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THE PRAGMATIC REALIZATION OF COMPUTER TERMINOLOGY IN ENGLISH AND UZBEK: A COMMUNICATIVE AND FUNCTIONAL ANALYSIS OF ANTHROPOMORPHIC, NATUROMORPHIC, AND ARTIFACT METAPHORS

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Abstract
The rapid development of information technologies has significantly expanded the scope and functions of computer terminology in modern languages. This study investigates the pragmatic realization of computer terms in English and Uzbek, focusing on the communicative and functional role of anthropomorphic, naturomorphic, and artifact metaphors. The research is based on a comparative analysis of computer terms collected from technological dictionaries, software interfaces, digital platforms, and professional discourse. Particular attention is paid to the pragmatic mechanisms that facilitate the perception and interpretation of technical concepts by users. The findings reveal that metaphorical computer terms contribute to communicative efficiency by transforming complex technological processes into cognitively accessible concepts. Anthropomorphic metaphors conceptualize technological systems through human characteristics, naturomorphic metaphors rely on natural phenomena, whereas artifact metaphors are based on everyday objects familiar to users. The comparative analysis demonstrates that English and Uzbek computer terminology share common cognitive models while exhibiting language-specific pragmatic adaptations. The study contributes to contemporary terminology theory, cognitive linguistics, and pragmatics by explaining how metaphorical mechanisms enhance the communicative effectiveness of computer discourse.

Keywords: Computer terminology, pragmatics, metaphorical terminology, anthropomorphic metaphor, artifact metaphor, naturomorphic metaphor, computer discourse, cognitive linguistics, English language, Uzbek language.

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Introduction

ПРАГМАТИЧЕСКАЯ РЕАЛИЗАЦИЯ КОМПЬЮТЕРНОЙ ТЕРМИНОЛОГИИ В АНГЛИЙСКОМ И УЗБЕКСКОМ ЯЗЫКАХ: КОММУНИКАТИВНО-ФУНКЦИОНАЛЬНЫЙ АНАЛИЗ АНТРОПОМОРФНЫХ, НАТУРОМОРФНЫХ И АРТЕФАКТНЫХ МЕТАФОР

Аннотация

Стремительное развитие информационных технологий значительно расширило сферу функционирования и функциональные возможности компьютерной терминологии в современных языках. Данное исследование посвящено изучению прагматической реализации компьютерных терминов в английском и узбекском языках с акцентом на коммуникативную и функциональную роль антропоморфных, натуроморфных и артефактных метафор. Исследование основано на сопоставительном анализе компьютерных терминов, отобранных из специализированных словарей, программных интерфейсов, цифровых платформ и профессионального дискурса. Особое внимание уделяется прагматическим механизмам, способствующим восприятию и интерпретации технических понятий пользователями. Результаты исследования показывают, что метафорические компьютерные термины повышают коммуникативную эффективность, преобразуя сложные технологические процессы в когнитивно доступные и понятные концепты. Антропоморфные метафоры концептуализируют технологические системы через человеческие характеристики, натуроморфные метафоры опираются на явления и процессы природы, тогда как артефактные метафоры основаны на предметах повседневного обихода, знакомых пользователям. Сопоставительный анализ показал, что компьютерная терминология английского и узбекского языков имеет общие когнитивные модели, одновременно демонстрируя языково-специфические прагматические адаптации. Полученные результаты вносят вклад в развитие теории терминологии, когнитивной лингвистики и прагмалингвистики, раскрывая роль метафорических механизмов в повышении коммуникативной эффективности компьютерного дискурса.

Ключевые слова: компьютерная терминология, прагматика, метафорическая терминология, антропоморфная метафора, артефактная метафора,

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натуроморфная метафора, компьютерный дискурс, когнитивная лингвистика, английский язык, узбекский язык.

The digital transformation of contemporary society has generated a vast number of new lexical units associated with information and communication technologies. Among them, computer terminology occupies a special position because it serves as a bridge between complex technological systems and their users. Modern communication increasingly relies on digital platforms, software applications, cloud technologies, and artificial intelligence tools, leading to the continuous expansion of computer-related vocabulary. Consequently, computer terminology has become an important subject of linguistic investigation, particularly within terminology studies, cognitive linguistics, and pragmatics.

