



UZBEK EQUIVALENTS OF ENGLISH ARTIFICIAL INTELLIGENCE TERMS: VARIATION AND CONCEPTUAL EQUIVALENCE

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A B S T R A C T	KEYWORDS
The rapid expansion of artificial intelligence (AI) has generated an unprecedented volume of specialized terminology, the overwhelming majority of which enters international scientific communication through English. When these terms are transferred into Uzbek, however, the process cannot be reduced to mechanical lexical substitution. English AI terms frequently acquire several Uzbek variants through borrowing, transliteration, calquing, descriptive translation, semantic extension, and hybrid formation. As a result, terminological variation may coexist with conceptual equivalence, while formally similar terms may represent partially different concepts. This article examines the relationship between English AI terminology and its Uzbek equivalents from a comparative-terminological and translation-theoretical perspective.	Artificial intelligence, AI terminology, Uzbek language, English language, terminological variation, conceptual equivalence, translation, terminology management, semantic adaptation, neologism, standardization, bilingual terminology

INTRODUCTION

Artificial intelligence has moved from a specialized area of computer science into almost every sphere of contemporary social, economic, educational, and scientific life. Concepts such as machine learning, neural network, deep learning, generative AI, large language model, and prompt engineering are no longer restricted to specialist laboratories. They increasingly occur in university curricula, governmental documents, journalism, business communication, popular science, and everyday digital discourse. Since English functions as the dominant international language of contemporary computing and AI research, most newly emerging concepts are first named, defined, and disseminated in English. This situation creates a significant linguistic challenge for languages whose AI terminology is still developing, including Uzbek. The central problem is not simply that some English terms have no “dictionary equivalent” in Uzbek. The deeper problem concerns the relationship between a concept and the linguistic form used to designate that concept. A translator may produce a formally elegant Uzbek expression that does not completely reproduce the conceptual structure of the English term. Conversely, an apparently foreign form such as *algorithm* may be conceptually precise and communicatively efficient despite its borrowed character.

Recent studies of English-Uzbek AI terminology confirm that Uzbek currently employs a mixed model in which direct borrowing, transliteration, calquing, descriptive translation, and semantic adaptation coexist. Research based on comparative and corpus approaches also indicates that a single

English AI term may correspond to several Uzbek forms, while some Uzbek variants cover only part of the conceptual content of the English source term (Khayitova, 2025; Ibrohimova, 2026; Karimova, 2026).

This phenomenon raises an important theoretical question: Should terminological variation be regarded primarily as a problem of translation, or as a natural stage in the conceptual development of a terminology system?

The present article argues for the second interpretation, although with an important qualification. Variation is natural when a new conceptual field enters a language, but it becomes problematic when competing forms obscure conceptual boundaries or prevent users from identifying which form should be preferred in academic and professional communication. Thus, the central issue is not the elimination of all variation, but the distinction between productive variation and dysfunctional variation.

The purpose of this article is therefore to investigate English-Uzbek AI terminology through the interconnected notions of terminological variation and conceptual equivalence. The study seeks to answer four questions:

1. What types of Uzbek equivalents are currently used for major English AI terms?
2. Why does terminological variation emerge between English and Uzbek?
3. To what extent do Uzbek equivalents preserve the conceptual content of English AI terms?
4. What principles can be used to evaluate and standardize Uzbek AI terminology?

The author's position is that an Uzbek equivalent should not be considered successful merely because it sounds natural in Uzbek or resembles the English term structurally. Its primary requirement is that it should activate approximately the same scientific concept within the relevant discourse community.

Theoretical Background: From Terminological Units to Concepts.

Classical terminology theory, particularly the tradition associated with Eugen Wüster, emphasizes the systematic relationship between concepts and designations. From this perspective, terminology is not simply a collection of difficult words; it is a structured system in which specialized concepts receive linguistic labels. The importance of conceptual organization remains fundamental to contemporary terminology work.

The significance of this principle is particularly visible in AI. Consider *machine learning* and *deep learning*. A translator who treats both expressions as interchangeable because they frequently occur together risks destroying a conceptual distinction. *Deep learning* is not simply a stylistic variant of *machine learning*: it refers to a specific family of machine-learning methods involving multilayer neural architectures. Consequently, terminological equivalence requires preservation of the hierarchical relation between the two concepts.

