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# Reimagining Teaching Style Through Renewable Energy Quality Assessment—A Focus on Power Technology and Equipment

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**Abstract.** This article delves into teaching style translation strategies from the perspective of power energy quality assessment, using power technology and equipment as specific cases, with the aim of enhancing the international dissemination efficiency of power energy professional knowledge in the education field. Through detailed data analysis, this article reveals the rapid pace of technological updates and equipment upgrades in the power energy industry, especially in the fields of smart grids and renewable energy. As of 2023, the proportion of non fossil energy generation installed capacity worldwide has approached 50%, indicating that the power industry is accelerating its transition to green and low-carbon. This article pays special attention to the complex terms and concepts involved in the teaching of power technology and equipment. Using the principle of adaptability in translation theory, it analyzes how to accurately convey the precise meanings of these terms in the translation process, ensuring that international students can accurately understand and master key knowledge points. By comparing traditional teaching methods with a new teaching model that incorporates elements of power energy quality assessment, the study found that the latter performs more outstandingly in improving students' practical and problem-solving abilities. Specifically, the accuracy of students in simulating power system fault handling has increased by about 30%. In addition, this article also utilizes big data analysis technology to comprehensively sort out and evaluate teaching resources in the field of power energy, and finds that high-quality teaching materials and case sharing are crucial for improving teaching effectiveness. Based on the above analysis, this article proposes a series of optimization suggestions for teaching style translation, in order to provide strong support for the international education of power energy majors and promote the exchange and progress of global power energy technology.

**Key words.** Power Technology and Equipment, Translation of Teaching Style, Quality Assessment, Data Analysis.

## 1. Introduction

The inevitable evolution of power systems centres on the "intelligence" of the smart grid, which aligns with national energy strategy needs. Leveraging information technology, power grid advancements ensure safe, economical, and environmentally sustainable operations [1], [2]. Meanwhile, technologies like cloud computing, big data, the Internet of Things, mobile internet, and artificial intelligence (collectively termed "cloud-to-intelligence" solutions) are increasingly integrated into various industries. This technological revolution has transformed human lifestyles and significantly impacted power sector innovation [3]. As China progresses in smart grid development, a new trend emerges: the integration of cloud-to-intelligence technologies, including data mining, represents a crucial future direction for power grid evolution.

The cornerstone of building a pervasive Power Internet of Things lies in fostering seamless business collaboration and comprehensive integration of power sector data. As grid intelligence soars to new heights, the energy landscape is inundated with an exponential deluge of data, necessitating precise processing and insightful analysis to unlock its full potential and propel power grids towards unprecedented advancements [4]. According to IDC's visionary forecast on global digital transformation, by 2025, a staggering 75% of enterprises worldwide will harness digital platforms and their interconnected ecosystems to adapt agilely to emerging markets and reshape industrial value chains, particularly within the energy sector [5]. This digital revolution underscores the imperative for advanced processing technologies tailored to big data in the power industry, ensuring that as digital platforms evolve, the intricate nuances and vastness of energy-related data are managed effectively. Critically, addressing linguistic inaccuracies and the imprecise use of technical jargon becomes paramount to facilitating clear communication of intricate power sector concepts and strategies, thereby enhancing collaboration, innovation, and ultimately, the efficient transformation of the global energy landscape.

When considering the diverse nature of data structures in the power field, big data primarily encompasses both structured and unstructured data. Structured data, in particular, refers to information that adheres to a predefined format, often broken down into fixed components and easily represented in two-dimensional tables [6]. Typical structured data include power grid operation data, condition monitoring data and meteorological data, etc. It is characterized by a complete structure and standard format, and can be processed by the two-dimensional logic of a computer database [7]. According to the experience of enterprise information management, only 20% of the data can be processed by a relational database, while the remaining 80% of unstructured data are difficult to be represented by a relational database [8].

NLP technology enables smart extraction of unstructured text data in the power sector, with research focusing on equipment defects, maintenance, and alarm signals. This enhances analysis accuracy and opens doors for more text mining applications. Current NLP use in power fields centres on text classification and knowledge mapping, with limited work in sentiment analysis and information retrieval [9]. Inspired by NLP's success in biomedicine and finance, the power industry can extract valuable insights from text data to improve operations and intelligence, guiding future research in intelligent text mining.

This paper puts forward some suggestions and strategies to improve the quality of teaching style translation, including strengthening the training of translation talents, establishing a unified translation standard, and strengthening quality supervision. These measures are expected to improve the current situation of teaching style translation in the field of power technology and equipment, and promote international exchanges and cooperation in this field.

In alignment with the need for intelligent text mining in the power industry, the following key tasks emerge:

- Exploring supplier-related topic extraction from power conversation texts. During work discussions, power grid enterprise personnel often refer to equipment suppliers. To evaluate these suppliers, text mining techniques can be used to identify and summarize key topics within supplier-related dialogue texts [10].

- Developing a supplier evaluation model leveraging text-based sentiment analysis. By analysing the sentiment expressed in power-related conversations, one can determine the emotional tone of the dialogue and assign an emotional score. From this, rules for both sentiment interpretation and supplier evaluation can be formulated, leading to the establishment of a comprehensive supplier evaluation model for the power industry.

