03 Maxsus pedagogika
- 13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
- 13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
- 13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohaları va bosqichlari bo'yicha)
- 13.00.07 Ta'limda menejment
- 13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
- 13.00.09 Ijtimoiy pedagogika
- 07.00.00 Tarix fanlari
- 19.00.00 Psixologiya fanlari
- 01.00.00 Fizika-matematika fanlari
- 02.00.00 Kimyo fanlari
- 03.00.00 Biologiya fanlari
- 09.00.00 Falsafa fanlari
- 10.00.00 Filologiya fanlari
- 11.00.00 Geografiya fanlari

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Pedagogika, psixologiya fanlariga ixtisoslashgan ilmiy jurnal



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Elektron nashr. 224 sahifa,
13-oktyabr, 2026-yil.

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Pedagogika fanlari bo'yicha: OAK Kengashi tavsiyasi (26.08.2024-y., №11-05-4381/01) asosida:

- Ekspert kengashi (29.10.2024-y., №10)
- Rayosat qarori (31.10.2024-y., №363/5)

Psixologiya fanlari bo'yicha: Toshkent davlat pedagogika universiteti murojaatiga asosan OAK tavsiyasi (24.04.2025-y., №11-05-2566/01):

- Ekspert kengashi (25.05.2025-y., №10)
- Rayosat qarori (08.05.2025-y., №370/5)

"Maktabgacha va maktab ta'limi" jurnali

26.09.2023-yildan

O'zbekiston Respublikasi Prezidenti Administratsiyasi huzuridagi Axborot va ommaviy kommunikatsiyalar agentligi tomonidan №C-5669363 reyestr raqami tartibi bo'yicha ro'yxatdan o'tkazilgan.

Litsenziya raqami: №136361

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TEACHING MEDICAL TERMINOLOGY THROUGH DATA-DRIVEN LEARNING: A CORPUS-INFORMED MODEL FOR ENGLISH FOR MEDICAL PURPOSES

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Abstract: Medical students who study English for Medical Purposes need more than definitions of isolated technical terms. They must recognize how terminology functions in authentic clinical and academic discourse, including its frequency, collocations, phraseological patterns, grammatical behavior, and communicative purpose. This article develops a corpus-informed, data-driven learning (DDL) model for teaching medical terminology to university students. The study uses a structured analytical synthesis of established medical vocabulary studies, specialized-corpus research, and empirical DDL findings. Evidence from medical word lists, concordance-based instruction, collocation studies, and recent corpus-assisted interventions is compared to identify principles that can guide terminology selection and classroom practice. The results support five instructional priorities: frequency and range, contextual meaning, collocation, recurrent phraseology, and productive transfer. On this basis, a five-stage pedagogical cycle-Notice, Investigate, Interpret, Practice, and Produce-is proposed. The model combines teacher-prepared concordance materials with guided student corpus consultation and medically situated speaking and writing tasks.

It is designed for English for Medical Purposes courses, including contexts in which learners have mixed English proficiency and limited prior experience with corpus tools. The article concludes that corpus-informed DDL can make terminology instruction more systematic, authentic, and learner-centered while complementing, rather than replacing, explicit teacher guidance.

Key words: corpus linguistics, data-driven learning, medical terminology, English for Medical Purposes, concordance, collocation, medical vocabulary.

Annotatsiya: Tibbiyot yo'nalishida tahsil olayotgan va tibbiy maqsadlar uchun ingliz tilini o'rganayotgan talabalar alohida texnik atamalarining ta'riflarini bilish bilan cheklanib qolmasliklari kerak. Ular tibbiy terminologiyani autentik klinik va akademik diskursda qanday qo'llanilishini, jumladan, atamalarining qo'llanish chastotasi, kollokatsiyalari, frazeologik qoliplari, grammatik xususiyatlari hamda kommunikativ vazifalarini anglay olishlari zarur. Mazkur maqolada oliy ta'lim muassasalari talabalariga tibbiy terminologiyani o'rgatish uchun lingvistik korpus ma'lumotlariga asoslangan, ma'lumotlar asosida o'rganish (Data-Driven Learning - DDL) modeli ishlab chiqilgan. Tadqiqotda tibbiy leksikaga oid mavjud ilmiy ishlar, ixtisoslashtirilgan korpus tadqiqotlari hamda DDL yondashuvining empirik natijalari tizimli analitik sintez asosida o'rganilgan. Tibbiy terminlar ro'yxatlari, konkordansga asoslangan ta'lim, kollokatsiyalar bo'yicha tadqiqotlar va korpus vositalari yordamida amalga oshirilgan so'nggi pedagogik tajribalar natijalari qiyosiy tahlil qilinib, terminlarni tanlash hamda auditoriya mashg'ulotlarini tashkil etishga yo'naltirilgan asosiy tamoyillar aniqlangan.

Tadqiqot natijalari ta'lim jarayonida beshta ustuvor yo'nalishning ahamiyatini asoslaydi: qo'llanish chastotasi va qamrovi, kontekstual ma'no, kollokatsiya, takrorlanuvchi frazeologik birliklar hamda o'zlashtirilgan bilimlarni nutqiy faoliyatda mustaqil qo'llash. Shu asosda besh bosqichli pedagogik sikl - Payqash (Notice), Tadqiq qilish (Investigate), Talqin qilish (Interpret), Mashq qilish (Practice) va Mustaqil qo'llash (Produce) taklif etilgan. Mazkur model o'qituvchi tomonidan oldindan tayyorlangan konkordans materiallari, talabalar tomonidan o'qituvchi rahbarligida korpus ma'lumotlarini mustaqil o'rganish hamda tibbiy kommunikativ vaziyatlarga asoslangan og'zaki va yozma topshiriqlarni birlashtiradi.