ISO 704 similarly places objects, concepts, definitions, and designations within a systematic relationship and emphasizes that terminology formation must be based on conceptual analysis rather than arbitrary word substitution. The current edition, ISO 704:2022, explicitly addresses principles for terminology formation and the relationship between concepts, definitions, and designations (International Organization for Standardization, 2022).

This principle has a direct methodological consequence for English-Uzbek AI translation: the translator should begin with the concept, not with the word.

Sager (1990) proposes a multidimensional understanding of terminology involving cognitive, linguistic, and communicative dimensions. His framework is particularly productive for AI terminology because AI concepts are highly technical but are simultaneously moving into public discourse.

A term such as *prompt* illustrates the problem. In ordinary English, *prompt* can refer to a stimulus, cue, or instruction. In generative AI discourse, however, it has acquired a specialized meaning: an input formulated for an AI system in order to elicit a particular output. Translating it solely according to its general dictionary meaning may therefore result in conceptual distortion.

Sager's model suggests that a term must be considered in relation to:

- the concept it designates;
- the linguistic form that represents it;
- the communicative situation in which it is used.

This is more convincing than a purely lexical approach because AI terminology moves rapidly between expert and non-expert contexts.

Cabré (1999) argues for an interdisciplinary understanding of terminology connecting linguistics, cognitive science, communication, documentation, and computer science. Her approach is particularly relevant to AI because the terminology itself emerges at the intersection of these fields. Cabré's work treats terminology not as a static inventory but as a system embedded in specialized communication. From this perspective, a term can be evaluated simultaneously at several levels: linguistic form, conceptual content, communicative function, and social acceptance. This provides a stronger theoretical foundation for assessing Uzbek AI terminology than the traditional idea that "one concept should have one term" in every communicative situation.

Temmerman's sociocognitive perspective:

Temmerman's sociocognitive approach challenges overly rigid concept-term relationships and emphasizes the dynamic nature of categorization. In rapidly changing domains, concepts may have fuzzy boundaries, prototype structures, and evolving definitions.

AI is precisely such a domain. The meaning of *artificial intelligence* itself has changed historically, while newer expressions such as *generative AI* and *large language model* continue to develop. Therefore, an Uzbek terminology system cannot simply copy a fixed English terminology list. It must participate in the conceptual development of the field.

In the author's view, this is one of the most important theoretical lessons for Uzbek terminology planning: terminology should be standardized, but conceptual development should not be artificially frozen.

Conceptual Equivalence versus Formal Equivalence:

Translation theory has long distinguished between formal correspondence and functional or conceptual equivalence. Nida's distinction between formal and dynamic equivalence, Baker's discussion of equivalence at different linguistic levels, and later translation theories all demonstrate that a translation cannot be evaluated solely by its formal similarity to the source.

This distinction becomes particularly important with technical terminology.

For example:

English: *artificial intelligence*

Uzbek: *sun'iy intellekt*

The Uzbek expression is a highly successful equivalent because it preserves the core conceptual relationship between *artificial* and *intelligence* and has achieved broad communicative acceptance.

However, not all terms are equally straightforward.

English: *machine learning*

Possible Uzbek forms include:

- mashinali o'qitish;
- mashinaviy o'rganish;
- mashina orqali o'rganish;
- machine learning;
- hybrid forms combining an Uzbek noun phrase with the English term.

The existence of these forms does not automatically mean that only one is “correct” and the others are linguistically worthless. Rather, each must be evaluated according to conceptual precision, grammatical naturalness, disciplinary usage, and communicative function.

Here the author's critical position differs from a purely prescriptive approach. A terminology cannot be standardized successfully by selecting the most literal translation alone. A literal calque may preserve lexical structure while producing a semantically weak or stylistically unnatural expression. At the same time, excessive reliance on English borrowing can prevent the development of Uzbek scientific language.

Therefore, conceptual equivalence should be treated as a graded phenomenon, not as an absolute binary category.

A useful analytical scale can be proposed:

Level	Type of equivalence	Description
1.	Full conceptual equivalence	Source and target terms designate essentially the same concept
2.	Near equivalence	Core concept is preserved, but semantic boundaries differ slightly
3.	Functional equivalence	Target term performs the same communicative function but conceptual structure is modified
4.	Partial equivalence	Only part of the source concept is represented
5.	Formal correspondence	Linguistic structure resembles the source, but conceptual identity is uncertain
6.	Non-equivalence	No established Uzbek term adequately represents the concept

This model is more useful for AI terminology than the simple categories “correct/incorrect,” because terminology is developing dynamically.