## 2. Qualitative Analysis of the Macro Characteristics of the Renewable Energy Internet

### A. *Qualitative Analysis of the Macro Characteristics of the Renewable Energy Internet*

The global energy Internet is a huge and complex system, involving many fields such as energy, economy and environment, and has many macro characteristics. The global energy Internet will have a significant and profound impact on the world energy and economic system, and the situation of the world energy and economic system also affects the global energy Internet and its macro characteristics [11]. It is of great significance to master the changes in the process of building the global energy Internet for the macro decision-making in the process of building the global energy Internet. This paper selects the macro characteristics indicators of the global energy Internet which are closely related to the world power energy-economic system, and reflects these indicators in the established system dynamics model to reflect the changes of the macro characteristics in the construction of the global energy Internet and its interaction with the world energy and economic system. The construction and development of the global energy Internet is a dynamic process, and the macro characteristics of the global energy Internet should be analyzed from the perspective of development and change [12]. It is necessary to analyze the influencing factors of the macro characteristics of the global energy Internet, as well as the development and change laws of these factors in different periods. The calculation formulas for the power energy loss rate and voltage fluctuation rate are shown in (1) and (2).

$$\lambda_1(\Omega) \geq \frac{h(\Omega)^2}{4} \tag{1}$$

$$h(\Omega) = inf_{X \subseteq \bar{\Omega}} \frac{P(X)}{V(X)} \tag{2}$$

Where $h$ is the solar energy conversion efficiency, $\Omega$ is the wind energy capture coefficient, $P(x)$ is the environmental impact factor, and $V(x)$ is the system life cost. As a clean primary energy source, wind and solar energy cannot be stored, and they are generally far away from the load center, and their development and utilization largely depend on the acceptance capacity of the power grid. The global energy Internet aims to realize the optimal allocation of clean energy on a global scale, and its construction process is inevitably accompanied by the development and utilization of clean energy in a larger range, and its own macro characteristics of energy development and utilization structure, energy supply and demand, power supply and demand, and power generation structure also change accordingly.

The energy revolution leads to more energy and more in the form of electricity production and consumption, the global energy of the Internet is a new stage of energy connectivity, the construction process is the global power network interconnection degree strengthening the process of power network interconnection, transmission path and transmission capacity of power in the global optimal configuration plays a decisive role [13], [14]. Improve the degree of global energy Internet interconnection, for power transmission way to increase the flow and use of electricity, will greatly improve the acceptance of clean energy power, increase the proportion of electricity in terminal energy consumption, reduce the demand for fossil energy and use, energy consumption pattern and energy intensity will also change greatly.

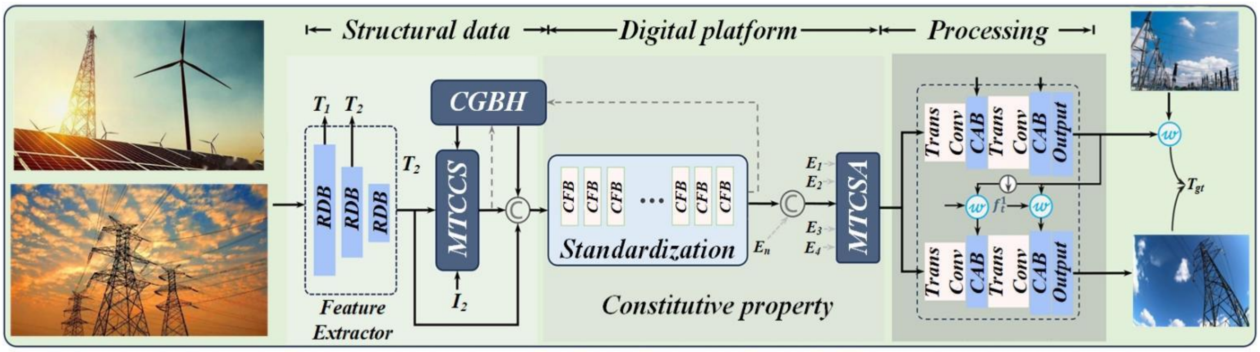


Figure 1. Flowchart of Teaching Style Translation Process in Power Technology and Equipment

Figure 1 shows a flowchart of the teaching style translation process in power technology and equipment. Macroeconomics and industrial structure directly reflect the development status of the entire society, and have a significant impact on the total energy consumption. The empirical research on economic data of 34 countries of the Organization for Economic Cooperation and Development shows that the economic development of most countries will promote an increase in energy consumption. In the future, with the large-scale development and utilization of clean energy and the growing proportion of electricity consumption, the relationship between energy and the economy is to a large extent the relationship between electricity and the economy. As the carrier of power production, transmission and distribution, the global energy Internet will have an increasingly significant impact on the economic system [15]. At the same time, economic development also affects energy demand and energy consumption, which depends on the global energy Internet and also has an impact on its macro characteristics. In addition, economic development will promote the improvement of R&D investment, and scientific and technological progress will also have an impact on the macro characteristics of the global energy Internet. The improvement of scientific and technological levels can reduce the energy consumption per unit of GDP, which is conducive to reducing energy consumption, so as to achieve the goal of low-carbon emissions.

## *B. Quantitative Analysis of the Relationship Between Global Energy, Electricity Consumption and Economic Development*

Regarding energy consumption and economic development, scholars at home and abroad have conducted extensive research on the relationship between the two using samples from different countries, regions, and periods, but have never conducted relevant studies from a global perspective. With the implementation of the Global Energy Internet Project, it is particularly necessary to explore the quantitative relationship between the two, and then study the dynamic relationship between global energy consumption, power consumption and economic development. This section first studies the long-term equilibrium and short-term fluctuation relationship between energy consumption and economic development based on raw data and H-P filtering data through cointegration testing and error correction models.

EC stands for energy consumption, measured in millions of tons of oil equivalent; GDP represents the development of the world economy, measured in billions of US dollars, using annual data from 1965 to 2015 as sample data [16]. To solve the problem of possible heteroscedasticity in time series, logarithmic transformation is needed, and the original cointegration relationship will not change after transformation. The unit root test was conducted on InEC and lnGDP, and the test results showed that both are first-order cointegration processes, meeting the basic conditions for the existence of a cointegration relationship. If two sequences are non-stationary, but one of their linear relationships appears stationary, then there exists a long-term equilibrium relationship between the two, known as cointegration. The formulas for calculating frequency deviation rate and power factor are shown in (3) and (4).

$$\mu\left(B\left(x,r\right)\right) \leq \frac{D^{6} f\left(2r\right)}{\mathrm{H}_{\infty}^{f}\left(A\right)} \tag{3}$$

$$Z = \inf_{x\in A} \inf_{r>0} \frac{f\left(r\right)}{\mu_{\eta}\left(B\left(x,r\right)\right)} \tag{4}$$

Where $B$ represents the hydropower efficiency, $r$ represents the photovoltaic power, $A$ represents the skill improvement rate, and $f$ represents the energy payback period.