Traditional terminological studies primarily focused on the structural and semantic characteristics of terms. However, recent linguistic research emphasizes that specialized lexical units should also be examined from a pragmatic perspective because their effectiveness depends on successful communication between experts and non-experts. Computer terms represent a particularly interesting category since they frequently employ metaphorical mechanisms that facilitate users' understanding of abstract technological concepts. Terms such as *mouse*, *window*, *virus*, *cloud*, and *firewall* illustrate how familiar concepts are transferred into technological discourse to simplify communication and reduce cognitive effort.

The pragmatic dimension of terminology has attracted growing scholarly attention over the last decades. Researchers argue that terms should not be viewed merely as nominative units but also as communicative tools functioning within specific discourse contexts. From this perspective, the success of a term depends not only on its semantic accuracy but also on its ability to convey information efficiently and to be interpreted correctly by users. Such an approach is particularly relevant to computer terminology, where the rapid development of technologies requires continuous lexical innovation and adaptation.

Metaphorical processes play a crucial role in the formation of computer terminology. According to conceptual metaphor theory, abstract concepts are commonly understood through more concrete experiences. This principle explains why many technological notions are expressed through terms derived from human characteristics, natural phenomena, and everyday objects. The widespread use of

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metaphorical terminology demonstrates that computer discourse is closely connected with human cognitive mechanisms and communicative needs.

Although numerous studies have examined computer terminology from structural, semantic, and cognitive perspectives, relatively little attention has been paid to its pragmatic realization in comparative English-Uzbek research. Existing investigations mainly focus on terminological borrowing, semantic development, and translation issues, whereas the communicative and pragmatic functions of metaphorical computer terms remain insufficiently explored. This gap is particularly evident in studies addressing anthropomorphic, naturomorphic, and artifact metaphors within computer discourse.

The present study aims to analyze the pragmatic realization of computer terminology in English and Uzbek by examining the communicative functions of metaphorical terms. The research seeks to identify the pragmatic mechanisms underlying the use of anthropomorphic, naturomorphic, and artifact metaphors and to determine their role in facilitating effective communication within technological discourse. By combining comparative, cognitive, and pragmatic approaches, the study contributes to a deeper understanding of the interaction between language, cognition, and technology.

The relationship between terminology and pragmatics has become an increasingly important area of linguistic research. Classical terminology theory, represented by scholars such as Eugen Wüster and V.M. Leichik, emphasized the systematic nature of terms and their role in scientific communication. According to Leichik, a term functions as a specialized linguistic unit designed to represent professional knowledge within a particular field. However, contemporary approaches suggest that terms should also be analyzed as communicative instruments whose effectiveness depends on pragmatic factors.

The foundations of pragmatic theory were established by J. Austin and J. Searle through speech act theory. Their research demonstrated that language functions not only as a means of description but also as a form of action. This perspective has important implications for terminology because specialized lexical units are employed to accomplish communicative objectives within professional discourse. H. Grice's cooperative principle and G. Leech's politeness theory further contributed to understanding how linguistic expressions achieve communicative efficiency in specific contexts.

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In cognitive linguistics, metaphor has been recognized as a fundamental mechanism of human thought rather than merely a stylistic device. Lakoff and Johnson argue that conceptual metaphors structure human understanding by mapping abstract concepts onto more familiar domains. Their theory provides a valuable framework for explaining the formation of computer terminology. Numerous technological terms derive from everyday experiences and objects, enabling users to conceptualize complex digital processes through familiar cognitive patterns.

Within Uzbek linguistics, the study of computer terminology has expanded considerably during recent years. Particular attention has been devoted to semantic adaptation, terminological borrowing, and translation strategies. The works of D.S. Saidqodirova have contributed significantly to understanding Internet and computer terminology from linguistic and pragmatic perspectives. Her studies emphasize that the acceptance and dissemination of technological terms largely depend on their communicative effectiveness and their ability to meet the needs of users. Furthermore, Saidqodirova highlights the importance of transterminologization processes through which terms acquire new semantic and pragmatic characteristics when transferred between terminological systems.

