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Methodology of foreign language training of master's students in the field of energy using innovative technologies

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Abstract: The article highlights the peculiarities of developing the methodology for foreign language training of graduates using innovative technologies and its implementation in the educational process with a practical justification of the results obtained. The study also aimed to determine the level of foreign language competence of future power engineers. The experimental work consisted of three stages, during which the following methods of scientific research were used: analysis, generalization, comparison, modeling, pedagogical experiment, and methods of mathematical statistics. Based on the analysis of scientific and pedagogical works, information and communication, interactive, project-based learning technologies that can ensure high-quality foreign language learning are highlighted. The information and communicative educational environment for foreign language training of future power engineers for the practical implementation of the developed methodology is designed using the method of modeling. During the pedagogical experiment, the effectiveness of using the electronic service Learning Apps in mastering lexical items and repeating grammatical rules; project technologies in activating receptive and productive types of speech activity; and information and communication technologies in objectively assessing the level of foreign language knowledge, skills, and abilities, as well as expanding personal and professional range, was established. The results of the experimental work revealed positive dynamics in the levels of lexical, grammatical, speech, pragmatic, and socio-cultural competences, which are the structural elements of master's students' foreign language competence. The proposed methodology allows for the intensification, optimization, and activation of the process of foreign language training of future power engineers in a blended learning environment.

Keywords: *Foreign language competence, Foreign language training, Foreign language, Future energy engineers. Information and communication educational environment, Innovative technologies, Master students.*

1. Introduction

Through the prism of the intellectual and innovative development of society, with all its key achievements and global problems, the modern paradigm of higher education in Ukraine is being formed. External social factors determine the specifics of the professional training of future specialists of the new generation. Higher education institutions respond to the challenges of the times and the latest trends in a timely manner by reorienting themselves to the needs of the domestic and international labour markets, modernising the traditional education system following European requirements, updating the content of educational and vocational programmes, identifying priorities based on recommendations from external stakeholders, improving areas of work, creating optimal conditions for

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the successful and safe life of all participants in the educational process, etc. Quality, innovation, foresight and accountability for results remain key features of higher education in Ukraine, even under martial law.

Today's realities determine the prospects of professions in the Ukrainian labour market that ensure the full functioning and development of the state. Energy specialists were in great demand during the war. After all, the rapid restoration of the power system after extensive damage caused by missile attacks, the reconstruction of the energy sector in the post-war period, the development of energy infrastructure, the integration of the Ukrainian energy sector into European standards, the implementation of green energy transition initiatives and the use of the latest technologies all depend on the professionalism of power engineers. Accordingly, special attention should be paid to the professional training of energy students who are able to innovate, generate scientific and technical ideas, approach engineering tasks creatively in a foreign language environment and cooperate successfully with foreign colleagues. The practical application of these skills updates the problem of learning the meta-language of the discipline by Master's students in energy engineering and mastering foreign language skills at a level that allows them to use them freely in organisational, production, design and research work. The solution to this problem can be found in the development of the methodology for building the foreign language skills of future energy engineers using innovative technologies.

2. Literature Review

In the context of European integration and the multiculturalism of modern society, the problem of forming foreign language competence in future specialists as an integral part of professional training has become the subject of close attention by researchers [1-9]. Based on the analysis of scientific and pedagogical sources, it was found that scientists have made significant developments in covering a wide range of issues in their solution, which relate to: the peculiarities of foreign language teaching of students in higher educational institutions of Ukraine [10-15]; pedagogical conditions for effective foreign language learning [16-20]; introduction of innovative teaching technologies in the educational process [21-28]; readiness of future specialists for foreign language communication in a professional environment [29-31]. This scientific research is of great importance for the theoretical and practical aspects of foreign language learning for professional purposes in higher education institutions. However, the problem of methodological substantiation of the process of foreign language competence formation of higher education students remains open. Some of the scientific works present methods aimed at developing lexical and grammatical competence as the main components of foreign language competence [32-36] forming foreign language competence by types of language activity – listening [37, 38] reading [39-41] writing [42, 43] and speaking [44-47]. Particularly noteworthy is the publication by Mykytenko [48] in which the researcher proposes a classification of relevant methods for the formation of professional foreign language competence (translation, direct, intensive, inductive, active, communicative), based on types of linguistic activity and thought processes. It should be noted that a cohort of foreign scholars are authors and supporters of traditional methods of learning foreign languages (grammar-translation, audiolingual, communicative, natural and direct teaching methods) [49-52].