## *C. Energy and Economic Theory*

From an economic perspective, the relationship between energy and the economy is an important foundation for national economic and social development. Regardless of the type of energy, it has two values for the economy: natural economic value and socio-economic value. The natural economic value is influenced by the level of technological development and determined by the physical and chemical properties of energy itself. The level of technological development is one of the important means to convert the natural economic value of the objective endowment of energy resources into practical and usable value, which directly determines the scale, efficiency, intensity, and other aspects of energy extraction. Socio economic value refers to the ancillary value that human beings bring to the industrial sector in the process of energy extraction, that is, the socio-economic benefits that energy production and processing bring to the industrial sector. It is the gain value obtained through reserves in the future, that is, energy is used as a production factor, input into the market for power generation and generates market value, thereby promoting socio-economic development. It is the life satisfaction value generated in the process of processing, transformation, and consumption, that is, the processed products of energy meet the basic needs of people's daily lives and public services of society. Formulas (5) and (6) outline the formulas for calculating line loss rate and power supply reliability, respectively.

$$\rho(r) = \mu\left(\mathrm{B}\left(x_0, r\right)\right) \tag{5}$$

$$x_\ell = \frac{1}{4} \sum_{k \in V(T_\ell)} r_{k,1} \tag{6}$$

Where $x_0$ represents the grid acceptance capacity, $r_k$ represents the energy storage efficiency, and $\rho$ represents the proportion of renewable energy.

Economic development requires industries to consume all kinds of energy. In the initial economic development, there is a high dependence on high carbon energy, such as fossil fuels. However, with the progress of science and technological innovation, the energy cost will come down, which will inevitably increase the output of the economy [17]. As people demand electricity, need to continuously improve the efficiency of high carbon energy, also can use renewable energy or new energy to replace fossil fuels power generation, new energy is new energy that can be reused, a high utilization rate, after long-term use of energy development cost reduction will greatly improve to the economy. Energy is both a dynamic factor and a restrictive factor for the economy. The two are interdependent. Economic development is based on energy, and energy development is based on economic development. The structure is shown in Figure 2.

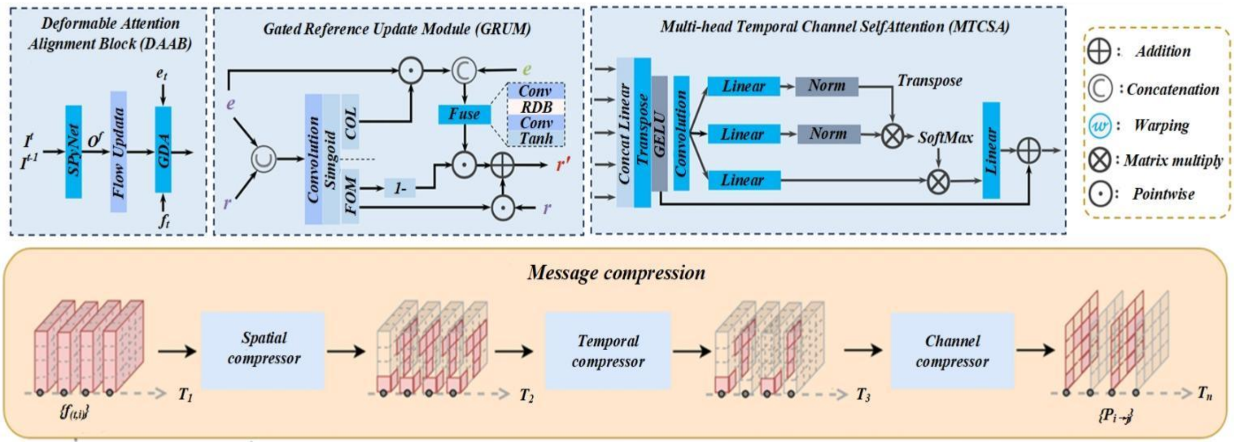


Figure 2. BERT-NSP-based Fine-tuning Model for Predicting the Coherence of Upper and Lower Sentences

Figure 2 shows a BERT-NSP-based fine-tuning model for predicting the coherence of upper and lower sentences. Human beings are both products and transformers of the environment. From ancient times to the present, humans have been in a continuous process of transforming the environment, and their ability to do so has become increasingly strong. In order to meet the daily needs of humans for electricity, heat, and other energy, it is necessary to develop and utilize energy, but the use of energy will inevitably have a certain impact on the environment [18]. For example, developing coal, oil, and natural gas for thermal power generation can cause acid rain pollution; For example, the development and utilization of hydropower may cause surface subsidence and damage to ecosystems. China has abundant energy reserves, but their distribution is uneven, and the level of development technology limits the efficiency of energy utilization, resulting in serious resource waste. Formula (7) integrates both types of features, thereby providing a comprehensive assessment:

$$M = \left(1 - C\right) P_{NS} + C_S \tag{7}$$

Where $M$ represents the load fit, $C$ is the maintenance cost coefficient, $P_{NS}$ is the environmental impact factor, and $C_S$ is the feedback loop efficiency. For a long time in the future, China will still be unable to break away from coal resources, and will continue to use electricity as the development center to promote hydropower generation, technological innovation, and the development of new energy generation. The main impact of China on the environment is caused by issues such as air pollution, water pollution, and household waste pollution during the mining and utilization of coal.