Borrowing and transliteration

One of the most visible strategies is direct borrowing. Terms such as *algorithm*, *server*, *platform*, *model*, *robot*, and *chatbot* are either already integrated or increasingly familiar in Uzbek technological discourse.

Borrowing has an obvious advantage: it facilitates international communication. AI specialists who work with English-language literature can immediately recognize the concept.

However, borrowing also creates a potential dependency problem. If every new English term is simply imported, Uzbek scientific discourse may gradually become structurally dependent on English.

The author therefore considers borrowing neither inherently positive nor inherently negative. Its acceptability should depend on three questions:

1. Is the concept internationally stable?
2. Is an adequate and natural Uzbek equivalent already available?
3. Would borrowing improve or reduce conceptual clarity?

Thus, *algorithm* is difficult to replace with an artificially created native equivalent because the borrowed form is already deeply integrated into international scientific usage. By contrast, a newly emerging term may reasonably receive an Uzbek equivalent if the latter is conceptually transparent and linguistically viable.

Calquing: Calquing involves translating the semantic components of a source term.

For instance: machine learning → mashinali o‘qitish / mashinaviy o‘rganish.

The difficulty is that English compounds and Uzbek word combinations do not necessarily organize semantic relations in the same way. A formally transparent calque may therefore be ambiguous.

This is where terminology theory and translation theory intersect. The translator should ask not “Can each English word be translated?” but rather “What conceptual relation does the complete term encode?”

Descriptive translation:

Some AI terms are translated through explanatory phrases. This strategy is particularly useful when the target language lacks a conventional term.

For example, *large language model* may initially appear in descriptive Uzbek formulations such as a phrase meaning “a large-scale language model.” Although longer than the English expression, such a formulation can be pedagogically effective because it exposes the conceptual structure.

The disadvantage is terminological economy. A term should ideally become compact enough for repeated professional use. Therefore, descriptive translation may be understood as a transitional strategy: it can explain a concept before a shorter conventional designation becomes established.

Hybrid terms combine English and Uzbek elements. Examples can include combinations involving *AI*, *model*, *prompt*, *data*, or Uzbek derivational morphology.

Hybridization is not necessarily evidence of linguistic weakness. In fact, it can be a normal stage of terminology development. Yet uncontrolled hybridization can generate orthographic and morphological inconsistency.

The challenge for Uzbek is therefore to determine how borrowed technological bases should interact with Uzbek affixation and syntax.

Selected English AI Terms and Their Uzbek Equivalents

The following table presents a conceptual rather than purely dictionary-based analysis.

№	English term	Possible Uzbek equivalent(s)	Main strategy	Conceptual assessment
1.	Artificial intelligence	sun'iy intellekt	Calque	High equivalence
2.	Machine learning	mashinali o'qitish / mashinaviy o'rganish	Calque / variation	Requires standardization
3.	Deep learning	chuqur o'rganish	Calque	High, if concept is defined correctly
4.	Neural network	neyron tarmoq	Calque + borrowing	High equivalence
5.	Natural language processing	tabiiy tilni qayta ishlash	Descriptive calque	High equivalence
6.	Large language model	katta til modeli	Calque	Conceptually adequate
7.	Generative AI	generativ sun'iy intellekt	Hybrid	High equivalence
8.	Prompt engineering	prompt muhandisligi / so'rov muhandisligi	Hybrid / calque	Conceptually unstable
9.	Training data	o'qitish ma'lumotlari / trening ma'lumotlari	Calque / borrowing	Variation
10.	Algorithm	algoritm	Borrowing	Highly established
11.	Chatbot	chatbot / suhbat roboti	Borrowing / calque	Borrowed form more concise
12.	Hallucination	gallyutsinatsiya	Borrowing	Potential semantic opacity

The table demonstrates an important principle: terminological form and conceptual adequacy do not always develop at the same speed.

For instance, *hallucination* in generative AI is a metaphorical term. It does not mean that an AI system literally experiences a human psychological hallucination. It describes the generation of false, fabricated, or unsupported information presented in a seemingly credible manner. Therefore, simply borrowing *gallyutsinatsiya* may be formally convenient but semantically opaque to non-specialists. In this case, an explanatory definition is indispensable. The term may remain borrowed while the terminology entry supplies a precise Uzbek definition.