A review of the literature on the subject of the study, as well as my our own experience of teaching a foreign language in a higher education institution, allows us to state that there is no methodology for the formation of Master students' foreign language competence based on the specifics of the future specialisation and the peculiarities of learning the meta-language of the specialisation in a blended learning environment. Accordingly, the aim of the study was to develop the methodology for the formation of foreign language competence of future power engineers using innovative technologies and its implementation in the educational process of professional training of master's students majoring in 141 Electric Power Engineering, Electrical Engineering and Electromechanics with a practical justification of the results obtained.

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3. Methodology

A number of research methods were used to achieve the above objective. We offer a brief description of them, reflecting all stages of the theoretical and practical underpinning of the subject of this publication.

The first stage was informational and exploratory. Based on the analysis and synthesis of scientific and pedagogical literature, the most researched problems of foreign language competence formation of higher education students in the process of professional training are identified. The data obtained from the results of the processed sources confirmed the relevance of the research topic and the expediency of developing the modern methodology for the formation of foreign language competence of future power engineers using innovative technologies.

The main stage of the research was based on the method of pedagogical experiment and modelling. A Separate Subdivision of the National University of Life and Environmental Sciences of Ukraine "Berezhany Agrotechnical Institute" was the basis of the pedagogical experiment, the participants were applicants for the second (master's) level of higher education majoring in 141 Electric Power Engineering, Electrical Engineering and Electromechanics. The experimental work was carried out as part of the study of the educational component "Business Foreign Language" (4 credits) lasting one semester.

The aim of the pedagogical experiment was to develop a methodology for the formation of foreign language competence of future power engineers that would be conducive to the development of positive motivation to learn, intensive for the learning of a foreign language and effective for the improvement of foreign language skills in receptive and productive language activities. The practical realisation of this goal was preceded by the process of determining the initial level of knowledge of the Master's students. The diagnostic and evaluation measure was carried out using tests. Among the online tests, we preferred the quizzes on the Deutsche Welle website. These can be found at https://learngerman.dw.com/uk/placementDashboard. The tests are organised by level and are interactive, allowing you to test your knowledge of vocabulary and grammar rules, listening and writing skills. The programme automatically highlights the number of correct answers and mistakes made, the overall score for the test, and offers self-study materials according to the level of the foreign language. It was found that 42% of the Master's students had a low level of residual knowledge according to the test control results. The average level is typical for 51% of those studying in higher education. Only 7% of the future energy engineers have a high level of competence in a foreign language. Taking into account the indicators obtained, we conclude that it is necessary to activate vocabulary, repeat grammar and automate language skills. We believe that the implementation of these processes should be organically combined with the study of educational materials that reveal the content of the discipline "Business Foreign Language" by presenting the author's methodology for the formation of foreign language competence of future power engineers using innovative technologies.

The results of the unified entrance examination in a foreign language for applicants to the master's programme for the academic year 2024-2025 were also taken into account. Table 1 shows the percentage of the total score of the examination testing of the foreign language knowledge of master's degree students in 141 Electric Power Engineering, Electrical Engineering and Electromechanics using organisational and technological processes. The grading of the examination papers was on a scale of 100 to 200 points.

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Table 1.
Results of the Unified Entrance Exam in a Foreign Language for Master's Degree Applicants.