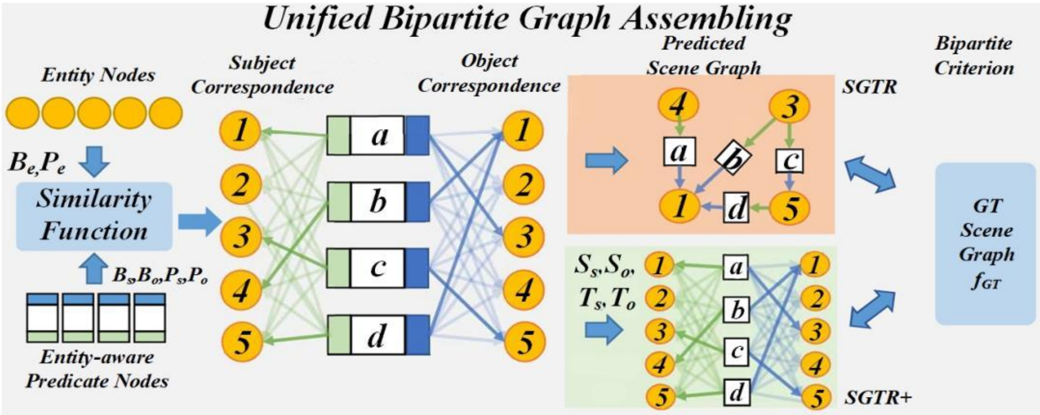


Figure 3. Conversation Interrupt Crossover Processing Flow

Figure 3 shows conversation interrupt crossover processing flow. China's power energy structure mainly relies on fossil fuels such as coal for power generation. The high dependence on high carbon energy will inevitably generate a large amount of "three wastes", high emissions, high pollution, and high consumption, all of which have a negative impact on the environment. In addition, developing new energy sources will also disrupt the original balance of the ecological environment [19]. When the environment loses balance, it will stimulate the government to strengthen environmental protection measures, more strictly control the emission of "three wastes", enhance technological development, drive the research and development of new energy, and improve people's environmental awareness. Formula (8) calculates adjacent dialogue cosine similarity after word segmentation:

$$S = cos\left(A,B\right) = \frac{\sum_{i=1}^{n} a_i \times b_i}{\sqrt{\sum_{i=1}^{n}\left(a_i\right)^2 \times \sqrt{\sum_{i=1}^{n}\left(b_i\right)^2}}} \tag{8}$$

Where *cos* represents the cosine function, $a_i$ represents the teaching quality index, *A* represents the participation, *B* represents the technical adaptability assessment, $a_i$ represents the teaching innovation, and $b_i$ represents the consumption of the third energy station.

## 3. Renewable Energy Supplier Evaluation Model

### *A. Analyze the Emotional Features of Electric Power Dialogue Text*

In the electric power sector, text mining has been utilized for equipment defects, operational maintenance, and alarm signals. This approach has partially eased the burden of manual defect analysis, enhanced analytical precision, and sparked ideas for further text mining applications in this domain. Dialogue texts, however, differ from objective descriptions of power equipment issues. They often exhibit strong subjectivity, varying syntax, informal content, and emotional language [20]. Therefore, mining such texts demands an integration with emotional analysis. Emotional analysis, also termed comment or opinion mining, encompasses both dictionary-based and machine learning-based techniques [21], [22]. Current research on Chinese text emotional analysis, mostly conducted at the sentence or paragraph level in areas like micro-blogging and product reviews, lacks consideration for the contextual nuances and interruptions typical of dialogue texts.

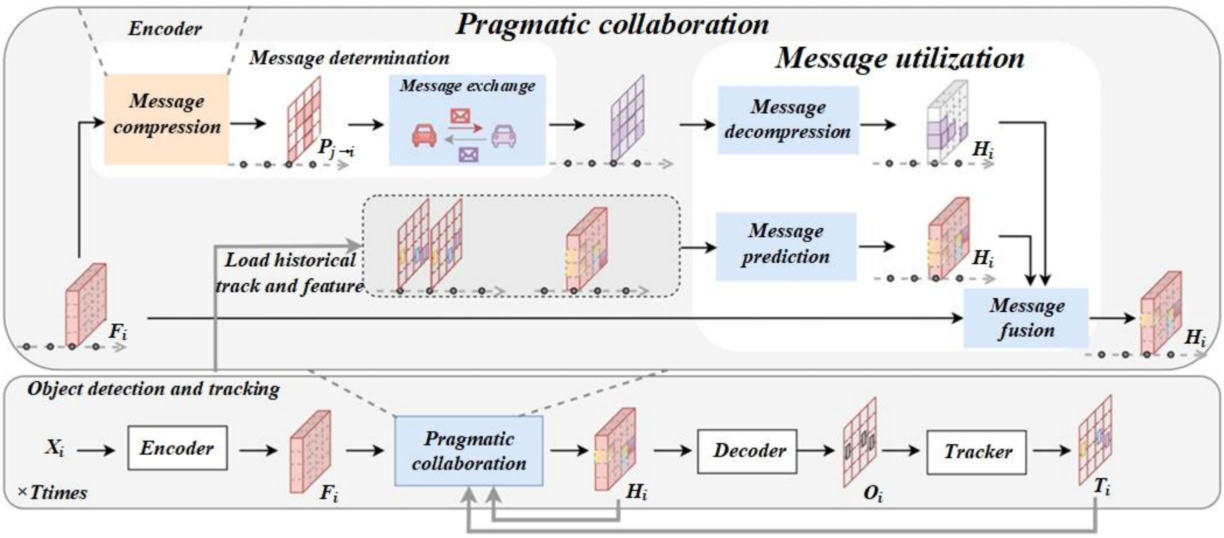


Figure 4. Flowchart for Assessing Power Energy Quality in Teaching Materials

Figure 4 shows a flowchart for assessing power energy quality in teaching materials. The evaluation results are not systematically linked to the credit evaluation of power equipment suppliers; China Electric Power Equipment Management Association mainly ensures the information communication and feedback between equipment manufacturing enterprises and electric power enterprises through the establishment of credit incentive and credit restraint mechanisms for power equipment suppliers. Such mechanisms and corresponding standards are mainly formulated through historical experience and manpower [23]. It can be seen that there are only policy and manual evaluation methods for credit evaluation of power equipment suppliers at present, and there is no intelligent mining credit evaluation method at present, and manual analysis has not included dialogue text in the evaluation category. The supplier evaluation model proposed in this chapter covers two innovations in method and application.