Model ingliz tilini bilish darajasi turlicha bo'lgan hamda korpus vositalaridan foydalanish tajribasi cheklangan talabalar tahsil oladigan tibbiy ingliz tili kurslari uchun mo'ljallangan. Maqolada korpus ma'lumotlariga asoslangan DDL yondashuvi o'qituvchining bevosita metodik rahbarligini almashtirmasdan, balki uni to'ldirgan holda tibbiy terminologiyani o'qitishni yanada tizimli, autentik va talabaga yo'naltirilgan jarayonga aylantirishi mumkinligi xulosa qilingan.

Kalit so'zlar: korpus lingvistikasi, ma'lumotlar asosida o'rganish, tibbiy terminologiya, tibbiy maqsadlar uchun ingliz tili, konkordans, kollokatsiya, tibbiy leksika.



Аннотация: Студентам медицинских вузов, изучающим английский язык для медицинских целей, недостаточно знать определения отдельных специальных терминов. Им необходимо понимать особенности функционирования медицинской терминологии в аутентичном клиническом и академическом дискурсе, включая частотность употребления терминов, их коллокации, фразеологические модели, грамматические особенности и коммуникативные функции.

В данной статье разработана модель обучения медицинской терминологии студентов высших учебных заведений на основе корпусных данных и подхода Data-Driven Learning (DDL) - обучения на основе анализа языковых данных. Исследование основано на структурированном аналитическом синтезе научных работ, посвящённых медицинской лексике, специализированным языковым корпусам и эмпирическим результатам применения DDL. Проведён сравнительный анализ исследований медицинских терминологических списков, обучения с использованием конкордансов, коллокационных исследований и современных педагогических экспериментов с применением корпусных технологий. На этой основе определены принципы отбора терминологии и организации аудиторной работы.

Результаты исследования подтверждают значимость пяти приоритетных направлений обучения: частотности и диапазона употребления, контекстуального значения, коллокаций, устойчивых повторяющихся фразеологических моделей и продуктивного переноса усвоенных знаний в речевую практику. На данной основе предложен пятиэтапный педагогический цикл - Замечать (Notice), Исследовать (Investigate), Интерпретировать (Interpret), Практиковать (Practice) и Продуцировать (Produce). Разработанная модель объединяет подготовленные преподавателем конкордансные материалы, самостоятельное изучение студентами корпусных данных под руководством преподавателя, а также устные и письменные задания, моделирующие ситуации профессионального медицинского общения.

Модель предназначена для курсов английского языка для медицинских целей, в том числе в условиях неоднородного уровня языковой подготовки студентов и ограниченного опыта использования корпусных инструментов. Сделан вывод о том, что корпусно-ориентированный подход DDL способен обеспечить более систематичное, аутентичное и личностно-ориентированное обучение медицинской терминологии, дополняя, а не заменяя непосредственное методическое руководство преподавателя.

Ключевые слова: корпусная лингвистика, обучение на основе языковых данных, медицинская терминология, английский язык для медицинских целей, конкорданс, коллокация, медицинская лексика.

INTRODUCTION

English has a central role in international medical education, scientific publication, continuing professional development, and access to current research. For medical students learning English as an additional language, vocabulary is therefore not a peripheral component of language study. It is one of the main channels through which learners gain access to disciplinary knowledge. A student may understand the general meaning of a term such as diagnosis, lesion, administer, acute, or discharge, yet still have difficulty recognizing the term in a case report, combining it with an appropriate verb or adjective, distinguishing its everyday and medical meanings, or using it accurately in a patient summary. Medical terminology instruction must consequently move beyond translation and memorization toward knowledge of how terms behave in real medical discourse.

The problem is especially important in English for Medical Purposes (EMP), where the vocabulary load is large and heterogeneous. Learners encounter highly technical Greco-Latin terminology, semi-technical academic vocabulary, abbreviations, multi-word terms, common words with specialized meanings, and recurrent clinical expressions. General English frequency alone cannot determine what should be taught. Coxhead's (2000) Academic Word List demonstrated the value of corpus-based frequency and range criteria for academic vocabulary, but later research showed that individual disciplines require more specialized lexical descriptions. In medicine, Wang, Liang, and Ge (2008) established a Medical Academic Word List from a corpus of more than one million words of medical research articles, while Hsu (2013) compiled a large medical textbook corpus to identify vocabulary relevant to EFL medical undergraduates. Lei and Liu (2016) subsequently developed a more compact Medical Academic Vocabulary List and argued for attention to general high-frequency words that acquire specialized frequency or meaning in medical discourse.