Higher education institution	Field of knowlendge / Specialty	Rating scores in a foreign language of enrolled applicants to the master's program			
		100-124	125-149	150-174	175-200
Separated Subdivision of National University of Live and Environmental Sciences of Ukraine "Berezhany Agrotechnical Institute"	14 Electrical engineering / 141 Electric power engineering, electrical engineering and electromechanics	53%	36 %	8 %	3 %

The control and experimental groups were formed based on the analysis of the evaluation scores and the results of the entrance control (Table 2). The control group consisted of 46 applicants for the second (master's) level of higher education, and the experimental group consisted of 47 future energy engineers. Master's students in the experimental group studied Business Foreign Language according to the developed methodology, and those in the control group studied using communicative and grammatical-translational methods. Although the process of acquiring foreign language knowledge took place in different ways, the final result was aimed at achieving a single goal – the formation of the ability to productively solve personal and professional tasks using a foreign language.

Table 2.
Levels of formation of foreign language competence of future power engineers based on the results of the entrance examination.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	3	7	24	52	19	41
Experimental group	47	4	8	23	49	20	43

The main stage of the pedagogical experiment also included the design of the information and communication educational environment for the foreign language training of future power engineers for the practical implementation of the methodology for the formation of foreign language competence using innovative technologies, the development and implementation of a set of interactive and project-based tasks in the educational process.

The final stage of the experimental work of the scientific research included diagnostic measures, comparing the data of the control and experimental groups by comparison, which made it possible to determine the effectiveness of the developed methodology for the formation of foreign language competence of future power engineers by means of innovative technologies in a specially designed information and communication educational environment.

4. Results and Discussion

The methodology for developing the foreign language competence of future power engineers is based on innovative technologies, among which priority is given to information and communication technologies, interactive technologies, and project technologies. The selection criterion was based on their specific features, in particular: personal focus on the needs, interests, and abilities of higher education students; creating conditions for development of the inner potential of each Master's student; individualising the process of foreign language training of future specialists; increasing motivation to learn a foreign language; ensuring the intensity of foreign language training; accessibility in the acquisition of foreign language knowledge, speech skills and abilities; intensification of the learning activities of higher education students; interactivity and integration in the presentation of thematic material; non-standard, innovative, creative approach to the performance of tasks in a foreign language;

productivity in the formation of components of foreign language competence (lexical, grammatical, linguistic, pragmatic, socio-cultural competence).

We believe that information, communication, interactive and project technologies provide optimal conditions for the implementation of the above-mentioned processes and form an individual trajectory for the Master's students. In order to give priority to innovative technologies, we also took into account the basic foreign language skills of university applicants, the duration of the foreign language course in the Master's programme (1 semester) and the specifics of the professional activities of future energy engineers.

It should be noted that the basis for mastering the meta-language of the field of energy is laid in the process of studying the discipline "Foreign language for professional purposes" by applicants for the first (bachelor) level of higher education. Master's students study Business Foreign Language, which is also professional in its nature. These issues are complementary and interdependent. Without knowledge of one academic discipline, mastering another is quite problematic. However, it is possible. The meta-language of the discipline mastered at the Bachelor's level is therefore a kind of foundation for the acquisition of foreign language and business communication skills at the Master's level. There is a rather long interval between the study of these disciplines, which significantly affects the processes of acquiring and mastering new foreign language knowledge [53]. The organic use of information and communication, interactive and project technologies allows you to systematise your knowledge of foreign vocabulary, review grammar, train pronunciation and activate practical skills in receptive and productive language activities by watching authentic videos with discussion, doing interactive exercises, creating thematic projects and presenting the results of project work.

The advantages of each of the selected teaching technologies, on which the author's methodology for the formation of foreign language competence of future power engineers is based, are theoretically argued.

In the context of the digitalisation of modern education, the most effective means of foreign language learning for higher education students are information and communication technologies, which offer a wide range of online resources for learning a foreign language at different levels and for monitoring learning outcomes. We agree with the scientific opinion of Pradivliannyi [22] and Tadeieva, et al. [25] that these technologies make it possible to improve the quality of learning in both professional and foreign language activities of a future specialist, increase the level of motivation, individualization and flexibility of the educational process in mastering a foreign language, which contributes to the creation of a situation of success, as well as the implementation of the principles of continuity, communication and authenticity. In our study, we consider information and communication technologies from the following perspectives:

1) educational (use of the Moodle platform for mastering the program requirements of the educational component "Business Foreign Language" in a blended learning environment);

2) training (learning a foreign language by levels);

3) information and search (foreign language professional websites);

4) reference (work with electronic dictionaries, encyclopedias);

5) controlling (diagnosing the level of knowledge) [53].