The emotional characteristics of the power dialogue text are analysed as follows:

- The syntactic forms of electric power dialogue texts are various, and the colloquialism is prominent. The syntax of dialogue texts is often personalized, free in form, without fixed format, and most of them are short sentences, which are colloquial, including more network terms and commonly used abbreviations.

- The text of the electric power dialogue is rich in semantic emotion and has emotional change. The emotional words in the dialogue text are rich and varied, and the emotional expression is more flexible, and there are emotional changes. For example, "It's quite good before the rotation meter, but it won't work after the change", which expresses two opposite emotions, so it is difficult to mine the emotions accurately. The comprehensive evaluation index of power quality and the calculation formula of harmonic distortion rate are shown in (9) and (10).

$$\gamma(s,t) := min\left\{s+t, \frac{3s+t}{2}, s+1\right\} \tag{9}$$

$$dim\hat{M}_{H,J}(x,y) = CZ(y) - CZ(x) \tag{10}$$

Where $CZ$ represents the energy volatility index, $x$ represents the capacity demand of the energy storage system, $H_j$ represents the environmental benefit assessment value, and $y$ represents the technology maturity level. Emotion analysis is to identify key words related to emotion in supplier topics. By analyzing semantic emotion of basic units and auxiliary units of emotion evaluation, it overcomes the difficulty of syntactic diversification and identifies semantic emotion changes in dialogue texts [24]. Finally, based on the results of emotion analysis, a supplier evaluation model based on dialogue text is established.

*B. Expansion of Ontology Dictionary in Power Field*

The concept of ontology dictionary in the power field is extended from the ontology of the power grid. Ontology applied to the power grid is a theory based on the concepts given by official standards and applied to power engineering, which describes the definition, types and relationships of entities [25], [26]. In this chapter, ontology dictionary refers to the collection of related words in the power field, combing and summarizing according to ontology words, categories, synonyms and near meanings, and storing them for subsequent queries and calls. Constructing an ontology dictionary is a huge project, and it needs a lot of manpower to review and revise it. It is difficult to transplant the ontology dictionary in a single field to other fields.

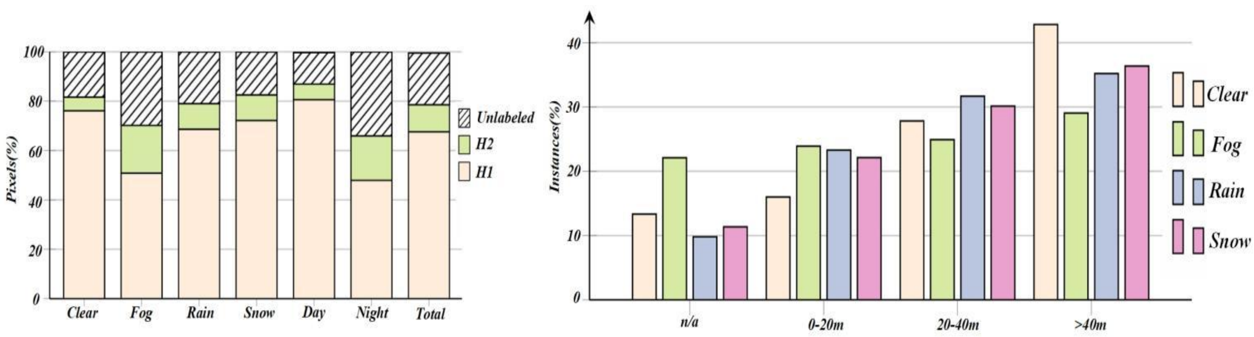


Figure 5. Impact of Translation Quality on Comprehension of Power Technology and Equipment Concepts

Figure 5 shows the impact of translation quality on comprehension of power technology and equipment concepts. This iterative process of circular supplementation plays a pivotal role in advancing the ontology dictionary, particularly within the realm of renewable energy. As the corpus expands to encompass a broader spectrum of renewable energy applications and advancements, the ontology dictionary undergoes dynamic updates, ensuring its relevance and comprehensiveness. This continuous enhancement process, fueled by the growing corpus, involves multiple iterations of refinement, effectively enriching the ontology with nuanced categories tailored to the renewable energy field, such as renewable energy supplier names, industry-specific events, and colloquial terms pertinent to this sector.

The expansion specifically acknowledges the informal nature of dialogue texts within the renewable energy domain, incorporating supplier names and their abbreviations to facilitate seamless comprehension. Furthermore, emotional analysis, a crucial aspect of understanding stakeholder sentiment towards renewable energy initiatives, is explored through both rule-based and machine learning methodologies.

The rule-based approach, leveraged in this context, meticulously compares emotional words and polarities within pre-processed texts against an emotional dictionary tailored for renewable energy discourse, providing insights into the text's emotional score, tendency, and intensity. This methodology, grounded in rationalism, offers a structured framework for evaluating renewable energy suppliers, where evaluation rules and parameters are meticulously crafted based on extensive research into the unique nuances of renewable energy-related dialogues.