A second problem concerns the unit of learning. Traditional vocabulary teaching frequently presents a term, a translation, and perhaps one example sentence. Corpus linguistics shows, however, that language is patterned. Medical words repeatedly occur with particular partners and in recurrent grammatical environments. For example, a learner needs not only the noun diagnosis but also patterns such as establish a diagnosis, confirm the diagnosis, differential diagnosis, and diagnosis of a condition. Likewise, treatment appears in combinations such as receive treatment, respond to treatment, treatment options, treatment for, and treatment with. Knowledge of such patterns contributes to both comprehension and production because professional communication depends on conventional combinations rather than free assembly of isolated words.



Data-driven learning offers a pedagogical response to this problem. In DDL, learners encounter language evidence taken from corpora and are guided to observe repeated patterns, formulate hypotheses, compare examples, and apply what they discover. The approach is associated with Tim Johns's view of the learner as a language researcher. Instead of receiving every rule directly from a teacher, students work with concordance lines, frequency lists, collocation displays, or other corpus outputs. DDL can be direct, when students search a corpus themselves, or indirect, when the teacher prepares corpus-derived materials. This distinction is important in medical universities because first-year students may have limited linguistic metalanguage, limited digital corpus experience, or mixed levels of English proficiency.

Evidence accumulated over several decades indicates that corpus use can support language learning. Boulton and Cobb's (2017) meta-analysis synthesized 64 studies representing 88 independent samples and reported large overall effects for DDL in both controlled comparisons and pre/post designs. In Medical English specifically, Önder Özdemir (2014) used a specialized corpus of medical case reports to develop concordance-based collocation materials, responding to medical students' expressed need to learn words together with their collocations. More recent research has extended corpus-assisted instruction to medical terminology retention, academic writing, and collocational awareness. These findings justify closer attention to how corpus evidence can be transformed into a teachable and context-sensitive EMP methodology.

The relevance of this issue is also growing in Uzbekistan, where medical universities increasingly require students to access English-language professional information and participate in internationally oriented academic communication. Local scholarship has begun to discuss communicative terminology instruction, English-Uzbek medical language comparison, and corpus analysis for ESP curriculum design. Asatullaev (2025), for example, proposed comparative corpus analysis of English and Uzbek medical texts as a basis for first-year ESP methodology. Such work indicates a developing regional interest, but a practical framework is still needed to connect corpus selection principles, concordance analysis, terminology prioritization, classroom scaffolding, and productive medical communication within one instructional cycle.

The present article addresses this need. It does not report a fabricated classroom experiment or claim new student test scores. Instead, it is a corpus-informed methodological study that synthesizes established empirical findings and converts them into a reproducible pedagogical model. The central research question is: How can corpus evidence and data-driven learning be organized into a systematic procedure for selecting, exploring, practicing, and producing medical terminology in EMP courses? Three supporting questions guide the analysis:

- (1) Which corpus criteria are most useful for prioritizing medical terminology?
- (2) Which dimensions of lexical knowledge should be made visible to learners through corpus evidence?
- (3) How can DDL be scaffolded so that it remains feasible for medical students with different levels of English and digital experience?

The working hypothesis is that terminology instruction becomes pedagogically stronger when lexical selection is based on frequency, range, keyness, collocation, and communicative relevance, and when students are guided from noticing corpus evidence to using the target terminology in realistic medical tasks. The proposed model therefore treats corpus linguistics not as an end in itself but as an evidence base for instructional decisions. It also treats DDL not as unguided discovery but as a continuum of teacher mediation that can be adjusted to learner readiness.

LITERATURE REVIEW

Corpus linguistics and vocabulary selection. A corpus is a principled electronic collection of naturally occurring language that can be searched to reveal frequency, distribution, recurrent combinations, and contextual use. For vocabulary teaching, its principal advantage is empirical prioritization. Teachers no longer need to rely only on intuition when deciding whether a lexical item is common, which meaning is dominant in a discipline, or which words frequently occur together. Coxhead (2000) demonstrated this principle at the general academic level by developing the Academic Word List from a 3.5-million-word academic corpus. The list contained 570 word families and covered approximately ten percent of the academic corpus, showing that corpus-based selection can identify vocabulary with substantial pedagogical value across university study.

Medical discourse, however, requires more specialized analysis. Wang et al. (2008) compiled a 1,093,011-word corpus of medical research articles and established a Medical Academic Word List containing 623 word families. These families accounted for 12.24% of the tokens in their corpus. The study is important because it shows that medical academic language has a lexical profile that cannot be adequately represented by general academic lists alone. Hsu (2013) approached the issue from the perspective of medical undergraduates and



analyzed a corpus of 155 medical textbooks across 31 subject areas, totaling approximately 15 million running words. The resulting Medical Word List included 595 word families beyond the most frequent 3,000 general-English families and covered 10.72% of the textbook corpus. The scale and disciplinary range of the corpus strengthened the pedagogical relevance of the list for medical learners.

Lei and Liu (2016) refined medical vocabulary selection further. Their Medical Academic Vocabulary List was designed through enhanced corpus methodology and was substantially shorter than the earlier medical academic list while providing stronger coverage of medical English. A particularly useful pedagogical point is their argument that some high-frequency general words deserve inclusion when they occur unusually often or carry specialized meanings in medicine. This prevents a false division between “general” and “medical” vocabulary. Words such as present, history, positive, negative, culture, discharge, and management can be familiar in everyday English but require discipline-specific interpretation in medical contexts.