The above mentioned technologies ensure the informativeness of the professional training of future specialists, both in the mixed format of compulsory training according to the programme requirements and in the initiative self-education. The active use of information and communication technologies in the educational process contributes to the formation of the ability to navigate in modern information flows, ensures self-improvement, professional growth and creative development of the individual [54].

The innovative orientation of the educational process is given by the active use of interactive learning technologies, which corresponds to the priority direction of modernisation of national education, which is determined by the needs of society and future professionals, is based on the freedom and personal choice of educational subjects, is determined by the presence of responsibility for the consequences of their own activities, takes into account the specifics of professional training in higher

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technical education institutions [55]. We support the position of A. Fandieieva [55] that interactive teaching technologies actualize the motivation of future specialists to innovative activities for the development of foreign language competence, improve knowledge, gain experience in foreign language communication, and organize creative interaction of students based on innovative orientation in the process of developing foreign language competence. Interactive learning technologies open up wide prospects for deepening the theoretical knowledge base, strengthen the motivational focus on studying disciplines, provide mastery of self-development skills, the ability to think, create [56]. We believe that an effective means of implementing these technologies is the online service Learning Apps for creating interactive exercises that facilitate students to perceive, understand and learn the material, help develop interest in learning, expand their scientific outlook [56] and provide an opportunity to perform a thematic task of a diagnostic nature until the correct solution is found [57].

The interactivity of the educational process complements and enhances creativity. Project-based learning technologies bring creativity to language learning for university students. We share the opinion of the scientist [58] that the project method is one of the most promising and effective innovative technologies allowing to develop a wide range of competences in the subjects of learning, and its use in the educational process accustoms students to independent, practical, planned and systematic work, fosters in them the desire to create the new or an existing but improved product, forms an idea of the prospects of its application, develops professional qualities, positive motives for choosing a profession. We are also impressed by the position of Zadorozhna [59] that through the prism of project work in the meta-language of the speciality, it is possible to reproduce the multifaceted content of the professional activity of energy engineers.

When choosing learning technologies that would unlock inner potential, develop creativity, and take into account the specifics of the future profession of energy students, we considered the specifics of the energy specialty. The focus on project technologies is due to the expediency of developing project skills necessary not only to create a foreign language product in the learning process, but also to acquire practical skills in project work when performing professional engineering duties in the future, such as designing models of electrical or electromechanical equipment, etc. Project technologies bring together two processes: the formation of knowledge, skills and abilities and their practical use in future professional activities. Project work as a way of solving foreign language problems by higher education students and a type of engineering activity as a way of performing professional duties by energy industry specialists have common features: motivational and personal – interest, initiative, creativity, ingenuity in solving problems; activity – individual, collective, pair forms of work; organisational and executive – planning, implementation, presentation; effective – a project as a result of the educational work of higher education students and a product of constructive activity of power engineers [53].

It should be noted that project-based technologies are an effective means of ensuring the autonomy of the professional training of higher education students in the context of the alternative replacement of offline learning by distance learning [60].

The integrated use of information and communication, interactive and project-based technologies for foreign language learning in a blended learning format allows to build a system of foreign language knowledge, language skills and abilities at the reproductive, constructive and creative levels.

4.1. Implementation of the Developed Methodology

In the context of innovative technologies, an information and communication educational environment has been designed for the practical implementation of the developed methodology for the formation of foreign language competence of future power engineers using innovative technologies. Its image is shown in Figure 1.

We offer a brief description of the information and communication educational environment for foreign language training of future power engineers, designed in five logically related levels that form an integral, functional system.

