

ŠIAULIAI UNIVERSITY

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MODELLING THE DEVELOPMENT SYSTEM
OF ENGINEERING ENGLISH FUNCTIONAL
ABILITIES FOR COLLEGE STUDENTS

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INTRODUCTION

The main objective of contemporary professional training is to develop a qualified, competent specialist who is able to act and make decisions independently. This position is emphasised in the documents forming and regulating professional training: *A Memorandum of Life Long Learning* (2000), *The Lisbon Strategy* (2000), *State Strategy for Education 2003-2012* (2002), *Law on Education* (2003), *The Resolution on Lifelong Guidance* (2004) and *The National Lisbon Strategy* (2005). Here a valuable feature of well-trained specialists of higher education lies in their competitive ability in the labour market of the European Union. The ability to compete in one's professional activity and appear mobile is directly related to the mastery of foreign languages of a contemporary specialist.

The knowledge of a foreign language the institutions of higher education seek for is defined by the educational policy related documents as a vital prerequisite for the development of the specialist's professional competences and acquirement of necessary qualification. The expansion of professional competences contains the knowledge of a profession, formation of special abilities and field experience gained. The focus on the development process based on field activity and practical experience characterizes the peculiarity and mission of professional training at higher non-university education level.

The Regulation of study area of General technology (engineering) sciences (2005) defines the knowledge of a foreign language in the process of professional training as the necessity to form and develop the abilities to apply language skills practically. Consequently, the disability of traditional pedagogical paradigm, focusing on teaching but not on learning, to achieve the current goals ascribed to the development of the English for professional purposes and the inevitability of educational paradigm change have become obvious. The necessity to look critically at the basics of individual's cognitive development processes and possibilities from the point of view of pragmatic constructivism appears vital and thus stimulates the search for new didactic modelling practice in concordance with requirements of the modern educational system. The attitude towards the basic changes in teaching-learning processes is expressed in the works of J. Dewey (1938, 2008), J. Bruner (1966, 1973), C. Argyris, D. A. Schön (1974), L. Vygotsky (1982, 1999), D. A. Kolb (1984), L. V. Wertsch (1990, 1991), W. James (1995), R. Arends (1998), E. Jensen (1999), P. Jarvis (2001), J. Piaget (2002), M. Bakhtin (2008). The authors put emphasis on the component of learning and the learner as an active cognitive

agent, the importance of the experience gained and sensed in the educational process. The didactics constructed with the reference to the constructivist theories postulates the learners' interactive activity as the essential feature of the process and this phenomenon is highlighted in the works of Lithuanian scientists investigating the problems of professional training: R. Laužackas (2000, 2005), M. Teresevičienė, D. Oldroyd, G. Gedvilienė (2004), A. M. Juozaitis (2005), R. Laužackas, E. Stasiūnaitė, M. Teresevičienė (2005), L. Šiaučiukėnienė, O. Visockienė, P. Talijūnienė (2006), P. Jucevičienė (2007).

The modelling of the development system of Engineering English, oriented to the development of learner's functional abilities, is, however, related to new educational and linguistic trends in the teaching-learning process of a foreign language for special purposes. The instrumental approach to the abilities to use functionally English for professional use advocates the importance of the two elements: the analysis of authentic linguistic discourse and language production exercising. The investigations carried out by S. Feez (2001), A. Hewings, M. Hewings (2001), M. Lewis (2001), M. H. Long (2004), U. Clark (2007), N. Coupland (2007), M. A. K. Halliday, C. Yallop (2007) speak for inseparability of linguistic form and meaning. The recommendation to substantiate teaching-learning process of Engineering English on studies of authentic linguistic texts functioning in real professional environment is given by S. Bacon, M. D. Finneman (1990), S. McGinnis, Ch. Ke (1992), D. R. Hall (2001). The communicative target in development of English for Special Purposes is identified by T. Hutchinson, A. Waters (1987), T. M. Cabre (1992), J. Hawthorn (1998), N. Holden (1998), M. Tisdell (1998), E. Frenco (2005) as the ability to recognize the linguistic faculties of the text typical for the achievement of a certain goal, the capability to decode the semantic message and transfer the information in accordance to the conventions of a text genre that carry out a certain communicative function.

The research works accomplished by M. McCarty, R. Carter (2001), W. Savage, G. Store (2001), P. Knight (2004), N. Noordin, A. A. Samad (2005) investigating the language as a communicative instrument with the pragmatic aim to meet the professional needs of the learner highlighted the necessity to start the didactic modelling of the development for Engineering English functional abilities from having defined the characteristic application forms of the language and the scope of functions performed in the professional environment. However, J. Sinclair, M. Coulthard (1975), W. Damon, E. Phelps (1989), J. L. Patry (1999), D. R. Hall, A. Hewings (2001), P. Gibbons (2004), N. Mercer (2004), L. van Lier (2004), P. Ske-

han (2004) distinguished the following elements significant for building the didactical practice: interaction, pedagogical scaffolding, joint meaning negotiation in the process of education and the transferring of experience gained in language classroom environment into real life situations; these elements enable to construct a modern didactic Engineering English study model as here all typical forms of professional language use are incorporated into one undivided teaching-learning system and ensure the harmonious expansion of all students' functional abilities of English for Special Purposes.

The relevance of the dissertation is substantiated by the attention given to such issues as the change of paradigms in development processes, the situation analyses of professional training in higher education, teaching-learning process and didactics considered in the research works of Lithuanian and world scientists mentioned above. The aspects of university students' learning processes were investigated by the scientists: V. Zuzevičiūtė (2005) carried out a research in students' metacognitive strategies; N. Mačianskienė (2004) analyzed foreign language learning strategies applied by university students; T. Bajzát (2007) performed a quantitative research on the insufficiency of General English skill development experienced by university graduates in the engineering professional use.