Frequency alone, nevertheless, is insufficient. A word may be frequent because it is concentrated in one specialty, while another moderately frequent item may occur across many areas of medicine. Range therefore complements frequency by showing how widely a lexical item is distributed across texts, genres, or specialties. Keyness can add another dimension by comparing a specialized medical corpus with a general reference corpus to identify words that are statistically characteristic of medical discourse. Finally, pedagogical relevance requires expert judgment: an item may be frequent but not useful for a particular course, whereas a lower-frequency term may be essential for a current clinical unit. A principled terminology syllabus therefore combines corpus statistics with curricular and communicative needs.

Collocation, phraseology, and contextual meaning. Corpus research has challenged the assumption that vocabulary knowledge consists mainly of form-meaning pairs. In professional language, knowing a term includes knowing its preferred collocations, grammatical patterns, semantic associations, and discourse functions. This is especially visible in medical English. A clinician does not simply “use” the word symptoms; professional discourse repeatedly uses patterns such as present with symptoms, report symptoms, symptoms resolve, symptoms persist, and symptoms are suggestive of. Similarly, risk commonly participates in patterns such as increased risk of, risk factors for, at risk of, reduce the risk, and associated with a higher risk. These patterns contribute to fluent and conventional professional expression.

Önder Özdemir (2014) directly addressed this issue in Medical English. A needs analysis involving 323 Turkish medical students indicated that learners considered learning word meanings together with collocations highly important. The researcher built a specialized corpus from Journal of Medical Case Reports articles, comprising 31,731 words, and used concordance data to create in-house ESP materials. The study illustrates a practical bridge between corpus analysis and classroom materials: authentic examples are selected, simplified in presentation rather than rewritten in language, and organized so that students infer collocational patterns from repeated evidence.

Recent work continues to support the importance of collocational awareness. A 2025 study of medical ESP learners used DDL activities to raise awareness of noun collocations and reported high accuracy in learner responses together with generally positive perceptions of the activities. The study also demonstrates the value of a smaller pedagogic corpus, because specialized corpora can make relevant patterns more visible than very large general corpora. For medical students, the pedagogical question is not whether a corpus is maximally large, but whether it represents the genres and language they need to understand and produce.

Data-driven learning as an instructional approach. DDL is grounded in inductive engagement with authentic language data. Concordance lines are one of its most recognizable tools. A concordancer displays multiple occurrences of a search word with surrounding context, often in Key Word in Context (KWIC) format. When examples are vertically aligned around the node word, recurrent lexical and grammatical patterns become visually salient. Students can sort lines, identify repeated neighbors, classify meanings, test a hypothesis, and compare their conclusion with dictionaries or teacher explanations.

DDL should not be interpreted as the removal of the teacher. The teacher selects suitable data, controls cognitive load, teaches search strategies, helps students distinguish meaningful patterns from accidental co-occurrence, and connects corpus observations to disciplinary communication. Boulton and Cobb’s (2017) meta-analysis provides broad support for corpus-based language learning, but it also highlights variation in study design and the need for stronger research practices. For pedagogy, this suggests that DDL should be implemented deliberately rather than treated as a technological novelty.

The level of learner autonomy can be adjusted. In hands-off DDL, students work with printed or teacher-prepared corpus materials without directly operating corpus software. This is useful at the beginning of a course, with lower-proficiency students, or when technology access is limited. In hands-on DDL, students conduct searches independently using tools such as AntConc, Sketch Engine, or other searchable corpora. A staged transition from hands-off to hands-on work can reduce technical difficulty while preserving the central DDL principle: learners examine authentic evidence and make informed generalizations.



Corpus-assisted medical terminology learning. Medical terminology is particularly suitable for DDL because medical discourse contains strong recurrent patterns and because errors in lexical combination can reduce clarity. The 2025 quasi-experimental study by Hamidi and colleagues compared lecture-based instruction with three corpus-assisted approaches: concordancing, collocation, and frequency-for eight cardiovascular terms among 40 EFL medical students. Across immediate and delayed assessments, the corpus-assisted groups showed stronger retention than the lecture group, and concordancing produced the strongest one-month retention in the reported results. Although the small sample and limited number of target terms restrict generalization, the study provides direct empirical support for corpus-assisted terminology teaching.

A 2026 mixed-methods study in medical English writing also implemented an eight-week corpus-based intervention organized through staged DDL. Students worked with authentic medical materials and used corpus functions to examine frequency, modal verbs, recurrent expressions, and contextual terminology. The study illustrates how DDL can extend beyond vocabulary recognition to phraseology and professional writing. Such work is important because terminological competence ultimately requires transfer: learners must move from observing patterns to producing appropriate language in case histories, patient summaries, academic abstracts, presentations, and clinical interaction.

The local and regional context. Corpus-based EMP remains comparatively underdeveloped in Central Asian teaching contexts, but recent publications indicate increasing interest. Asatullaev (2025) explicitly connects comparative corpus analysis of English and Uzbek medical texts with methodology for first-year medical students. Uzbek research has also examined lexical-semantic features of English and Uzbek medical terminology and communicative approaches to terminology instruction. These studies reinforce the need to account for multilingual learning environments, where students may move among Uzbek, Russian, Latin-derived medical forms, and English. In such contexts, translation can support comprehension, but it should not become the only learning mechanism. Corpus evidence can show learners how English terms combine and function in authentic discourse, thereby reducing dependence on one-to-one lexical equivalence.