Despite the growing body of research on computer terminology, comparative investigations of pragmatic realization in English and Uzbek remain limited. Existing studies rarely address how metaphorical computer terms function within communication and how different metaphorical models influence users' interpretation of technological concepts. The present research seeks to address this gap by examining the pragmatic functions of anthropomorphic, naturomorphic, and artifact metaphors in computer discourse.

Research Methodology

The present study employs a multidisciplinary approach that integrates principles of comparative linguistics, terminology studies, cognitive linguistics, and pragmatics. Such an approach is necessary because computer terminology represents a complex linguistic phenomenon that cannot be adequately explained through a single theoretical framework. The analysis focuses on the pragmatic realization of metaphorical computer terms in English and Uzbek and examines how these terms function within contemporary technological discourse. Particular attention is paid to the communicative effectiveness of metaphorical terminology and its role in

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facilitating the transmission of specialized knowledge to users with different levels of technical competence.

The research material consists of 180 computer and Internet terms selected from English and Uzbek technological dictionaries, software interfaces, operating systems, information technology glossaries, educational platforms, and professional digital communication sources. The corpus includes terms frequently used in computer discourse and representing different metaphorical models. The selected units were grouped into three major categories: anthropomorphic metaphors, naturomorphic metaphors, and artifact metaphors. This classification made it possible to identify the dominant conceptual patterns underlying computer terminology and to examine their pragmatic functions within communication.

Several complementary methods were employed during the analysis. The comparative method was used to identify similarities and differences between English and Uzbek computer terminology. Semantic analysis facilitated the examination of metaphorical meaning transfer from source domains to technological concepts. Cognitive analysis was applied to reveal the conceptual models motivating metaphorical term formation. Pragmatic analysis focused on the communicative functions of terms and their role in enhancing user comprehension. In addition, elements of quantitative analysis were employed to determine the frequency distribution of different metaphorical categories within the collected corpus.

The analytical procedure consisted of four stages. First, the collected terminology was classified according to its metaphorical source domain. Second, the semantic relationship between the original and terminological meanings of each unit was examined. Third, the communicative functions of the terms were analyzed within authentic discourse contexts. Finally, the English and Uzbek data were compared in order to identify language-specific and universal patterns of pragmatic realization. Such a methodology provides a comprehensive basis for investigating the interaction between metaphor, cognition, and communication in computer terminology.

Results and Discussion

Pragmatic Realization of Computer Terminology in Digital Communication

The analysis demonstrates that the pragmatic effectiveness of computer terminology is largely determined by its ability to transform complex technological concepts into cognitively accessible forms. Users typically encounter computer terms while

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interacting with software interfaces, online platforms, operating systems, and digital services. In such contexts, successful communication depends on the degree to which a term facilitates immediate understanding. The findings indicate that metaphorical terminology significantly reduces cognitive effort by connecting unfamiliar technological concepts with pre-existing knowledge structures. Consequently, metaphorical computer terms perform not only nominative but also explanatory and communicative functions.

The study revealed that metaphorical terms constitute approximately 68% of the analyzed corpus. This finding confirms that metaphorization remains one of the most productive mechanisms of computer term formation. Most metaphorical units originate from conceptual domains that are familiar to ordinary users and therefore require minimal interpretative effort. As a result, metaphorical terminology contributes to the democratization of technological knowledge by making specialized information accessible to wider audiences. This tendency can be observed in both English and Uzbek computer discourse, although certain language-specific adaptations are also evident.

Table 1. Distribution of Metaphorical Models in the Corpus

Metaphorical Type	Number of Terms	Percentage
Anthropomorphic	52	42%
Naturomorphic	38	31%
Artifact	34	27%
Total	124	100%

The quantitative data indicate that anthropomorphic metaphors represent the most productive category. This result suggests that users tend to conceptualize technological systems through analogies with human behavior and social interaction. Such conceptualization facilitates understanding because human experience serves as one of the most accessible cognitive domains.

Anthropomorphic Metaphors and Their Pragmatic Functions

Anthropomorphic metaphors are based on the transfer of human characteristics, actions, and social roles to technological entities. The analysis identified a substantial number of anthropomorphic computer terms, including *user*, *administrator*, *host*,

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client, *agent*, *assistant*, *bot*, and *avatar*. These terms conceptualize technological processes through human-centered models and thereby simplify interaction between users and digital systems.