The didactic context of the recent changes in teaching-learning processes determines **the problematic question of the dissertation research: How is it possible to build the modern model of the development system for college students' Engineering English which enables to foster the expansion of functional abilities?**

At the beginning of the research **the scientific hypothesis** put forward claims that **the successful way of modelling the development system of English functional abilities necessary for engineering professional application should be sustained by the didactics of interactive activities of learners.**

Research object is the development of Engineering English at college.

Research matter is modelling the system of Engineering English functional ability development at college.

Research aim is to define theoretically and reveal empirically the didactic conditions and factors of the system for development of Engineering English functional abilities.

Research objectives:

1. To provide a theoretical rationale for the research construct in respect to the terms of paradigm change in educational sciences and validate the

relevance to apply the modern didactics for development of English functional abilities at theoretical level.

2. To determine significant factors in building the model for development of Engineering English functional abilities at college:
 - 2.1. To define the scope of the expression forms of Engineering English functional abilities and determine the application importance in professional environment.
 - 2.2. To identify the didactic conditions and facilities for educating Engineering English functional abilities at college.
 - 2.3. To rank the priorities of didactic models used in development of Engineering English and estimate the interrelation between assessments of functional ability development results achieved and the application of didactic model practice.
3. On the basis of research results to build the didactic model oriented to the fostering of functional abilities for education of Engineering English.

The methods applied in the dissertation research:

- **Scientific literature source and document analysis** was carried out in order to examine the theories of the modern educational system and identify significant factors in didactic modelling of Engineering English functional abilities at theoretical level.
- **Qualitative and quantitative ways of research** interrelated according to the design pattern of different domination: the qualitative research helped to identify the facilities and conditions significant for didactic modelling; however, the quantitative research validated the advantage in application practice of the didactic model oriented for the fostering of Engineering English functional abilities.
- **Qualitative research methods: Interview method** enabled to define the scope of English functional abilities applied in the engineering professional environment, to validate the relevance of their development and distinguish basic elements for didactic modelling. **Content analysis method** was used in processing the data gained during the interview.
- **Qualitative research methods: Questionnaire survey** helped to reveal the priorities in didactic model application practice for the development of Engineering English at college and to validate empirically the interrelation between the educational practice oriented to the fostering of functional abilities and the results of self-assessment suggested by the learners. **Statistical data analysis methods** were used for the processing of quantitative research results: **Cronbach**

Alpha test assessed the reliability of questionnaire segments; **factor analysis** identified the application practice of didactic models; **Kaiser-Meyer-Olkin** test helped to assess the interrelation of results gained by the questionnaire survey; **Kolmogorov-Smirnov Z criterion** was applied to find out the result distribution character according to different groups of informants; **Student's t** criterion enabled to compare the average of the results within two independent groups of informants; **Chi-Square** criterion was applied for comparison of percentage form of results suggested by two independent groups, **One-Way ANOVA**, **Fischer Statistics** and **Bonferonni criterion** helped to identify the difference in the assessment result average found within independent informant groups, **Spearman Correlation** helped to define the interrelation between assessment results gained.

However, the performed analysis of theoretical sources revealed the fact that the current context of scientific works lacks more profound insights into the research on the use forms of Engineering English and the interrelation between the didactic process at college and the results of their development. This dissertation paper supplements to the investigation of relevant issues and introduces novelty to the general context of educational researches. **The scientific novelty of the work** comprises:

1. The teaching-learning process of Engineering English in Lithuanian colleges is exhaustively investigated for the first time.
2. On the basis of research instrument constructed, the practice of the didactic model application for development of Engineering English functional abilities is diagnosed and the changes in their application practice caused by *The Regulation of study area of General technology (engineering) sciences* (2005) are assessed.
3. The contents of Engineering English functional abilities applied in the professional environment are identified and the didactic model of these abilities is empirically validated.

The practical significance of the dissertation contains the didactic model for developing Engineering English functional abilities, the practical application of which enables lecturers of foreign languages update the educational process, ensures more effective expansion of students' ability to use the linguistic skills in practice and contributes to the process of designing new programs as well as improving the existing ones.

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GENERAL REVIEW OF THE CONTENTS

The introduction to the dissertation substantiates the research problem, defines the research object, aim and objectives, explains theoretical and methodological approaches to the research, presents the research methods applied, reveals the scientific novelty and practical significance of the research, and presents the list of publications.

1. The theoretical bases for modelling the development system of Engineering English functional abilities

1.1. The theories on the development of English functional abilities

The theoretical construct of the dissertation comprises three basic concepts: Engineering English, functional abilities and modelling of the educational process. These construct segments become cornerstones for building the theoretical bases of the work and for developing the empirical part of the research.

Engineering English is a variety of English used for special purposes. This type of the language is shared by all engineering specialists in their professional environment and bears a distinctive feature of linguistic identity which enables to differentiate Englishes for professional application and General English. This linguistic identity is determined by the forms of specific lexis and specific context. According to three approaches to the analysis of the language nature and development, Engineering and General Englishes are similar from the structural and interactional point of view. The peculiarities appear in the functional or communicative use as they represent different discourses of application. The level of language skills is described by communicative competence. However, General English communicative competence covers all language skills equally balanced and developed, while Engineering English discriminates the development of these skills and subcompetences due to the specific use necessities and the character of application. Engineering English studies are directly related to the contents of the linguistic material but not to the linguistic form. Here the emphasis is given to the profession activity related application and instrumental use character.

Functional abilities from the point of view of Engineering English integrate professional and linguistic abilities of the learner. Professional abilities according to their level of complexity are grouped into elementary, functional and complex. Consequently, functional abilities become the prerequisite and instrument for successful achievement of complex and

sophisticated actions in professional situations. The logical assumption leads to the conclusion that foreign language abilities cannot be treated as the ultimate goal of the teaching-learning process as they play an infra-structural role in the training of all competences (functional, cognitive and general) and the role of the instrument for their full realization. The dissertation refers to the term of English functional abilities as the practical use ability, the application of which in the professional, academic and social environments determines quality of professional activity the individual.