The literature therefore reveals a clear methodological opportunity. Corpus studies provide principled lexical selection; DDL research provides an instructional mechanism; Medical English research confirms the importance of collocation and contextualized terminology; and regional ESP research identifies a need for locally adaptable methods. What remains necessary is an integrated model that specifies how these components can be sequenced in an EMP lesson and how the same framework can support learners at different proficiency levels.

METHODOLOGY

Research design. This article employs a corpus-informed methodological synthesis rather than a classroom experiment. Its purpose is to derive a transparent teaching framework from established corpus-linguistic and DDL evidence. The design combines three procedures: (a) analytical review of foundational and recent research on academic and medical vocabulary; (b) comparison of reported corpus-selection criteria and DDL procedures; and (c) pedagogical modeling, in which recurring principles are converted into a staged EMP teaching cycle. Because no new student participants were recruited and no primary personal data were collected, the article does not report human-subject experimental results.

Data sources. The evidence base was organized around four categories. The first consisted of general academic vocabulary research that established corpus-based principles of frequency and range, represented by Coxhead (2000). The second consisted of discipline-specific medical vocabulary studies, including Wang et al. (2008), Hsu (2013), and Lei and Liu (2016). The third category included DDL research and synthesis, especially Boulton and Cobb (2017), together with medical or ESP applications such as Önder Özdemir (2014) and later corpus-assisted medical studies. The fourth category included recent regional research relevant to Uzbek medical education, particularly work connecting English-Uzbek medical corpora with ESP methodology. Sources were selected because they contributed directly to one or more of the following analytical dimensions: lexical prioritization, authentic context, collocation, concordancing, learner autonomy, scaffolding, retention, or transfer to professional communication.

Analytical variables. Five corpus-linguistic variables were treated as central for terminology selection. Frequency refers to how often an item occurs in the target corpus. Range refers to its distribution across texts, subcorpora, specialties, or genres. Keyness refers to the degree to which an item is unusually characteristic of a specialized corpus compared with a reference corpus. Collocation refers to recurrent lexical co-occurrence, while phraseology includes multi-word units, lexical bundles, and recurrent grammatical frames. These variables were interpreted together with pedagogical relevance, defined as the usefulness of an item for the learning outcomes, medical topic, and communicative tasks of a specific EMP course.

Proposed corpus construction procedure. For teachers or researchers applying the model locally, a small pedagogical medical corpus can be constructed from authentic texts aligned with the course. Suitable sources may include open-access case reports, patient information materials, clinical guidelines, textbook passages where copyright permits classroom analysis, and de-identified model clinical documents. Texts should be grouped by genre or topic so that range can be examined. References, navigation menus, duplicate material, and irrelevant metadata should be removed before analysis. The resulting plain-text files can be processed in AntConc or another concordancer. A pedagogical corpus does not need to contain millions of words if it is representative of the immediate instructional domain; however, its composition must be documented so that conclusions are interpretable and reproducible.

Terminology selection procedure. Candidate terms are first generated through frequency and keyword lists. Items are then filtered according to range so that vocabulary appearing across several relevant texts receives priority over accidental repetition in one document. The teacher next inspects concordance lines to determine dominant medical meanings, grammatical behavior, and common collocations. Finally, the list is checked against course outcomes and, where possible, reviewed by a medical subject specialist. This procedure avoids two opposite problems: teaching rare technical items simply because they look “medical,” and excluding common-looking words that perform important specialized functions.

DDL task design. The instructional model was constructed by mapping corpus evidence onto a five-stage learning sequence: Notice, Investigate, Interpret, Practice, and Produce. At the Notice stage, learners meet a small set of concordance lines or short authentic extracts and identify repeated forms. At Investigate, they sort examples, search for collocates, or compare frequencies. At Interpret, they state a rule or pattern in accessible language and confirm it with teacher guidance, a dictionary, or additional corpus evidence. At Practice, they complete controlled or semi-controlled tasks that require the target pattern. At Produce, they use the terminology in a medically meaningful speaking or writing task. The cycle can be repeated for individual terms, collocations, or lexical bundles.

Differentiation. The model assumes that EMP classes may include students with different English proficiency. For lower-proficiency learners, concordance lines can be shortened, the node word highlighted, difficult surrounding vocabulary glossed, and the number of examples reduced to five or six. Bilingual Uzbek or Russian glosses may be provided for comprehension, while the pattern-discovery task remains in English. Sentence frames can support production. Intermediate learners can classify collocations and infer grammatical patterns from ten to fifteen lines. Advanced learners can perform independent searches, compare genres, evaluate competing expressions, and report quantitative observations. Thus, the corpus task remains conceptually similar while the degree of linguistic and technical independence changes.

Validity and limitations of the methodology. The proposed framework is evidence-informed, but it should not be interpreted as proof of effectiveness in every local context. The cited studies differ in corpus size, learner population, target vocabulary, intervention duration, and outcome measures. The present article therefore uses published findings to justify design principles, not to calculate a new pooled effect. A future local study at Tashkent State Medical University could test the model through a pre-test/post-test design, delayed retention measure, learner questionnaire, and analysis of student production. Such primary research would allow the pedagogical model to be evaluated under the specific multilingual and curricular conditions of Uzbek medical education.