In parallel, while acknowledging the value of machine learning for emotional analysis, this chapter emphasizes the rule-based approach as it offers a more direct and interpretable path to evaluating renewable energy suppliers, aligning with the need for transparency and accountability in this rapidly evolving field. Ultimately, this integrated approach enriches the ontology dictionary and evaluation models, fostering a deeper understanding of renewable energy dynamics through the lens of both rational analysis and emotional intelligence. Formulas for active and reactive power loss are provided in formulas (11) and (12).

$$\mu = h^2 c_{n-1} + \frac{1}{4} v^2 d\theta^2 + dr^2 \tag{11}$$

$$h_{\lambda K + \mu L} = \lambda h_K + \mu h_L \tag{12}$$

Among them, $h$ represents the number of students' skill application cases, $L$ indicates the adoption rate of innovative teaching methods, $\lambda$ indicates the teaching satisfaction survey, and $v$ indicates the utilization rate of teaching resources. In the emotional analysis of power dialogue texts, the cumulative method, grounded in emotional keywords and word polarity, assesses the text's emotional tendency. The crucial step in this process is pinpointing emotion-related keywords within sentences. Analysis of numerous power dialogues reveals that key terms influencing emotional evaluations include event words (Inc), emotional words (Sen), conjunctions ($Con_j$), degree adverbs (Ad), and negative words (Neg), all following specific rules for evaluation targets. In expanding the power field ontology dictionary, this chapter designates Inc and Sen as the fundamental units for emotional evaluation [28]. Meanwhile, $Con_j$, Ad, and Neg serve as supporting units, refining the text's emotional analysis. For supplier-specific topic texts, each sentence undergoes word segmentation, part-of-speech retrieval, and tagging to extract key information. Redundant sentences are discarded, and emotional scores are assigned based on the following criteria:

- If a single-sentence dialogue text includes at least one Inc or Sen, it's deemed emotionally charged and contains evaluative opinions; otherwise, it's considered neutral and irrelevant for supplier evaluation, justifying its exclusion.

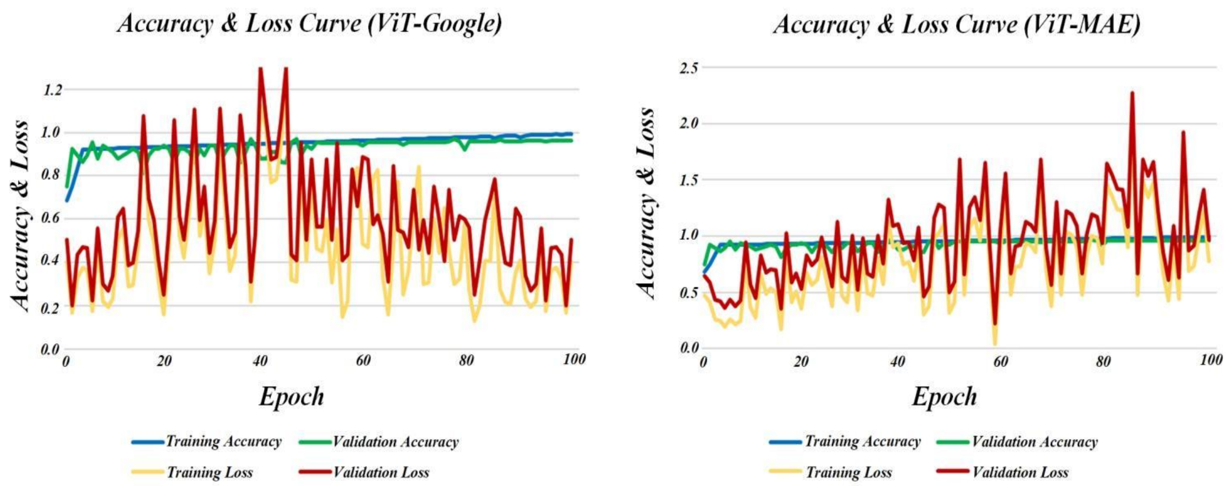


Figure 6. Translation Quality Trends in Power Technology and Equipment Literature over Time

- The trends in translation quality for power technology and equipment literature are depicted in Figure 6, illustrating how these metrics have evolved over time. In assessing the text, sentences containing only Inc are factored into the event score, while those with exclusively Sen are incorporated into the emotional score. When both Inc and Sen are present in a sentence, they are respectively tallied for both event and emotional scores. Additionally, determining the evaluation priority coefficient ($\eta$) for the basic unit and establishing the dependency relationship between the auxiliary and basic units is crucial.

- The event word Inc, as a professional word, is mostly used to describe the occurrence of faults, and $Inc_i$ is the emotional score of the $i$-th event word, which is set according to the severity of the event, taking -1 or -2 respectively.

- According to the polarity intensity, the polarity coefficient of degree adverb $Ad$ is 0.5, 1 or 2, $Ad_k$ is the emotional polarity coefficient of the $kth$ degree adverb, and $Ad_0$=1 if there is no degree adverb.

- Negative word Neg has a negative coefficient of -1, $Neg_l$ is the negative coefficient of the $l$-th negative word, and $Neg_0$=1 if there is no negative word.