Modelling of the development system reveals the possibilities for constructing the teaching-learning process of Engineering English functional abilities. A model in general acts as a tool for understanding and improving the reality, while the model of development system suggests the answers to the questions *Why?* and *How?* as it is substantiated by the theoretical references and practical didactics of the educational phenomenon. The current change in education paradigm investigated by P. Jarvis (1985), R. Arends (1998), M. Teresevičienė (1998, 2001), E. Jensen (1999), M. Teresevičienė, G. Gedvilienė (1999), B. Bennett, C. Rolheiser-Bennett, L. Stevahn (2000), P. Ramsden (2000), M. Teresevičienė, D. Oldroyd, G. Gedvilienė (2004), G. Petty (2006), R. Čiužas and V. Adaškevičienė (2007), P. Jucevičienė (2007) advocates the priority of learning to teaching and consequently highlights the following features of constructivist learning approach: (1) learning is the process of active construction, (2) while learning the information is interpreted individually, (3) learning is the fusion of growing knowledge, (4) learning is based on collaboration, (5) it is a self-regulating process, (6) it is aim achievement oriented and (7) learning is context and environment related. These learning process suppositions determine the character of modern didactics, the basic principles of which are: (1) activity – while learning an individual should be active, reflect and make decisions, (2) constructivist – learning is based on learner's knowledge possessed and this knowledge is used for further learning, (3) cumulative – new knowledge is related to the one of already acquired, (4) goal – the learner should know what he or she is taught and why it is important. According to these principle aspects of didactic process construction the teacher plays the role of a consultant, subject expert, encourager, organizer, counsellor or mediator.

1.2. The modelling variety and features of models for development of Engineering English functional abilities

1.2.1. The peculiarities and limitations of the traditional model application for the development of Engineering English functional abilities

The methodology of developing English for Special Purposes can be analyzed from three perspectives: (1) the theories on the language nature, (2) the theories on the language teaching-learning process nature and (3) theories on the second or foreign language development characteristics. The theoretical background allows distinguishing the two currently used models of foreign language development: traditional behaviouristic that refers to structural linguistics with orientation to teaching and pragmatic constructivist with emphasis on learning.

The traditional model for development of foreign language abilities is linked to the theoretical postulations of Behaviourism philosophy and psychology claiming that the behaviour or speech actions learned is nothing else but the individual's reaction to a set of well-planned, purposeful and logically arranged stimuli, that is why teaching stands prior to learning (Skinner, 1973; Watson, 2004). The didactics of the traditional model comprises the following groups of teaching methods: *Grammar-translation* and *Audio-lingual* (Richards, Rogers, 1994; Lightbown, Spada, 2000). The language skill development process according to these methods is treated as drilling of the same action in order to achieve a well-formed habit. The main features of the process are: (1) the priority is given to speech accuracy, mistakes are not tolerated and must be corrected, (2) study material is split into segments and they are taught gradually from simple to more complex, each time one segment is dealt with, (3) the weekly number of classes is small, (4) teacher is the only language expert learners are provided during classroom time, (5) students take part in a limited type of language activity – the interaction type is reduced to teacher's initiating, students' response and response evaluation suggested by the teachers, (6) students face major problems in accurate language production at the beginning of the course, (7) in the classroom time teachers use native language or unnaturally simplify the target one. The structural linguistics explains the mistakes made by the student as the result of interrelation and diversity of two languages (native and target foreign) and recommends developing better language habits via drills and repetition. This traditional way of development overrates teaching and underrates learning, ignores reflective, contemplative and experimental aspects of learning, due to which the

learner becomes the active and equally significant agent of the process (Jarvis, 2001).

When Engineering English as any language for professional application is studied according to the traditional didactics, the major problems the student may encounter are: (1) linguistic forms are studied in isolation, the sequence of skill developing is fixed and has no reference to the needs of learners and their individual aims, (2) the development process is teacher oriented, of atomistic structure and the ultimate goal is language accuracy but not fluency, (3) grammar and vocabulary are treated separately from the way they function in real life situations (Feez, 2001). So, the traditional model for Engineering English development can be effective in teaching paradigms of professionally used words, eliminate the mistakes in well-drilled and memorized language items taken separately; however, this didactic way fails to develop English functional abilities which are supposed to be used instrumentally in spontaneous communicative environment.

1.2.2. The conditions and possibilities modelling of the modernistic educational system for the development of Engineering English functional abilities

1.2.2.1. The advantages of constructivist educational system for the development of Engineering English functional abilities

The philosophical bases of modernistic way to understand the process of individual's development in general and individual's abilities to apply skills gained in practice are the subject matter of the philosophical theory of pragmatism (Dewey, 1938; Džeimsas, 1995). This school of thought highlights the role of individual experience in human life as the world sensed is the only one possible to contemplate and know (Argiris, Schön, 1974; Kolb, 1984). Individual experience and contemplating require the unity of thinking and acting, while the criteria to assess the individual truth of the idea are its capability to achieve positive and practical results. The activity of every individual contains the potential of cognitive, emotional, aesthetic and moral development.

The pragmatic insight into the use of language is expressed in the works of linguists who emphasised the functional aspect of the language – its communicative and interactional potential. The goal of the pragmatic methodology becomes the communicative competence, i. e. productive and receptive language skills, of the individual (Chomsky, 2004; Dewey, 1938; Mey, 1998; Richards, Rogers, 1994). The language according to this approach to educating is referred to as the tool and instrument used for prob-

lem solving which is achieved via mutual participation in communicative interaction. So the model known as genre-based or text-based language pedagogy appeared on the bases of functional systemic linguistics and cognitive constructivist theories (Bruner, 1973; Vygotsky, 1982, 1999; Feez, 2001). This approach emphasises the importance of three factors of language use: the meaning, function and social context, and these elements cannot be treated separately in the process of language skill development. Consequently, the theoretical modelling for foreign language development suggests the following principle suppositions: (1) the learner is an active participant in the cognitive process, (2) joint meaning negotiation is the cognitive instrument in social communication, (3) the experience gained during dialogical interaction and joint knowledge acquisition becomes the individual instrument for problem solving, (4) language and thinking come together and are inseparable as rational thinking is fostered due to social activity and relates intellectual action to words used, (5) social context challenges the individual to act, then the ability to challenge the action from others is acquired and eventually the ability to challenge the action from oneself is developed, (6) cognitive process happens due to action, sight and speaking, (7) the goal of functional foreign language development is the effective social communication and this is achieved via authentic interactional practice, diversity of teaching-learning methods as in this way the learning of language items and language systems are united into an organic completeness.