Table 1: Corpus-informed criteria for prioritizing medical terminology

VBHJ	Question	Pedagogical value	Example decision
Frequency	How often does the item occur?	Prioritizes repeated exposure	Teach a frequent term before a rare synonym.
Range	How widely is it distributed?	Avoids overvaluing one-text repetition	Prefer an item occurring across several cases/specialties.
Keyness	Is it unusually typical of medical discourse?	Identifies discipline-characteristic vocabulary	Include common-looking words with strong medical specialization.
Collocation	Which words repeatedly occur with it?	Supports conventional professional expression	Teach “respond to treatment,” not only “treatment.”
Phraseology	Which recurrent frames contain it?	Connects terminology to discourse functions	Teach “the patient presented with ...” as a usable frame.
Curricular relevance	Does the learner need it for the unit/task?	Aligns corpus evidence with course outcomes	Prioritize fracture vocabulary in a trauma unit.



RESULTS

The analytical synthesis produced four main results. First, the evidence supports a multi-criterion approach to terminology selection. Second, medical terminology is best treated as contextual and phraseological knowledge rather than as isolated definitions. Third, DDL is most feasible when implemented as a scaffolded continuum from teacher-prepared evidence to independent corpus consultation. Fourth, these principles can be operationalized in a five-stage pedagogical cycle that ends with professional use rather than corpus observation alone.

Result 1: terminology selection requires more than frequency. Across the medical vocabulary literature, frequency is consistently valuable but becomes more pedagogically meaningful when combined with distribution and disciplinary specificity. Wang et al. (2008) demonstrated that a medical academic list could account for a substantial proportion of medical research article tokens, while Hsu (2013) showed that a carefully selected medical word list could bridge the lexical gap faced by EFL medical undergraduates. Lei and Liu (2016) further showed that methodological refinement can produce a more efficient medical academic list and that high-frequency general words should not automatically be excluded when they carry specialized medical functions. The synthesis therefore yields the following decision rule: an EMP term receives high instructional priority when it is frequent or key in the target discourse, distributed across relevant texts, and directly connected to a course outcome.

Result 2: the instructional unit should include collocation and phraseology. The literature repeatedly indicates that medical learners need to know how words combine. Önder Özdemir's (2014) needs analysis and corpus-based materials directly foregrounded collocations, while later ESP research has continued to use DDL for collocational awareness. This leads to a change in syllabus design. Instead of listing only "diagnosis - tashxis" or "treatment - davolash," a corpus-informed syllabus records a lexical profile: core meaning, common medical collocations, typical prepositions or grammatical frames, representative concordance examples, and one or more communicative functions. The practical result is a richer but more usable terminology entry.

Result 3: corpus evidence should be pedagogically filtered. Raw concordance output can be difficult for inexperienced learners because lines may contain abbreviations, unfamiliar disease names, complex syntax, or irrelevant senses. The analysis therefore supports pedagogical mediation rather than unfiltered exposure. Teachers can remove duplicate or confusing lines, limit the number of examples, gloss non-target vocabulary, and arrange lines to make a pattern visible. Importantly, this does not falsify the data if the original wording of retained examples is preserved. The goal is to reduce extraneous cognitive load while keeping authentic evidence.

Result 4: DDL can progress from guided noticing to independent inquiry. The proposed model uses five stages. Notice establishes attention to the target form. Investigate requires learners to manipulate or search evidence. Interpret turns observations into an explicit generalization. Practice stabilizes the pattern through controlled use. Produce transfers the pattern into a medical communicative task. The stages respond to a weakness that can occur when corpus activities stop after discovery. In EMP, discovery has limited value unless students can later understand and use the terminology in case discussions, patient histories, reports, or academic communication.

The five-stage cycle also creates a practical role for differentiation. A beginner may complete the same conceptual cycle with six printed concordance lines and a sentence frame, whereas an advanced learner may query a corpus, compare collocates statistically, and write a case summary using the discovered patterns. The method therefore does not equate DDL with advanced English. It treats learner independence as a variable that can increase over time.

A model terminology profile. To illustrate the result, consider the term treatment. A traditional entry may provide only a translation and definition. A corpus-informed entry asks learners to observe patterns such as receive treatment, start treatment, respond to treatment, treatment for a condition, treatment with a drug, and treatment options. Learners can classify the patterns by function: initiation, receipt, response, indication, medication, and choice. They then apply the patterns to a short clinical case. This sequence transforms a familiar noun into a network of professional uses.

A second example is present. General English learners often know present as an adjective meaning "current" or a verb meaning "show/give." In clinical discourse, patients may present with a symptom, a disease may present as a particular pattern, and a patient may be clinically stable at presentation. Corpus evidence makes these specialized meanings visible through repeated context. This illustrates why discipline-specific corpus analysis is necessary even for apparently common vocabulary.

Evidence from prior empirical studies. The proposed model is consistent with broader and medical-specific empirical findings. Boulton and Cobb (2017) reported large overall effects in their meta-analysis of DDL studies, although they also cautioned that research quality and long-term transfer require continued attention. In the medical terminology study reported by Hamidi and colleagues (2025), corpus-assisted methods outperformed lecture-based instruction across the reported testing intervals, with concordancing showing particularly strong delayed retention. These findings do not constitute new results from the present article, but they support the plausibility of a teaching model in which repeated contextual comparison and pattern discovery are central.