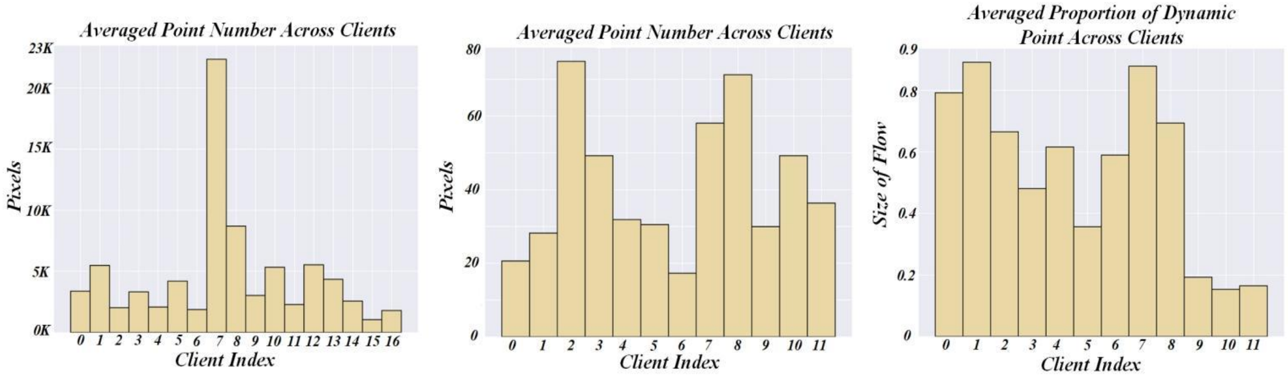


Figure 7. Distribution of Language Errors and Inaccurate Terms in the Power Technology and Equipment Literature

Figure 7 shows the distribution of language errors and inaccurate terms in the power technology and equipment literature. The assessment framework for power equipment suppliers, grounded in advanced text mining techniques, demonstrates exceptional versatility. By leveraging dialogue texts related to electric power procurement, operations, and maintenance as a practical example, this chapter aims to enrich the ontological dictionary and formulate a comprehensive evaluation model. This innovative approach not only presents a novel avenue for the meaningful utilization of dialogue texts but also establishes a robust basis for gauging supplier satisfaction within power grid companies. As a result, power grid enterprises are better positioned to objectively appraise suppliers in terms of equipment quality and service proficiency, enabling more strategic decision-making. Moreover, this serves as a valuable tool for suppliers to pinpoint areas of weakness, facilitating necessary improvements and ultimately enhancing their market competitiveness.

## 4. Summary and Prospect

Through in-depth research on this article, from the perspective of power energy quality assessment, the teaching style of power technology and equipment has been translated and optimized, significantly improving the internationalization level of teaching content and students' professional understanding ability.

- Data shows that students who adopt this new teaching model have an average score improvement of about 20% in the final exams of electricity and energy related courses compared to traditional models, demonstrating stronger knowledge mastery and application abilities.

- The rapid development of the power and energy industry has put forward higher requirements for education and teaching. Especially in cutting-edge fields such as smart grids and renewable energy, the continuous emergence of new technologies and equipment requires teaching content to keep up with industry trends. Through comparative analysis, this study found that incorporating practical cases of power energy quality assessment into teaching not only enhances students' practical skills, but also demonstrates higher flexibility and innovation in solving complex power problems.

- The data analysis of this study shows that the optimized teaching style translation strategy has a significant effect on improving students' comprehensive quality. Especially for students who are interested in entering the international power energy field, this teaching model provides them with a more comprehensive and in-depth learning experience, enhancing their international competitiveness and adaptability.

Therefore, we firmly believe that from the perspective of power energy quality assessment, continuously optimizing teaching style translation strategies will have a profound impact on the international development of power technology and equipment education.

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## References

[1] E. Ahmad, D. Khan, M. K. Anser, A. A. Nassani, S. A. Hassan, and K. Zaman, “The influence of grid connectivity, electricity pricing, policy-driven power incentives, and carbon emissions on renewable energy adoption: Exploring key factors,” *Renewable Energy*, vol. 232, p. 121108, Oct. 2024, doi: 10.1016/j.renene.2024.121108.

[2] Y. Bahini, R. Mushtaq, and S. Bahoo, “Global energy transition: The vital role of cobalt in renewable energy,” *J. Cleaner Prod.*, vol. 470, p. 143306, Sep. 2024, doi: 10.1016/j.jclepro.2024.143306.

[3] T. Briera and J. Lefèvre, “Reducing the cost of capital through international climate finance to accelerate the renewable energy transition in developing countries,” *Energy Policy*, vol. 188, p. 114104, May 2024, doi: 10.1016/j.enpol.2024.114104.

[4] E. M. Ebaidalla, “The impact of taxation, technological innovation and trade openness on renewable energy investment: Evidence from the top renewable energy producing countries,” *Energy*, vol. 306, p. 132539, Oct. 2024, doi: 10.1016/j.energy.2024.132539.

[5] P. Esmaeili, M. Rafei, M. Salari, and D. Balsalobre-Lorente, “From oil surges to renewable shifts: Unveiling the dynamic impact of supply and demand shocks in global crude oil market on U.S. clean energy trends,” *Energy*