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The basic level is the educational and programmatic level, which defines the peculiarities of learning the discipline "Business Foreign Language" as an obligatory part of the professional training of future energy engineers and the subject-subject interaction between the participants of the educational process, which ensures the formation of the Master's personality and observance of the principle of individual and differentiated approaches to education. The second level of the information and communication educational environment of the foreign language training of future power engineers is organisational and activity-based with a characteristic didactic toolkit that includes information and communication, project, interactive learning technologies; reproductive and productive teaching methods, individual, group and collective forms of work; visual and information teaching aids.

It should be noted that the introduction of technologies and teaching methods in foreign language training, the organization of educational activities of higher education students in accordance with the chosen forms of work, is carried out on the basis of educational and methodological support. In that respect, the next level of the information and communication educational environment is the information and resource level. In the context of the designed information and communication educational environment, the formation of foreign language competence of future power engineers is carried out in two learning formats: Offline and Online. The main means of implementing the blended learning model is the Moodle platform, which allows to unite academic staff and higher education students in a single integrated multifunctional system for presenting, learning, reproducing, transforming, testing, and evaluating knowledge. An integrated application to the Moodle e-course is the interactive content of the Learning Apps, which contains a series of exercises to review, systematise and generalise lexical and grammatical knowledge [61]. The effectiveness of using the online service Learning Apps in the Moodle system in the process of professional training of future specialists has been theoretically substantiated, experimentally tested and confirmed by scientists [62].

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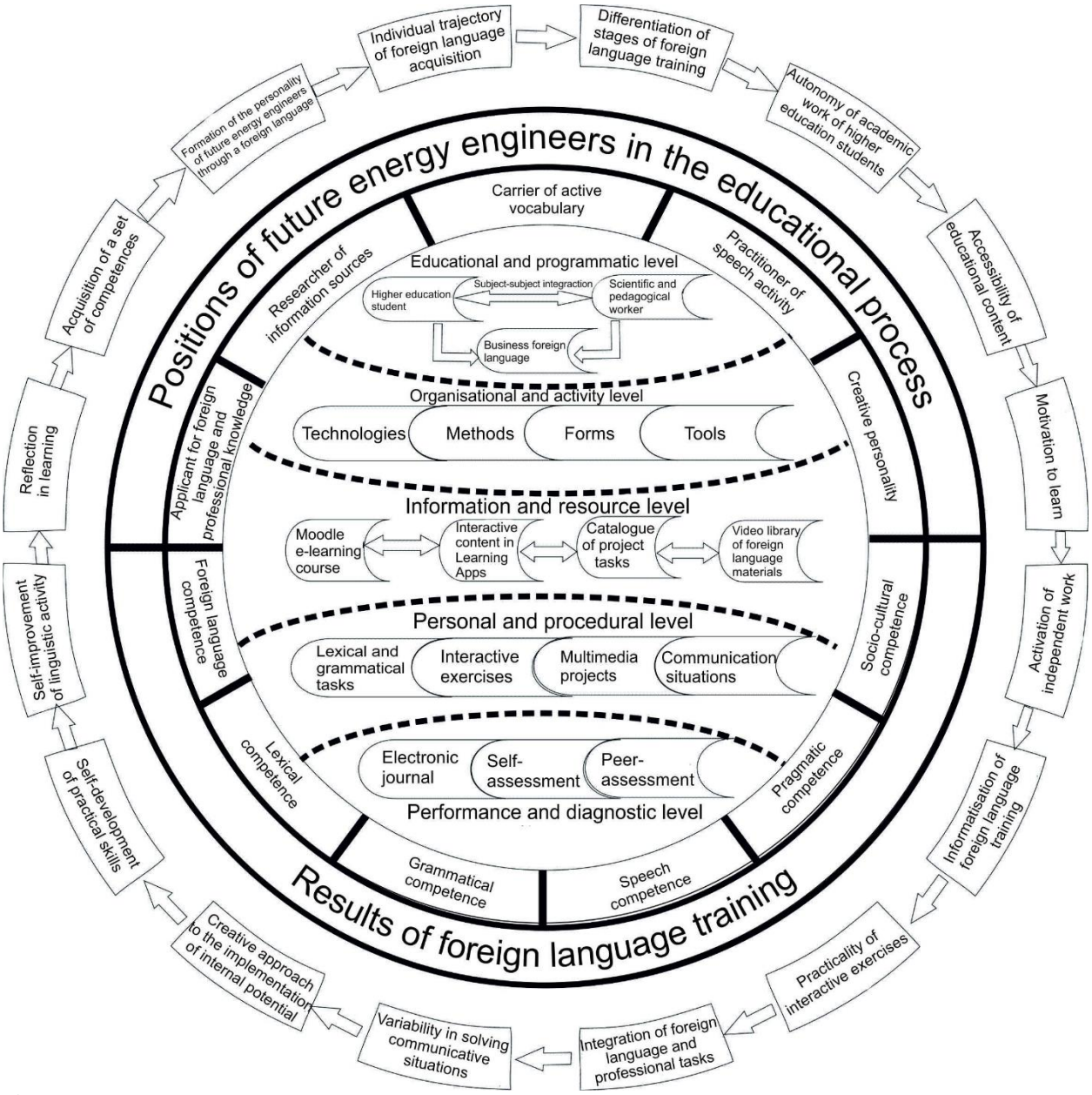