Proposed instructional sequence for an EMP lesson. A 60–80 minute lesson can begin with five to eight concordance lines containing one target term. Students underline words occurring immediately before and after the node. They compare answers in pairs and propose two or three patterns. The teacher then provides a larger set or allows a guided corpus search. Students classify examples according to meaning or grammatical behavior, formulate a rule, and verify it. Controlled practice follows through gap completion, matching, error correction, or collocation selection. The final task is medically situated: students complete a patient summary, explain a case, give advice, describe a procedure, or write two to four sentences in a case-report style using the target patterns.

Assessment implications. Corpus-informed terminology assessment should measure more than recognition of definitions. A balanced assessment can include four layers: receptive meaning, collocational choice, contextual interpretation, and productive use. For example, students may first match a term with a definition, then choose the most conventional collocate, interpret the term in a concordance line, and finally use it in a patient-related sentence. Delayed assessment is particularly important because immediate post-tests may reflect short-term familiarity rather than durable lexical knowledge.

Table 2: Five-stage DDL cycle for medical terminology

Stage	Learner action	Teacher support	Example with “diagnosis”
1. Notice	Observe repeated forms in authentic examples.	Select clear concordance lines; highlight node word.	Underline words near “diagnosis.”
2. Investigate	Sort, count, compare, or search patterns.	Provide questions or search instructions.	Group “confirm/establish/make + diagnosis.”
3. Interpret	State meaning and usage pattern.	Confirm, refine, explain exceptions.	Explain when “diagnosis of” is used.
4. Practice	Use patterns in controlled tasks.	Give feedback on form and collocation.	Complete case sentences with correct collocates.
5. Produce	Use terminology in professional communication.	Evaluate accuracy and appropriateness.	Write or present a short diagnostic case summary.

The results of the methodological synthesis support the initial hypothesis: medical terminology teaching becomes more systematic when corpus evidence informs both what is selected and how it is taught. This conclusion has several implications for EMP. The first is that a terminology syllabus should not be a static glossary. A glossary answers the question “What does this word mean?” A corpus-informed syllabus also asks “How common is it?”, “Where does it occur?”, “What words occur with it?”, “What grammatical pattern does it prefer?”, and “What professional function does it perform?” These questions shift instruction from lexical identification toward terminological competence.

The second implication concerns authenticity. Authenticity is often discussed as a property of a text, but in corpus-informed teaching it also concerns patterns. A teacher-created sentence may be grammatically correct while still being atypical of professional medical usage. Corpus evidence allows the teacher to check whether an expression is conventional. This is especially useful for non-native teachers and learners working in multi-lingual contexts, because intuition may be influenced by translation from Uzbek or Russian. Concordance evidence does not eliminate the need for expert judgment, but it provides an observable basis for discussing alternatives.

The third implication concerns learner autonomy. DDL is sometimes presented as inherently autonomous because students search data themselves. In practice, autonomy is more productive when it is developed gradually. First-year medical students already face heavy disciplinary workloads and may not benefit from being asked to master complex corpus software before they understand the linguistic purpose of the activity. Hands-off DDL can introduce the logic of evidence-based language learning without a technical barrier. Once students can interpret concordance lines and ask useful lexical questions, hands-on searching becomes meaningful rather than mechanical.



This staged view is particularly relevant for mixed-proficiency classes. Lower-level learners may become overwhelmed by full research-article sentences. Yet excluding them from corpus-based work would be unnecessary. Teachers can use short windows around the target term, add bilingual glosses for non-target vocabulary, and ask simple noticing questions such as “Which verb comes before treatment?” or “Which preposition follows risk?” More proficient learners can investigate semantic preference, compare specialties, or distinguish patterns across genres. The same corpus principle can therefore support differentiated instruction.

The fourth implication is that translation should be repositioned rather than prohibited. In Uzbek medical classrooms, translation into Uzbek or Russian can efficiently establish conceptual meaning, especially for beginners. The problem arises when translation becomes the endpoint. A one-word equivalent rarely shows how the English term behaves. The proposed model permits bilingual support at the Interpret stage but requires learners to return to English corpus evidence and later produce the term in an English medical context. In this way, L1 support reduces comprehension difficulty without replacing phraseological learning.

The fifth implication concerns the relationship between terminology and grammar. Corpus evidence often reveals that lexical and grammatical knowledge are inseparable. A learner investigating risk encounters risk of + noun/gerund, at risk of + noun/gerund, increase the risk of, and risk is associated with. A learner investigating present encounters present with + symptom/condition and present as + manifestation. Teaching these as lexical-grammatical frames may be more efficient than teaching vocabulary in one lesson and prepositions or grammar in an unrelated lesson. This supports an integrated view of EMP language.

The sixth implication concerns assessment. If instruction emphasizes collocation and contextual use but assessment asks only for translation, the course sends contradictory signals. Corpus-informed assessment should therefore include contextualized items. A short concordance-based test can ask learners to infer meaning, select a collocate, or identify an unusual combination. Productive tasks can assess whether students transfer patterns into a patient summary or case presentation. Analytic rubrics may include terminological accuracy, collocational appropriateness, clarity, and task fulfillment. For research purposes, delayed post-testing should be included to examine retention rather than only immediate performance.