*Policy*, vol. 192, p. 114252, Sep. 2024, doi: 10.1016/j.enpol.2024.114252.
[6] Y. Fang, J. Han, E. Du, H. Jiang, N. Zhang, and C. Kang, "Electric energy system planning considering chronological renewable generation variability and uncertainty," submitted for publication.
[7] M. Khezri and Q. M. Hasan, "Exploring the impacts of entrepreneurship indices on renewable energy mix: A cross-country study," *Renewable Sustainable Energy Rev.*, vol. 199, p. 114539, Jul. 2024, doi: 10.1016/j.rser.2024.114539.
[8] B. Masoomi, I. G. Sahebi, F. Gholian-Jouybari, C. Mejia-Argueta, and M. Hajiaghaei-Keshteli, "The role of Internet of Things adoption on the sustainability performance of the renewable energy supply chain: A conceptual framework," *Renewable Sustainable Energy Rev.*, vol. 202, p. 114610, Sep. 2024, doi: 10.1016/j.rser.2024.114610.
[9] K. M. Møller, "Domestic renewable energy industries and national decarbonization policy," *Energy Policy*, vol. 192, p. 114249, Sep. 2024, doi: 10.1016/j.enpol.2024.114249.
[10] S. F. Moosavian, Y. Noorollahi, and M. Shoaei, "Renewable energy resources utilization planning for sustainable energy system development on a stand-alone island," *J. Cleaner Prod.*, vol. 439, p. 140892, Feb. 2024, doi: 10.1016/j.jclepro.2024.140892.
[11] S. Ullah and B. Lin, "Green energy dynamics: Analyzing the environmental impacts of renewable, hydro, and nuclear energy consumption in Pakistan," *Renewable Energy*, vol. 232, p. 121025, Oct. 2024, doi: 10.1016/j.renene.2024.121025.
[12] J. Z. Wang, G. F. Feng, and C. P. Chang, "How does political instability affect renewable energy innovation?," *Renewable Energy*, vol. 230, p. 120800, Sep. 2024, doi: 10.1016/j.renene.2024.120800.
[13] D. Wu, D. Zhou, Q. Zhu, and L. Wu, "An investigation into the role of Residents' cognitive preferences in distributed renewable energy development," *Appl. Energy*, vol. 372, p. 123814, Oct. 2024, doi: 10.1016/j.apenergy.2024.123814.
[14] G. Xu, M. Yang, S. Li, M. Jiang, and H. Rehman, "Evaluating the effect of renewable energy investment on renewable energy development in China with panel threshold model," *Energy Policy*, vol. 187, p. 114029, Apr. 2024, doi: 10.1016/j.enpol.2024.114029.
[15] Z. Yang, H. Liu, Y. Yuan, and M. Li, "Can renewable energy development facilitate China's sustainable energy transition? Perspective from Energy Trilemma," *Energy*, vol. 304, p. 132160, Sep. 2024, doi: 10.1016/j.energy.2024.132160.
[16] R. Yasmeen and W. U. H. Shah, "Energy uncertainty, geopolitical conflict, and militarization matters for Renewable and non-renewable energy development: Perspectives from G7 economies," *Energy*, vol. 306, p. 132480, Oct. 2024, doi: 10.1016/j.energy.2024.132480.
[17] J. Yi, S. Dai, L. Li, and J. Cheng, "How does digital economy development affect renewable energy innovation?," *Renewable Sustainable Energy Rev.*, vol. 192, p. 114221, Mar. 2024, doi: 10.1016/j.rser.2023.114221.
[18] M. Aydin, T. Degirmenci, O. Bozatli, and D. Balsalobre-Lorente, "Fresh evidence of the impact of economic complexity, health expenditure, natural resources, plastic consumption, and renewable energy in air pollution deaths in the USA? An empirical approach," *Sci. Total Environ.*, vol. 921, p. 171127, Apr. 2024, doi: 10.1016/j.scitotenv.2024.171127.
[19] G. Bovesecchi, M. Pierro, M. Petitta, and C. Cornaro, "Flexible photovoltaic systems for renewable energy integration in Lazio region, Italy," *Energy Rep.*, vol. 12, pp. 1221-1234, Dec. 2024, doi: 10.1016/j.egyr.2024.07.029.
[20] Y. Chi, R. Li, J. Li, and S. Yang, "The innovation consumption mode of distributed renewable energy under resource bricolage: A case study of China," *Energy Rep.*, vol. 11, pp. 1420-1429, Jun. 2024, doi: 10.1016/j.egyr.2024.01.005.
[21] F. Gianaroli, M. Ricci, P. Sdringola, M. Alessandra Ancona, L. Branchini, and F. Melino, "Development of dynamic sharing keys: Algorithms supporting management of renewable energy community and collective self consumption," *Energy Build.*, vol. 311, p. 114158, May 2024, doi: 10.1016/j.enbuild.2024.114158.
[22] A. Poshnath, B. Rismanchi, and A. Rajabifard, "Renewable energy allocation in Multi-Owned Buildings for Sustainable Transition: A novel Evidence-Based Decision-Making framework," *Energy Build.*, vol. 320, p. 114601, Oct. 2024, doi: 10.1016/j.enbuild.2024.114601.
[23] F. Vecchi, R. Stasi, and U. Berardi, "Modelling tools for the assessment of Renewable Energy Communities," *Energy Rep.*, vol. 11, pp. 3941-3962, Jun. 2024, doi: 10.1016/j.egyr.2024.03.048.
[24] A. Al-Quraan and I. Athamnah, "Economic predictive tri-level control for efficiency maximization of stand-alone hybrid renewable energy system," *J. Power Sources*, vol. 596, p. 234098, Mar. 2024, doi: 10.1016/j.jpowsour.2024.234098.
[25] L. Deguenon, D. Yamegueu, S. Moussa Kadri, and A. Gomna, "Overcoming the challenges of integrating variable renewable energy to the grid: A comprehensive review of electrochemical battery storage systems," *J. Power Sources*, vol. 580, p. 233343, Oct. 2023, doi: 10.1016/j.jpowsour.2023.233343.
[26] O. Erixno, F. Ramadhani, N. A. Rahim, and A. Rivai, "Realistic operation and strategic energy, economic and environmental analyses of a hybrid renewable energy based - micro combined heat and power," *Sol. Energy*, vol. 272, p. 112467, Apr. 2024, doi: 10.1016/j.solener.2024.112467.
[27] R. Kumar *et al.*, "Rooftop solar potential in micro, small, and medium size enterprises: An insight into renewable energy tapping by decision-making approach," *Sol. Energy*, vol. 276, p. 112692, Jul. 2024, doi: 10.1016/j.solener.2024.112692.
[28] R. M. Reffat and R. Ezzat, "Impacts of design configurations and movements of PV attached to building facades on increasing generated renewable energy," *Sol. Energy*, vol. 252, pp. 50-71, Mar. 2023, doi: 10.1016/j.solener.2023.01.040.