1.2.2.2. The factors and conditions of constructivist didactic model application for the development of Engineering English functional abilities

The modelling of the didactic process represents the teaching-learning cycle the principle statements which claim that (1) what is supposed to be learned and assessed as a result should be well-comprehended by the learner and (2) the student-teacher interaction is equally beneficial as the interaction between learners. This position is backed up by the theory of L. Vygotsky who proposed that teaching-learning process starts from instructing and instructions precede learning. There are the key words that characterize the constructivist model of development: pedagogical scaffolding, discourses (both analyzed and created) and joint construction or negotiation of the meaning. Such didactic context reveals the following main features: (1) the teacher and students collaborate and act together, (2) the interaction initiated by the teacher lead students to the potential level of language production, (3) the teacher acts as an authority and provides the

learners with the expert support and (4) the target language is used interactively and mediates the learning. Such interactive teaching-learning cycle in practical classroom performance reveals systemic functional linguistic approach to the nature of the language and is realized via five stages of didactic activity: (1) building the context, (2) modelling and deconstructing the text, (3) joint construction of the text, (4) independent construction of the text, (5) linking related texts. The argument advocating the advantages of such didactic modelling scheme is the phenomenon of the ability to shift the experience from classroom to real professional life environment (Gage, Berliner, 1994; Patry, 1999; Brunevičiūtė, 2004).

2. Research methodology and methods applied

2.1. The conceptual bases of the research strategy

The methodology of the research is based on the pragmatism philosophical theory by J. Dewey (1938, 2008) and W. James (1995) who related into one the individual's thinking and ways of acting, emphasizing the main elements of the educational paradigm: individual experience as the instrument of knowing the truth, naturalistic humanism, the integration of science and culture. The understanding of thinking phenomenon is based on ideas of cognitive psychology by J. Piaget (2002), constructivist theories by J. Bruner (1966, 1973), A. Lurija (1979), L. Vygotsky (1982, 1999), J. Shotter, M. Billig (1998), M. Bahtin (2008). Neo-constructivists G. Blanck (1990), M. Cole (1990), L. C. Moll (1990), A. Rosa, I. Montero (1990), J. Tudge (1990) and J. V. Wertsch (1990, 1991) suggest the concept of interactive learning within cultural, social and institutional context as well as the explanation of cognitive process as the result of collaboration, joint construction of the meaning, mutual communication and the dialogical nature of thinking. The ideas of humanistic psychology and their imperative application in the modern process of teaching-learning go back to the works of H. Gardner (1993), G. Butkienė, A. Kepalaitė (1996), V. Lepeškienė (1996), C. Rogers, J. Freiberg (1993) and T. H. McLaughlin (1997).

The necessity of the change in educational paradigm and the characteristics of the new one oriented to the learning of an individual is based on the ideas of these scholars: C. Argyris and D. A. Schön (1974), M. Knowles (1984), D. A. Kolb (1984), L. Jovaiša, J. Vaitkevičius (1987), J. Laužikas (1993), R. Arends (1998), E. Jensen (1999), V. Jakavičius (1998), P. Freire (2000), P. Ramsden (2000), P. Jarvis (2001), M. Terešvičienė (2001), R. Baranauskienė (2003), A. Pollard (2006), P. Jucevičienė (2007). The changes in development process didactics in general

and in professional training at higher education level refers to the following authors: N. L. Gage, D. C. Berliner (1994), V. Šernas (1998), P. Jucevičienė, D. Lepaitė (2000), R. Laužackas, K. Pukelis (2000), R. Laužackas (2000, 2005), J. Adomaitienė, M. Teresevičienė (2002), A. Juodaitytė (2003), M. Teresevičienė, D. Oldroyd, G. Gedvilienė (2004), A. M. Juozaitis (2005), L. Šiaučiukėnienė, R. Laužackas, E. Stasiūnaitė, M. Teresevičienė (2005), O. Visockienė, P. Talijūnienė (2006).

The explanation of English as a foreign language study process, its functional nature, application and constructivist approach to the development of language abilities are found in the works of S. Krashen (1989), J. Hawthorn (1998), J. C. Richards, T. S. Rogers (1994), P. M. Lightbown, N. Spada (2000), Ch. N. Candlin, N. Mercer (2004), M. A. K. Halliday, C. M. I. M. Matthiessen (2004). The concept ideas suggested by T. Hutchinson, A. Waters (1987), T. M. Cabre (1992), N. Holden (1998), M. Tisdell (1998), K. Gatehouse (2001), G. Cook (2003), E. Frenco (2005) give an insight into the issue of Engineering English as a variety of English for Special Purposes.

The compilation and the contents of the questionnaire used in the research reflected the basic elements and principles of the didactic modelling for the development of English for professional use:

- M. McCarty, R. Carter (2001), W. Savage, G. Store (2001), P. Knight (2004), N. Noordin, A. A. Samad (2005) suggest the identification of English for Special Purposes as a communicative instrument, the pragmatic function of which is to meet the professional needs of the learners;
- R. Carter (2001), S. Feez (2001), A. Hewings, M. Hewings (2001), P. Knight (2004), M. Lewis (2001), M. H. Long (2004), M. McCarthy, U. Clark (2007), N. Coupland (2007), M. A. K. Halliday, C. Yallop (2007) suggest the idea of inseparability of language form and meaning according to the systemic functional linguistic approach to text styles, genres and functions;
- S. Bacon, M. D. Finnemann (1990), S. McGinnis, Ch. Ke (1992), D. R. Hall (2001) advocate the necessity to use authentic learning material samples;
- J. Sinclair, M. Coulthard (1975), W. Damon, E. Phelps (1989), J. L. Patry (1999), D. R. Hall, A. Hewings (2001), M. P. Breen (2004a, 2004b), P. Gibbons (2004), L. van Lier (2004), N. Mercer (2004), P. Skehan (2004) emphasize the important role of the natural interaction and individual language use experience shift from academic situations into professional life environment.