Figure 1.
Information and communication environment for language training of future engineers.

The next component of the information and resources level is a catalogue of project tasks, organised under three thematic headings: "Who knows two languages is twice a man", "Country Studies", and "Meta-language of the specialty". The training projects are motivational. They aim to increase the interest of future energy engineers in foreign language training. To ensure the authenticity of the information and communication educational environment of foreign language training of future power engineers, the information and resource level contains a video library of foreign language materials, viewing which forms the skills of perception and understanding of a foreign language, clear and correct pronunciation, and speech rate. The video material (interviews with Essay German) is taken from original sources and is based on spontaneous situations. The selection of educational videos was based

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on the relevance of the topic and its novelty in relation to the requirements of the programme, as well as the correspondence of the lexical content with the level of foreign language training of university students. The components of the information and resource level acquire signs of practicality at the personal and procedural level, in particular Moodle – in working with lexical and grammatical tasks of a reproductive, translational, and creative nature, Learning Apps – in carrying out interactive exercises, a catalogue of project tasks – in creating multimedia projects, a video library of foreign language materials – in solving communication situations. Successful completion of training, consolidation, and project tasks is determined at the performance and diagnostic level through objective self- and peer-assessment and recorded in an electronic journal [61].

The levels of the information and communication educational environment presented above are interrelated and aim to ensure optimal conditions for the development of master students' foreign language competence through innovative technologies.

Having characterised the structure of the information and communication educational environment for foreign language training of future power engineers, we consider it expedient to analyse the results of the practical implementation of the developed methodology for the formation of foreign language competence of future power engineers by means of innovative technologies in the educational process.

4.2. Effectiveness of the Proposed Methodology

The effectiveness of the developed methodology for the formation of foreign language competence of future power engineers by means of innovative technologies in a qualitative and quantitative ratio was determined by carrying out a series of diagnostic measures and summarising the results. Taking into account the pecularites of the study of the "Business Foreign Language" component of the (second) Master's degree, we consider foreign language competence as a set of lexical, grammatical, linguistic, pragmatic and socio-cultural skills that together ensure the successful achievement of the communicative objective at a personal and professional level [63]. Let's confirm the above with practical examples and observe the levels of formation of each of the structural components of foreign language competence.

Vocabulary is the fundamental basis for the practical use of a foreign language. Accordingly, the ability to activate it logically and consistently in speech is one of the integral features of foreign language competence. University students systematised professional vocabulary and learned business vocabulary as part of the pedagogical experiment. The study of lexical items by students in the control group was based on the contextual method – the use of new words in the context of sentences, dialogues and monologues. Participants in the experimental group developed practical skills in foreign language vocabulary in the online environment of Learning Apps. Interactive exercises such as "Guess the Word", "Find a Pair", "Simple Ordering", "Free Text Answer", "First Million" are productive in activating the vocabulary of future energy engineers compared to traditional translation exercises. The effectiveness of using the Learning Apps online service to develop the lexical competence of future energy engineers is confirmed by the indicators presented in Table 3. The experimental group's level of mastering thematic vocabulary and using it in practice is higher than that of the control group.