This illustrates a broader principle proposed in this article:

A borrowed term can achieve conceptual equivalence only when its specialized definition becomes stable within the target-language discourse.

Neural network → neyron tarmoq:

The Uzbek form *neyron tarmoq* is highly compatible with international scientific usage. The first component is an adapted scientific borrowing, while the second is a native lexical item. Its conceptual

advantage is that it maintains a visible connection with the English term without sacrificing Uzbek syntactic structure.

This hybrid pattern may actually provide a productive model for Uzbek AI terminology. **Natural language processing → tabiiy tilni qayta ishlash.** This term presents a strong case for descriptive calquing. The Uzbek phrase is semantically transparent and allows non-specialists to infer its basic meaning.

However, *qayta ishlash* can be interpreted broadly as physical or industrial processing. The scientific definition must therefore clarify that the “processing” concerns computational analysis, generation, transformation, and interpretation of human language.

Large language model → katta til modeli. The phrase *katta til modeli* is conceptually economical and structurally transparent.

Nevertheless, the adjective *katta* can be misunderstood as referring merely to physical or computational size. In AI discourse, “large” relates to factors such as the scale of training data, parameter count, and model capacity.

Thus, conceptual equivalence again depends not only on the term but also on terminological definition.

Implications for Uzbek Language Policy and Education. The development of Uzbek AI terminology has consequences beyond translation. First, terminology directly influences higher education. Students cannot acquire advanced AI concepts efficiently if textbooks use inconsistent terms.

Second, terminology influences digital literacy. If Uzbek users encounter an English technical term in one context and an unrelated Uzbek variant in another, conceptual continuity is weakened.

Third, terminology affects machine translation and natural language processing. Computational systems require consistent terminology to achieve reliable translation and information retrieval.

Fourth, terminology contributes to language prestige and scientific functionality. A language becomes a full language of science not merely by having a large vocabulary, but by possessing stable systems for naming and defining new concepts.

For this reason, Uzbek AI terminology should not be developed exclusively by linguists. Linguists understand lexical formation and semantic structure, but AI specialists understand the concepts themselves. Terminologists can connect these two domains.

A sustainable institutional model should therefore involve:

- linguists; terminology specialists; translators; computer scientists; AI researchers; lexicographers; university teachers; software developers; language-policy institutions.

This interdisciplinary model is consistent with the broader conception of terminology as an interface among language, cognition, communication, documentation, and technology (Cabr , 1999).

Conclusion

The translation of English artificial intelligence terminology into Uzbek represents a complex process of conceptual negotiation rather than simple lexical substitution. The analysis demonstrates that Uzbek AI terminology currently contains multiple competing strategies: borrowing, transliteration, calquing, descriptive translation, semantic adaptation, and hybrid formation. Recent Uzbek scholarship confirms that such variation is a central feature of the emerging terminology system.

The central argument of this article is that conceptual equivalence should be the principal criterion for evaluating Uzbek equivalents of English AI terms. Formal similarity, lexical transparency, and stylistic naturalness are important, but none of them can compensate for conceptual distortion.

At the same time, terminological variation should not be treated automatically as a defect. During the early stages of conceptual integration, competing forms may provide evidence of linguistic experimentation and help the language identify the most functional designation. The real problem emerges when variation becomes uncontrolled and prevents users from recognizing conceptual distinctions.

The study therefore proposes a multidimensional approach combining conceptual accuracy, semantic coverage, communicative function, linguistic naturalness, international recognizability, and terminological stability. Within this framework, standardization should be understood not as the arbitrary elimination of variants but as the evidence-based selection of preferred forms after conceptual analysis.

The development of Uzbek AI terminology consequently requires a shift from word-centered translation to concept-centered terminology management. Corpus evidence, expert consultation, bilingual terminological databases, and interdisciplinary cooperation should become central components of this process.

Ultimately, the successful development of Uzbek AI terminology will depend on achieving a balance between two legitimate objectives: preserving the communicative advantages of international terminology and strengthening Uzbek as an independent language of contemporary science and technology. The most successful Uzbek terms will therefore not necessarily be the most literal ones. They will be the forms that name the concept accurately, function naturally in Uzbek, remain recognizable internationally, and achieve sufficient stability within the scientific community.

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