2.2. The stages and methods of research strategy

Stage 1. At this stage the first objective of the research was achieved – Engineering English functional abilities and the necessity to of their application in the professional environment were identified. The *Text Research* was carried out and *Content Analysis* method was applied for decoding the information identifying the variety of foreign language expression features and the contexts of their use. The documents selected for the analysis suggest the regulations for the development of English for Professional Purposes in the three contexts: the European Union, Lithuanian and professional training contexts. The identification of Engineering English functional abilities and their relevance to the quality of professional activity was analyzed via *Person's Individual Experience Research*; the methods applied were *Content Analysis*, *Semi-structured Interview* and *Categorization* of the data. The methodological guidance of this stage relies on the works of M. Patton (1990), D. Silverman (2000, 2001), M. Travers (2001), H. Fenneteau (2002), S. Kvale (2003), B. Bitinas (2006), L. Cohen, L. Manion, K. Morrison (2007) and L. Rupšienė (2007).

Stage 2. At this stage the second objective of the research was achieved – the didactic conditions and facilities for educating Engineering English functional abilities in colleges were identified. The *Text Research* and *Content Analysis* were applied in investigation of 22 study syllabi of English for Engineering Purposes (representing 7 engineering sciences). The analysis of academic subject objectives was based on the theoretical classification of educational aims suggested by L. Jovaiša (2001): cognitive aims, ability development and personality cultivating aims. The didactic facilities in educating Engineering English functional abilities necessary for practical professional activity were identified on the basis of information gained during the *Interview* with engineering specialists.

Stage 3. At this stage the third objective of the research was achieved – the variety of application practice of didactic models used for the development of Engineering English abilities in colleges and the interrelation between the results of the development of functional abilities and didactic models. The *Diagnostic Research*, *Statistical Analysis* and the *Questionnaire* methods were used at this stage. The methodology was build on the recommendations suggested by V. Panioto (2000), K. Kardelis (2002), R. Vaitkevičius, A. Saudargienė (2006) and V. Jadov (2007). The reliability of the questionnaire was tested with the help of *Cronbach Alpha* (total 0,95, individual question groups 0,88, 0,84, 0,78, 0,83 and 0,90).

2.3. The research participants

The research participants at Stages 1 and 2 were 12 specialists of engineering education background (representing 7 engineering sciences), with engineering professional work experience (average 9,4 years), facing the necessity to use English in professional environment. The research participants at Stage 3 were 845 students of 7 Lithuanian (Alytus, Kaunas, Marijampolė, Panevėžys, Šiauliai, Utena and Vilnius) colleges studying 25 engineering professions.

2.4. The statistical analysis of the research data

The statistical analysis was carried out using SPSS 12 and SPSS 16 programs (Čekanavičius, Murauskas, 2002; Leonavičienė, 2006; Vaitkevičius, Saudargienė, 2006). The following statistical analysis methods were applied: *Cronbach Alpha, factor analysis, Kaiser-Meyer-Olkin test, Kolmogorov-Smirnov Z, Kruskal-Wallis H, Student's t criteria, One-Sample T test, Chi-Square criterion, One-Way ANOVA, Fischer Statistics, Bonferroni criterion, Spearman Correlation*, statistical significance $p \geq \alpha = 0,05$.

3. The empirical research of the possibilities and conditions for improving the educational process of Engineering English functional abilities of college students

3.1. The scope of expression forms and importance of Engineering English abilities

The scope of expression forms and their application importance were investigated via the analysis of the following documents that influence the training of engineering specialists at higher education level: *A Memorandum of Life Long Learning* (2000), *The Lisbon Strategy* (2000), *State Strategy for Education 2003-2012* (2002), *Law on Education* (2003), *The Resolution on Lifelong Guidance* (2004), *The National Lisbon Strategy* (2005), *The Regulation of study area of General technology (engineering) sciences* (2005) and 15 Standards of engineering specialists' training. The analysis was based on determining the categories and the sub-categories as their segments in the documentation texts. The findings of this research stage allowed to state that English abilities are referred to as general ones and the importance of their development is treated as an underlying and document regulated task for institutions of higher education implementing professional study programs. The English ability expression forms of functional character are indicated as the ability to communicate and collaborate

in the professional environment and to be able to use the language as the instrument for personal professional growth. Due to the fact that English abilities are ascribed to the general type, the ability of shifting English used in technological contexts to other social contexts is deduced. The analysis of the scope of Engineering English functional abilities and the necessity of their application was supported by investigating the individual experience of engineering practitioners. The interview data allowed determining the category of functional abilities and its constituent sub-categories: to communicate orally, to understand information written, to understand information spoken and to communicate in writing.

On the bases of results gained at this stage of research the conclusions were drawn:

1. The scope of Engineering English functional abilities used in professional activity form the following sequence according to the frequency of their application: (a) the ability to communicate orally in the professional environment, (b) the ability to understand written profession related information, (c) the ability to understand oral profession activity related information, (d) the ability to communicate in writing in professional activity situations.

2. The importance of English abilities of professional environment application is substantiated by the following arguments: (a) English as foreign language abilities are ascribed to general ones that are necessary for an individual to survive in today's society and the harmonious development of special and general abilities is emphasized; (b) the necessity to develop English for professional use abilities is highlighted by the documents standardizing professional training at national and European level; (c) the interrelation of the abilities to apply English in professional situations and the ability to use the language for the improvement of professional training and professional growth.