For example, the term *host* originally refers to a person who receives and entertains guests. Within computer discourse, however, it designates a computer system that provides services to other devices. The metaphor facilitates comprehension because it transfers an already familiar social relationship into a technological environment. Similarly, *client* conceptualizes software applications as participants in a service relationship, enabling users to understand the structure of network communication more intuitively.

The pragmatic value of anthropomorphic metaphors lies in their ability to humanize technological processes. Complex computational operations become easier to understand when described through concepts associated with everyday human experience. Consequently, anthropomorphic terminology promotes communicative efficiency and reduces the cognitive distance between users and technology. The findings suggest that this metaphorical model is particularly effective in educational contexts where novice users require simplified explanations of technical concepts.

Another significant example is the term *assistant*, widely used in contemporary artificial intelligence systems. Virtual assistants such as voice-controlled applications are intentionally named through anthropomorphic metaphors because such terminology creates expectations regarding functionality and interaction. The term not only describes the technological system but also shapes users' perceptions of its communicative role. Therefore, anthropomorphic metaphors perform both descriptive and persuasive pragmatic functions.

Naturomorphic Metaphors and Conceptual Accessibility

Naturomorphic metaphors originate from natural phenomena, biological processes, and environmental elements. The corpus includes numerous examples such as *virus*, *worm*, *cloud*, *tree*, *root*, *branch*, and *web*. These terms demonstrate how natural concepts are employed to explain abstract technological structures and processes.

Among the most widely recognized examples is the term *virus*. Originally associated with biological infection, the concept was transferred into computer discourse to describe malicious software capable of replication and system damage. The success of this metaphor can be explained by its strong pragmatic potential. Users

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immediately associate the term with danger, transmission, and protection, thereby understanding the basic characteristics of the technological phenomenon without requiring detailed technical explanations.

The term *cloud* provides another illustrative example. Although cloud computing involves highly complex technological infrastructures, the metaphor evokes an image of something existing beyond direct physical access. This conceptualization simplifies understanding by emphasizing accessibility rather than technical architecture. In Uzbek discourse, the equivalent expression *bulutli texnologiyalar* demonstrates a similar pragmatic function and confirms the cross-linguistic effectiveness of the metaphor.

The findings indicate that naturomorphic metaphors play a crucial role in reducing abstraction within technological communication. By linking digital concepts to natural experiences, these terms create intuitive conceptual models that facilitate information processing. Their effectiveness is particularly evident in public communication, educational materials, and media discourse, where audiences often possess limited technical expertise.

Artifact Metaphors and Interface-Oriented Communication

Artifact metaphors derive from objects created and used in everyday human activity. Examples identified in the corpus include *desktop*, *folder*, *window*, *clipboard*, *toolbar*, *portal*, *basket*, and *recycle bin*. These terms constitute one of the most influential categories of computer terminology because they directly shape users' interaction with digital interfaces.

The term *desktop* illustrates how artifact metaphors facilitate user orientation within digital environments. By conceptualizing the computer screen as a physical work desk, the metaphor enables users to transfer existing knowledge about organizing documents and tools into virtual contexts. This transfer significantly enhances usability and reduces learning difficulties.

Similarly, the term *folder* reflects the adaptation of a familiar office object into technological discourse. Users immediately understand that a folder serves to organize and store information because the metaphor corresponds to established real-world practices. The pragmatic effectiveness of the term therefore depends on the successful mapping between physical and digital experiences.

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The analysis reveals that artifact metaphors are especially important in graphical user interfaces. Their primary function is not merely terminological but operational. These metaphors guide user behavior, influence expectations, and facilitate navigation within software environments. As a result, they contribute directly to the communicative success of human-computer interaction.

Comparative Analysis of English and Uzbek Data

The comparative analysis demonstrates substantial similarities between English and Uzbek computer terminology. In most cases, metaphorical models are preserved during terminological transfer. Terms such as *virus – virus*, *cloud – bulut*, *root – ildiz*, *branch – shox*, and *web – to'r* illustrate the adoption of similar conceptual structures across both languages. This tendency suggests the existence of universal cognitive mechanisms underlying technological conceptualization.