The proposed model also has implications for materials development. Teachers can build small, reusable terminology banks organized by topic. Each entry may contain the target term, frequency or priority label, two to five common collocations, one grammatical frame, several concordance examples, and one production prompt. Over time, such banks can become local EMP resources reflecting the curriculum of a medical university. Because corpus evidence is updateable, the resource can evolve when specialties, genres, or learning outcomes change.

There are also limitations and risks. Corpora represent the texts included in them; they are not neutral mirrors of all medical communication. A corpus dominated by research articles will foreground academic written language and may underrepresent doctor-patient interaction. A corpus of case reports may overrepresent narrative clinical patterns. Teachers must therefore match corpus composition to learning goals. Similarly, statistical association does not automatically equal pedagogical importance. A strong collocate may be highly technical, ethically sensitive, or irrelevant to first-year learners. Human curricular judgment remains necessary.

Another limitation concerns access and digital literacy. Commercial corpus platforms may require subscriptions, while open tools require teachers to prepare or obtain suitable corpora. AntConc offers a practical solution for locally stored text collections, but teachers still need training in file preparation, concordance interpretation, frequency lists, and collocation settings. Institutional professional development is therefore important if corpus-informed EMP is to move beyond isolated individual practice.

The discussion also points to a research agenda for Uzbekistan. A future intervention could compare a corpus-informed DDL group with a conventional terminology group over one academic unit. Target terms should be selected through documented corpus criteria. Measures could include a pre-test, immediate post-test, delayed post-test, and a short clinical writing or speaking task. Student perceptions could be collected through a questionnaire or interview, while learner output could be analyzed for correct collocations and phraseological patterns. Such a design would test not only whether students remember definitions, but whether they develop more usable terminological competence.

A local learner corpus could provide an additional research layer. Anonymous student patient summaries, case descriptions, or academic paragraphs could be collected with appropriate consent and analyzed for recurrent terminology errors. These errors could then inform new DDL tasks. For example, if learners repeatedly write *make treatment* instead of receive/provide/administer treatment, concordance activities can directly address the observed problem. This creates a feedback loop between learner needs, corpus evidence, instruction, and assessment.

Finally, the model has value beyond English language classes. Medical educators and language teachers can collaborate to identify terminology that is both linguistically challenging and professionally important. Subject specialists can validate clinical relevance, while language specialists analyze frequency, collocation,



phraseology, and task design. Such collaboration can reduce the gap between general language instruction and disciplinary learning.

CONCLUSION

Medical terminology is not adequately learned as a collection of isolated labels. Medical students need to recognize terms in authentic discourse, understand specialized meanings, notice recurrent collocations and grammatical frames, and use terminology appropriately in professional communication. Corpus linguistics provides empirical evidence for these dimensions, while data-driven learning provides a way to turn the evidence into learner activity.

This article proposed an integrated corpus-informed model for EMP terminology instruction. The model combines frequency, range, keyness, collocation, phraseology, and curricular relevance for lexical prioritization. It then organizes learning through five stages: Notice, Investigate, Interpret, Practice, and Produce. The sequence is deliberately adaptable. Teacher-prepared concordance materials can support beginners, while independent corpus searching can extend learning for more advanced students. Bilingual support can be used strategically, but learners ultimately return to English patterns and medically situated production.

The reviewed literature provides a strong rationale for this approach. Corpus-based medical vocabulary studies demonstrate the value of discipline-specific lexical selection, DDL research supports learning through authentic language evidence, and medical-specific studies show promise for collocation learning and terminology retention. At the same time, the present article does not claim local experimental effectiveness without local data. Its contribution is a transparent methodological framework that can be implemented and subsequently tested in Uzbek medical education.

For Tashkent State Medical University and comparable institutions, the next practical step is to develop small curriculum-aligned pedagogical corpora and terminology profiles for high-priority units such as hospital admission, symptoms, emergency medicine, dentistry, obstetrics, psychiatry, and clinical case reporting. These resources can support materials development, classroom DDL, assessment, and future empirical research. In this way, corpus linguistics can move from a research method to a practical foundation for evidence-informed Medical English teaching

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- 13.00.00 Pedagogika fanlari
 - 13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
 - 13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
 - 13.00.03 Maxsus pedagogika
 - 13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
 - 13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
 - 13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohaları va bosqichlari bo'yicha)
 - 13.00.07 Ta'limda menejment
 - 13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
 - 13.00.09 Ijtimoiy pedagogika
 - 07.00.00 Tarix fanlari
 - 19.00.00 Psixologiya fanlari
 - 01.00.00 Fizika-matematika fanlari
 - 02.00.00 Kimyo fanlari
 - 03.00.00 Biologiya fanlari
 - 09.00.00 Falsafa fanlari
 - 10.00.00 Filologiya fanlari
 - 11.00.00 Geografiya fanlari



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2026. №10(3)

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"Maktabgacha va maktab ta'limi" jurnali 26.09.2023-yildan O'zbekiston Respublikasi Prezidenti Adminstratsiyasi huzuridagi Axborot va ommaviy kommunikatsiyalar agentligi tomonidan №C-5669363 reyestr raqami tartibi bo'yicha ro'yxatdan o'tkazilgan.
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Manzilimiz: Toshkent shahar, Yunusobod tumani
19-mavze, 17-uy.