3.2. The didactic conditions and facilities of developing Engineering English functional abilities in colleges

At this stage of research the didactic conditions for developing Engineering English functional abilities necessary for successful professional activity were determined. The text analysis of interview data revealed the individual experience reflected by the engineers in practice. The finding categories allowed to determine the didactic conditions favourably disposed to the education of English abilities vital to every engineer. On the basis of teaching-learning process features identified, the recommended didactic model was built: the educational aims of Engineering English sub-

ject, teaching-learning methods and organisation of the study process. The didactic conditions and facilities were investigated analyzing the educational aims of college Engineering English syllabi (25 engineering study programs of 7 engineering sciences). The analysis was carried out in two aspects: from the point of view of the development conditions planned and from the point of view of the language skill facilitating the fostering of functional abilities.

The results of the research identify the following didactic conditions and facilities for Engineering English functional ability development at institutional level:

1. In order to foster students' functional abilities successfully the development process should meet these didactic conditions:

- (a) The educational aims of the subject should cover the formation of three types of abilities: (1) the acquisition of professional lexis and terminology, (2) the comprehension of written information for professional use, (3) the oral communication in professional situations.
- (b) The expansion of abilities of English for professional application should be based on: (1) the teaching-learning activities devoted to reading, analyzing and understanding the written profession related texts , (2) the simulation activities of oral communication, (3) the activities integrating the language and content studying, (4) the independent learning activities.
- (c) The teaching-learning activities should be chosen and implemented in the way that ensure psychologically safe classroom environment, encourage students to take active and beneficial part in the activity and minimize the affective barrier of learners.

2. The educational aims of Engineering English subject revealed the following development facilities significant for the expansion of students' functional abilities in colleges:

- (a) The major part of subject educational aims focuses on ability development and thus corresponds to the requirement to develop functional abilities interactively.
- (b) The acquisition of the terminology necessary for English of professional use covers the group of cognitive aims and thus ensures the lexical possibilities of all functional ability dissemination in professional environment.
- (c) The expression forms of functional abilities necessary for professional activity are linked with the planned aims of the ba-

sics of professional studies and according to the importance the ranking sequence is:

- the ability to communicate orally in professional environment is emphasized as the most important and the planned way of its development is the cultivation of speaking skills, this skill fostering activity gets the major part of attention in the subject syllabus;
- the ability to understand written profession related information is highlighted as an important capability in professional activity and its development is planned via the reading skill cultivation exercises;
- the ability to communicate in writing in professional situations is planned to be developed via the writing skill cultivation activities; however, this ability is treated with more attention as the study syllabus aim than engineering specialists refer to it according to their individual experience;
- the ability to understand profession related spoken information is rated equally with the communication in writing ability according to the frequency of their application; however, the possibilities planned in the subject educational aims for the development of this type of functional ability are minor.

3.3. The priorities of applying didactic models for the development process of Engineering English functional abilities

At this stage of investigation the diagnostic research was carried out, the analysis data was provided by students of engineering professions studying in Lithuanian colleges as the answers to the questionnaire. The data gained enabled (1) to determine the diversity of didactic models used in the process for educating Engineering English and the change in model application practice caused by *The Regulation of study area of General technology (engineering) sciences* (2005), (2) to reveal the self-assessment results of Engineering English functional abilities and (3) to substantiate the correlation between the didactic model application practice and the results of ability fostering.

3.3.1. The application practice of didactic models for the development of Engineering English functional abilities in colleges

The identification of didactic model application practice was carried out with the help of *factor analyses*. The expression of the features of the two didactics (traditional and functional ability oriented) was evaluated analyzing *KMO*, *L* (weight) and *spread* (%) of each factor segment. The factor analysis was applied for investigation of development process practice in general and for four language skill (speaking, reading, writing and listening) development separately. The same procedure was carried out for all research participant groups representing 9 engineering sciences individually.

The research data analysis revealed the fact that the traditional and composed didactic model use is predominating in the process of Engineering English studies in colleges, however, the didactics focusing on the development of language functional abilities is of minor application practice. The factor analysis of the didactic models used for the development of individual functional ability and language skill determined the following: the traditional and functional ability oriented models are used simultaneously for the development of oral communication ability; the functional ability oriented model is applied for the development of reading and understanding the written information ability; the composed model features were identified in the process of the development of communicating in writing ability; the simultaneous application of the two models (the traditional and functional ability oriented) was deduced in the process of the development of understanding the information spoken.

The analysis of the change in the didactic practice inflicted by *The Regulation of study area of General technology (engineering) sciences* (2005) was carried out with the help of *Student's t* test for two independent groups of research participants (having studied Engineering English before and after the document) and *Chi-Square* test while the level of statistical significance equalled to $\alpha = 0,05$. The analysis results showed no influence of the document on the didactic model application practice as: (1) 28 didactic features (77,8 per cent) out of 36 ones remained unchanged; (2) the change of four didactic model features was statistically significant and the change of the rest four ones was statistically insignificant, (3) the tendencies in strengthening of the traditional didactics in post-document period was revealed as three traditional didactic features showed statistically significant growth and only one traditional model feature became weaker in expression, (4) the expression of one functional ability oriented model feature showed statistically significant decline.

3.3.2. The interrelation between the results of self-assessing Engineering English functional abilities developed and the didactic model application practice

At this stage the diagnostic research data on the results self-assessed by the engineering students was investigated: the abilities of Engineering English developed and their application experience. The self-assessment results were correlated with the results of the didactic model application practice. The *statistical analysis* methods (*Student's t test, one-Way ANOVA, Fischer Statistics, Bonferonni criterion* and *Spearman Correlation*, statistical significance $\alpha = 0,05$) were used for evaluating the results for the group of all participants and individually in the groups of engineering sciences, years of studying and in accordance to the study regulation document.