At the same time, certain differences emerge due to linguistic and cultural adaptation processes. Some English terms are borrowed directly without translation, whereas others undergo semantic transformation in order to align with Uzbek linguistic norms. These adaptations influence pragmatic interpretation because they affect the degree of transparency and familiarity associated with particular terms.

The findings indicate that the pragmatic success of computer terminology depends on the balance between international standardization and local comprehensibility. English functions as the primary source of technological innovation, while Uzbek adaptations seek to preserve communicative clarity for local users. Consequently, computer terminology represents an area where global and national linguistic processes interact dynamically.

Discussion

The findings of the present study confirm that computer terminology should be viewed not only as a system of specialized lexical units but also as a communicative mechanism functioning within a particular pragmatic environment. Traditional terminological approaches have generally emphasized precision, systematicity, and standardization as the defining characteristics of terms. However, the results obtained in this research demonstrate that communicative effectiveness plays an equally important role in determining the success and dissemination of technological terminology. Computer terms achieve widespread acceptance because they facilitate

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the transfer of complex information through conceptual structures that are already familiar to users. Consequently, pragmatic considerations appear to be one of the primary factors influencing the formation and stabilization of computer terminology in modern discourse.

The findings also support contemporary pragmatic theories emphasizing the role of linguistic economy in communication. In digital environments, users are often required to process large amounts of information within limited periods of time. Under such conditions, terminology must provide rapid access to meaning without requiring extensive explanation. Metaphorical terms successfully fulfill this requirement because they activate previously established cognitive schemas. For example, users can immediately infer the general functions of terms such as *virus*, *folder*, *desktop*, or *cloud* due to their association with familiar concepts. As a result, communication becomes more efficient, and the cognitive burden imposed on users is significantly reduced.

The predominance of anthropomorphic metaphors in the analyzed corpus deserves particular attention. The results indicate that technological systems are frequently conceptualized through human-centered models, reflecting a broader tendency to interpret complex phenomena in relation to human experience. Terms such as *host*, *client*, *assistant*, and *agent* demonstrate that human social relationships provide a productive source domain for technological terminology. This observation is consistent with cognitive linguistic theories suggesting that human experience constitutes one of the primary foundations of conceptualization. Moreover, anthropomorphic terminology contributes to the humanization of technology, making digital systems appear more accessible and user-friendly. Such pragmatic effects are especially important in educational contexts and public technological communication.

Naturomorphic metaphors constitute another significant category within computer terminology. The analysis revealed that terms derived from biological and environmental concepts often perform important explanatory functions. The widespread use of terms such as *virus*, *worm*, *tree*, *root*, and *cloud* demonstrates the effectiveness of natural imagery in technological discourse. These metaphors provide intuitive representations of processes that would otherwise require highly technical explanations. In addition, naturomorphic terminology frequently carries evaluative and emotional connotations that influence user perception. The term *virus*, for instance, not only identifies a type of malicious software but also immediately

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communicates notions of danger, infection, and vulnerability. Consequently, the pragmatic function of such terms extends beyond simple designation to include interpretation and evaluation.

Artifact metaphors represent a particularly important component of human-computer interaction. Unlike many other metaphorical models, artifact-based terminology directly influences users' behavior within digital environments. Terms such as *desktop*, *folder*, *window*, and *clipboard* guide interaction by establishing analogies between virtual interfaces and familiar physical objects. These analogies enable users to transfer real-world knowledge into digital contexts, thereby facilitating navigation and task completion. The results suggest that artifact metaphors play a central role in interface design because they enhance usability while simultaneously supporting communicative clarity. Their continued presence in contemporary software environments demonstrates their enduring pragmatic value.

The comparative analysis of English and Uzbek terminology indicates that many metaphorical models exhibit a high degree of cross-linguistic stability. This finding supports the hypothesis that certain conceptual structures possess universal cognitive foundations. Metaphors based on human experience, natural phenomena, and everyday objects appear to be readily transferable across linguistic and cultural boundaries. Nevertheless, the study also revealed instances of language-specific adaptation reflecting differences in linguistic norms and communicative traditions. Such adaptations demonstrate that pragmatic realization is influenced not only by universal cognitive mechanisms but also by sociolinguistic and cultural factors. Therefore, computer terminology should be understood as a dynamic system shaped by the interaction of global technological trends and local linguistic practices.