Table 3.
Levels of formation of lexical competence of future power engineers.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	11	24	21	46	14	30
Experimental group	47	15	32	23	49	9	19

A complementary component of lexical competence is grammatical competence, which ensures text comprehension, sentence construction, the development of coherent speech and contributes to successful language learning in general. The foreign language training of Master's students involves the

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generalisation of knowledge of the grammatical system of a language and the rules of its functioning in the process of communication. In the context of the study, the repetition of grammatical topics was carried out in the control group in the form of open-ended and closed-ended tests, essay writing, and in the experimental group by doing interactive exercises "Classification", "Correspondence Table", "Filling in the Table", "Filling in the Blanks", "Printable Quiz" and creating their own tasks in the online Learning Apps environment. The results of the diagnostic measures used to determine the level of grammatical competence of the Master's students are shown in Table 4. The obtained indicators allow us to conclude that interactive control methods, in comparison with traditional ones, are effective for testing theoretical knowledge of foreign language grammar and practical skills and abilities of their correct use in all types of speech activities.

Table 4.
Levels of formation of grammatical competence of future power engineers.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	5	11	21	46	20	43
Experimental group	47	9	19	23	49	15	32

The development of lexical and grammatical competence is manifested in language competence, which is based on the ability to use the language practically in typical, non-standard and unpredictable communicative situations. The Master's students' ability to use a foreign language in social interaction was formed on the basis of solving communicative situations with elements of discussion. The forms of work were the same for the control and experimental groups, only the content differed. The topics of the business and country-specific communication situations were based on mini-texts in the control group and on short videos from EASY German Learning German from the Streets in the experimental group (https://www.youtube.com/@EasyGerman). The ability to listen, read and understand information in a foreign language, discuss communication situations, justify effective ways of solving them and formulate general conclusions are the main indicators that determine the level of foreign language proficiency in receptive and productive language activities. According to the results of the pedagogical experiment (Table 5), it was found out that communicative situations based on thematic video materials are more effective for the development of Master's students' speech competence.

Table 5.
Levels of formation of speech competence of future power engineers.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	7	15	24	52	15	33
Experimental group	47	9	19	28	60	10	21

The generalising component of foreign language competence is pragmatic competence, which determines the ability to functionally use lexical, grammatical and linguistic resources in organic combination with verbal and non-verbal means of communication. In order to develop the ability of the Master's students to apply their foreign language knowledge in the light of the needs, objectives and tasks of the professional field, active learning technologies were chosen, in particular the case technology for the control group and the project technology for the experimental group. The work on the case and project have a number of common features: gradual implementation, intensification of independent learning and cognitive activity, creative approach, identification of soft skills (critical thinking, creativity, flexibility, initiative, time management, teamwork, communication skills, emotional intelligence), unlocking the internal potential of master's students, etc. The level of pragmatic competence of future energy engineers is determined on the basis of the cases and projects presented on

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the topics of the content module "Cooperation with foreign partners". The indicators in Table 6 reflect the qualitative and quantitative advantages of using project technologies in the educational process of foreign language training of Master's students in comparison with case technologies.

Table 6.
Levels of formation of pragmatic competence of future power engineers.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	5	11	23	50	18	39
Experimental group	47	8	17	27	57	12	26

Sociocultural competence has a worldview and developmental function in broadening the horizons of Master's students through the prism of a foreign language. The discipline Business Foreign Languages is not only based on the acquisition of programmatic knowledge, but also covers socio-cultural phenomena. In foreign language training, we emphasise the development of country studies and socio-cultural knowledge, with an increased focus on the energy sector of European countries (Austria, Germany, etc.). Taking into account the principles of systematicity and consistency, strength of the acquisition of foreign language knowledge, skills and abilities, connection between learning and practice, informativeness, interdependence of types of language activity, personal and professional development, the Master's students of the control and experimental groups were asked to justify the topic "Travel to energy facilities in European countries" in an arbitrary form, organically combining general, professionally oriented information with the knowledge of the educational component "Business Foreign Language". The participants in the control group dealt with the topic in the form of dialogues, reports and multimedia presentations. A collaborative project was undertaken by the Master's students in the experimental group. In accordance with the terms of reference, the students of the second (Master's) level of higher education developed a route sheet with specific stations:

- Stop 1. "Munich International Airport";
- Stop 2. "Business meeting with partners";
- Stop 3. "Munich Süd Thermal Power Plant";
- Stop 4. "Wilchelm Raiffeisen Energie, an energy kooperative";
- Stop 5. "Solar24 GmbH";
- Stop 6. "Solimpeks Solar GmbH";
- Stop 7. "Conclusion of the cooperation agreement";
- Stop 8. "In the restaurant";
- Stop 9. "Cultural program in the city";
- Stop 10. "At the hotel".

The results of the project work were presented in the form of a role-play and business game, in which the Master's students fully revealed their inner potential in the practical mastery of language skills. The qualitative and quantitative indicators obtained are presented in Table 7.

Table 7.
Levels of formation of socio-cultural competence of future power engineers.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	6	13	23	50	17	37
Experimental group	47	9	19	26	55	12	26

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The indicators presented above reflect a positive dynamic in the level of lexical, grammatical, linguistic, pragmatic, socio-cultural competences of the Master's students in the experimental group. To confirm the feasibility of implementing the developed methodology in the designed information and communication educational environment in order to obtain qualitative changes in the level of foreign language competence of the Master's students, the final control was carried out. The results are presented in Table 8.

Table 8.
General indicators of the levels of foreign language competence of future power engineers based on the final control.

Category of groups	Number of future engineers (N)	Levels of formation					
		High		Medium		Low	
		N	%	N	%	N	%
Control group	46	5	11	23	50	18	39
Experimental group	47	8	17	28	60	11	23

A comparison of the pre-test (Table 1) and post-test (Table 8) shows that the experimental group tends to significantly increase the number of Master's students with a high level of foreign language proficiency compared to the control group. In particular, the digital score increased by 9% in the experimental group, compared to a 2% increase in the control group. The study of the Business Foreign Language discipline using innovative technologies has helped to increase the average level of foreign language knowledge, speech skills and abilities in the experimental group by 11%. Traditional teaching methods led to a 2% decrease in the number of Master's students with an average level in the control group. The low level of foreign language skills among future energy engineers has also changed qualitatively. Comparative characteristics of the indicators obtained at the beginning of the experiment and after its implementation show that the number of students decreased by 20% in the experimental group and by only 2% in the control group. The data presented in the tables show that the development of Master's students' foreign language competence based on the developed methodology was successful.

5. Conclusions

The results of the experimental work have shown that the proposed methodology is effective for the formation of Master's students' foreign language competence through innovative technologies and has been fully implemented in a specially designed information and communication educational environment. Statistical analysis of quantitative data suggests that the interactive service-Learning Apps is effective in studying and systematising lexical and grammatical knowledge; information and communication technologies contribute to the development of receptive and productive types of language activity; project work forms the ability to practically use the target language in solving professionally oriented tasks. The implementation of the developed methodology in the information and communication educational environment has created optimal conditions for the formation of an individual trajectory of foreign language acquisition, differentiation of stages of foreign language training, autonomy of academic work of higher education students, accessibility of educational content, increase of internal motivation to learn, activation of independent work, informatisation, and practicality of interactive exercises, integration of foreign language and professional tasks, variability in solving communicative situations, implementation of a creative approach to the implementation of educational projects, self-development of practical skills, self-improvement of linguistic activity, self-evaluation of academic achievements, acquisition of a set of competences and formation of the personality of future energy engineers through a foreign language. The proposed methodology, which is based on interactive, project-based, information and communication technologies, ensures the productivity of foreign language learning – from reproduction to creative use, the formation of foreign language competence – from communicative to professional levels of proficiency.

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The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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