The conclusions of this stage of research state that:

- The self-assessment results of Engineering English functional abilities developed for the whole group of participants are positive; neither various engineering science groups nor the groups in respect to study regulation document showed differences in results; the assessment results differed according to the study year groups as the first year students assessed the fostering of their English abilities higher.
- The abilities of language production character (communication orally and in writing) were assessed less positively as the one third of students gave positive assessment and over one third expressed doubt; the development of these productive abilities were subjected to no change influences by the factors of different engineering science and the regulation document. Rather low results in self-assessment of language production abilities could be related to the predominating practice of traditional didactic model application.
- The abilities of language reception character (understanding information written and spoken) were assessed positively; the difference in results was found in different groups of participants representing different engineering sciences: the higher results were shown in the groups where the study process was based on the functional ability oriented model and lower results in the groups of traditional didactic practical application.
- The self-assessment results of the experience in practical application of functional abilities and linguistic facilitation for participating in professional and academic mobility programs were positive in all groups; while the ability to apply the language instrumentally for the professional growth differed among the groups of engineering sci-

ences: the results appeared higher in the groups with the application of functional ability oriented practice.

- The self-assessment results of the ability to use English skills in practice and the ability to apply learning strategies differed in the student groups of different years of studies (first year students showed the best results) and the groups of different engineering sciences; the lowest results were found in the groups of the traditional or composed didactic model use and the highest ones in the groups of functional ability oriented model domination.
- The self-assessment results of the experience of functional ability application in practice were higher in the groups of students who took the course of Engineering English before the study regulation document and these results could be related to the factors of credit volume and the curriculum place of the subject.

3.4. The review of empirical research findings

The findings of the research enabled to reveal the existing educational system applied for the development of Engineering abilities, the predominating features of practical didactics in Lithuanian colleges. The research results allowed to identify the weaknesses of the educational system practice and to substantiate the necessity of didactic change in the studies of English for professional use. The empirical findings supported the theoretical rationale of the educational process construction: clearly defined aim of the subject studies (Cabre, 1992; McCarty, Carter, 2001; Savage, Storer, 2004; Knight, 2004; Frendo, 2005); studies based on functional approach to the language nature and development (Hutchinson, Waters, 1987; Hawthorn, 1998; Wertsch, 1990; Holden, 1998; Gatehouse, 2001); language studies focus on the analyses and comprehension of authentic teaching-learning material (Bacon, Finnemann, 1990; McGinnis, Ke, 1992; Hall, 2001); the application of simulative oral communication activities when learners can participate in equal symmetric interaction for joint meaning and classroom discourse construction (Sinclair, Coulthard, 1975; Damon, Phelps, 1989; Patry, 1999; Hall, Hewings, 2001; Gibbons, 2004). The empirical findings allowed justifying the hypothesis put forward at the beginning of the dissertation claiming that the system for practical development of Engineering English functional abilities necessary for professional activity could be modelled more successfully when it is substantiated by the didactics of interactive participation of the learners.

CONCLUSIONS

1. The analysis of the theoretical basics of educational paradigm change defined the modernistic didactic model oriented to learning, highlighted the origin links of this development model to the constructivist theories and proved the application relevance of this didactics in the process of educating Engineering English as a foreign language for professional purposes. The theoretical argumentation is validated by the following features of the constructivist didactic model:
 - The ideas of pragmatism and hermeneutics philosophies, constructivism theories, cognitive and humanistic psychologies, active and experiential learning, communication systems theories, systemic functional linguistics, discourse-based language pedagogy build the theoretical basics of the didactic system for development of Engineering English abilities.
 - The functional needs of the language user define the communicative aspect of the application of English for professional purposes and the following features characterize its educational system: (a) the aim of the educational process is to meet the needs of professional activity, (b) the subject syllabus is profession and professional activity related, (c) the development focuses on the language necessary for specific activity and the analysis of specific linguistic discourse, (d) the development process covers three fields of language use (to get, interpret and produce information).
 - The aim of educating Engineering English is the functional abilities which are the prerequisite and instrument for accomplishment of complex professional tasks. The key concepts of functional language development process are action and experience gained during language use activities. Knowing a language is defined as communicative competence containing the segments of linguistic, socio-cultural, discourse, strategy and pragmatic sub-competences. The communicative competence in the use of language is achieved by fostering the language skills: speaking, reading, writing and listening.
 - The didactic model for the development of Engineering English is based on the principles of constructivist didactics: (a) the principle of the aim – learners should know what and why they are learning as the aim is oriented to Engineering English functional abilities development, (b) the cumulative principle allows the knowledge and understanding newly acquired to be related to the one gained

earlier, (c) the constructivist principle claims that learning refers not only to the knowledge possessed at the very moment but also that the knowledge is used for further learning, (d) the principle of action highlights the idea that the individual should be active, thinking and making decisions in learning.

- The essential elements of the didactic model oriented to the development of Engineering English functional abilities are the following: (a) interaction, (b) discourse, (c) pedagogical scaffolding and (d) joint construction of the meaning. These model segments give the constructivist rationale to the cognitive process at interpersonal and intrapersonal levels.
2. The empirical research determined the following significant factors in didactic modelling for the process of the development of Engineering English functional abilities at colleges:
 - 2.1. The analysis of the documents regulating professional training showed that Engineering English abilities are treated as general abilities, i. e. the ability to communicate, collaborate and use language as an instrument for professional growth; and the application of these abilities is possible to be transferred from technological context to the ones of social character. The research of the engineers' individual experience identified the following English functional abilities necessary for successful expression and expansion of professional competence of today's specialist: (a) the ability to communicate orally, (b) the ability to understand the information written, (c) the ability to understand the information spoken, (d) the ability to communicate in writing.
 - 2.2. The didactic conditions and facilities for fostering functional abilities in the process of Engineering English education in colleges were investigated and the essential factors were determined.
 - 2.2.1. The research data of the experience of engineering specialists revealed the following didactic attitudes towards the process of developing English for professional use:
 - The aims of the academic subject English for Professional Purposes are: (a) to know professional lexis, (b) to understand the information written for professional application, (c) to be able to communicate orally in the situations of professional activity.
 - The types of teaching-learning activities are: (a) the activity of reading, analyzing and comprehending the text written; (b) the activity of simulating oral communication situations;