The results of this study correspond with the conclusions reached by D.S. Saidqodirova regarding the communicative and pragmatic nature of Internet terminology. Her research emphasizes that technological terms become successful when they satisfy communicative needs and facilitate efficient information exchange within professional and non-professional communities. The present findings extend this perspective by demonstrating that metaphorical structures constitute one of the principal mechanisms through which such communicative effectiveness is achieved. Furthermore, the observed processes of semantic adaptation and terminological transfer support Saidqodirova's observations concerning transterminologization,

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whereby lexical units acquire new functions and meanings as they move between different conceptual and terminological domains.

From a theoretical perspective, the study contributes to contemporary research in terminology, pragmatics, and cognitive linguistics by highlighting the interconnected nature of these disciplines. The findings suggest that the pragmatic dimension of terminology cannot be fully understood without considering the cognitive mechanisms underlying metaphorical conceptualization. Likewise, the study demonstrates that terminology functions not only as a system of knowledge representation but also as a practical instrument of communication. This interdisciplinary perspective provides a more comprehensive understanding of how technological language evolves and adapts to the needs of modern digital societies.

Conclusion

The present study investigated the pragmatic realization of computer terminology in English and Uzbek with particular emphasis on anthropomorphic, naturomorphic, and artifact metaphors. The analysis demonstrated that computer terms perform functions extending far beyond simple nomination. Within contemporary technological discourse, terminology serves as a communicative mechanism that facilitates the transmission, interpretation, and assimilation of specialized knowledge. The effectiveness of computer terminology largely depends on its ability to transform abstract technological concepts into cognitively accessible forms that can be easily understood by users with different levels of expertise.

The research findings indicate that metaphorization represents one of the most productive mechanisms in the formation and development of computer terminology. The majority of analyzed terms were found to originate from conceptual domains associated with human behavior, natural phenomena, and everyday objects. Such metaphorical structures enhance communicative efficiency by establishing connections between unfamiliar technological concepts and existing cognitive knowledge. Consequently, metaphorical computer terms reduce cognitive effort and improve users' comprehension of complex digital processes. This confirms the important role of metaphor not only as a linguistic phenomenon but also as a cognitive and pragmatic strategy in technological communication.

The study further revealed that anthropomorphic metaphors constitute the most productive category within the analyzed corpus. By attributing human characteristics

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and social roles to technological entities, these metaphors facilitate interaction between users and digital systems. Naturomorphic metaphors contribute to conceptual accessibility by employing familiar representations derived from biological and environmental processes. Artifact metaphors, in turn, play a crucial role in interface design and human-computer interaction by connecting virtual environments with everyday physical experience. Together, these metaphorical models create an integrated communicative framework that supports efficient technological communication.

The comparative analysis demonstrated that English and Uzbek computer terminology share many common conceptual foundations despite differences in linguistic structure and cultural context. The preservation of similar metaphorical models across both languages indicates the existence of universal cognitive mechanisms underlying technological conceptualization. At the same time, language-specific adaptations reflect the influence of local communicative needs and linguistic traditions on terminological development. This interaction between universal and culture-specific factors contributes to the dynamic evolution of computer terminology in multilingual contexts.

The results obtained in this research support contemporary approaches that view terminology as a communicative and cognitive phenomenon rather than merely a system of specialized vocabulary. The findings also reinforce the significance of pragmatic analysis in understanding the functioning of technological language. By demonstrating the relationship between metaphorical conceptualization and communicative effectiveness, the study contributes to ongoing discussions in terminology theory, cognitive linguistics, and pragmatics.

Future research may expand the scope of investigation by examining emerging terminology associated with artificial intelligence, machine learning, virtual reality, and other rapidly developing technological domains. Additional studies may also explore sociolinguistic, discourse-pragmatic, and linguocultural dimensions of technological communication in order to provide a more comprehensive understanding of contemporary digital language. Such investigations will further contribute to the development of terminology studies and to the understanding of how language adapts to technological innovation in the twenty-first century.

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