- (c) the activity integrating language and subject content studies; (d) autonomous learning.
 - The dimensions of organizing the process of Engineering English studies which reveal the aspects for process revision and possibilities for improvement: (a) the recommended place of the subject in the study curriculum should be more linked with the study subjects of professional character; (b) the amount of subject credits and weekly classroom hours is insufficient; (c) teaching-learning differentiation is important for those who possess different level of language communicative competence; (d) the importance to use authentic study material; (e) the possibility to chose a supplementary study module of English or any other foreign language.
- 2.2.2. The analysis of educational aims of Engineering English syllabi in colleges identified the possibilities of developing functional abilities as the process of Engineering English functional ability expansion via fostering language skills:
- The educational aims of ability development pursue the expansion of learner's abilities to act in professional situations and the ability of target language practical application which is defined as person's capability to get, understand and transfer information. The group of cognitive aims pursues the knowing of professional lexis which is professional knowledge related and enables the learner to act in job environment. The group of other aims pursues the cultivation of individual's socio-cultural perceptions, application of metacognitive strategies and communicative skills.
 - The development of Engineering English functional abilities is realized in the process of fostering language skills and the ranking of their importance is reflected in the sequence: (1) speaking, (2) writing, (3) reading and (4) listening.
- 2.3. The research of the experience of college students studying various engineering professions identified the application priorities of Engineering English didactic models and revealed the interrelations between the self-assessment results of functional ability development and the didactic model application practice.
- 2.3.1. It was diagnosed that the predominating practice of didactic model application in colleges for development of Engineering English functional abilities distinguishes the composite characteristics of traditional and functional ability oriented

models in practice. The application of the didactic model oriented to the development of functional abilities revealed a narrower range of distribution:

- The functional ability to communicate orally (speaking skill) is developed via the two simultaneously existing didactic models: the traditional and functional ability oriented ones.
- The ability of comprehending written profession related information (reading skills) is developed via the didactic model functional ability oriented.
- The ability to communicate in writing in professional activity situations (writing skills) development demonstrated the application of the model possessing the composite features of two didactics: the traditional and constructivist ones.
- The ability to comprehend spoken profession related information (listening skill) is developed via two simultaneously applied didactic models: the traditional and functional ability oriented ones.

2.3.2. The analysis of the data gained by the survey of the college students studying engineering professions showed the fact that the document *The Regulation of study area of General technology (engineering) sciences* (2005), issued for unification of the structure, content and credit volume of Engineering English subject, caused minor changes in the didactic model application practice: the prevailing didactic practice of traditional education character remained dominating over the constructivist, functional ability oriented model use.

2.3.3. The survey data analysis of college students studying engineering professions revealed the direct links between the application practice of the didactic model chosen and the results of the developing English functional abilities. It was determined that the educational process based on the didactic model functional ability oriented ensures higher results in the education of receptive and productive skills of English for professional needs as well as better self-assessment results of the abilities in practical application:

- The low self-assessment results of the abilities to communicate orally and in written in the situations of professional activity are due to traditional didactic application practice.
- The higher self-assessment results of the abilities to comprehend written and spoken information in English are stated in

those engineering profession groups where the study process is based on the didactic model oriented to functional ability development; and the lower results are gained in those groups of research participants where traditional or composed didactic model application predominate in practice.

- The self-assessment results of Engineering English functional abilities to use the language instrumentally for the professional growth purposes are higher in those student groups where the study process is based on the constructivist didactics functional ability oriented and more favourable conditions are created for the developing of transferable abilities.
- The lowest self-assessment results of the ability to use Engineering English in practice are discovered in those participant groups where the traditional or composed didactic models are prevailing; the highest results are found in the groups where the study process is based on the application of the didactic model functional ability oriented.
- The minor correlation links between the study regulation document and Engineering English didactics were proved, however, the decline in self-assessment results of the ability to use the target language practically could be related to the factors of subject credit volume and the semester curriculum location as the parameters of Engineering English practical use experience suggested by the research participants are higher within the groups having taken the subject before the regulation document was issued and lower results are demonstrated in the groups who took the language course after it.

RECOMMENDATIONS

On the basis of theoretical and empirical conclusions of the dissertation research and having evaluated the topicality of the education of Engineering English functional abilities as well as their expansion conditions at institutional college level, the following actions ensuring the improvement for the development of Engineering English functional abilities are recommended.

The suggestions for the institutions designing and implementing Engineering study programs:

- Alter the place of Engineering English in the study curriculum: the period of Engineering English should be more related to other subjects of professional training, i. e. it is recommended to be shifted from the initial semesters to the subsequent ones. In the case of overlapping of Engineering English and Professional Internship subjects in time, the assignments on English for Special Purposes should be incorporated into the internship tasks.
- Provide the students with the possibility to take a supplementary module of English or any other foreign language. Encourage the learners to take part in international student exchange programs and support the possibility to study for awhile in colleges abroad. According to the wish provide the students with a possibility to study some subjects of professional character in English together with foreign exchange students in Lithuanian colleges.
- Increase the integration of Engineering English and profession training subjects by providing the students a possibility to participate in experience sharing seminars and meetings in English with engineering specialists from abroad.
- At the stage of Engineering English syllabus planning, consult engineering practitioners and colleague teachers of profession training subjects in order to determine clearly the scope of English for professional environment functions the learners are supposed to encounter in real life activities.
- Compiling the study material for Engineering English, file language text samples of real life use; the sample material could be suggested by engineering practitioners on the basis of their personal professional activity experience in order to reveal the necessity of functional abilities in specialist's professional career and development.

- Get acquainted with the theoretical approaches to modern systems of development, rate the strong points and take critical insight into the institutionally prevailing didactic practice of Engineering English teaching-learning in accordance to the requirements of the context of educational paradigm change.
- Study, assess and apply the didactic model of Engineering English functional abilities which ensues the integrated fostering of two types of Engineering English skills: reading and speaking (Figure).

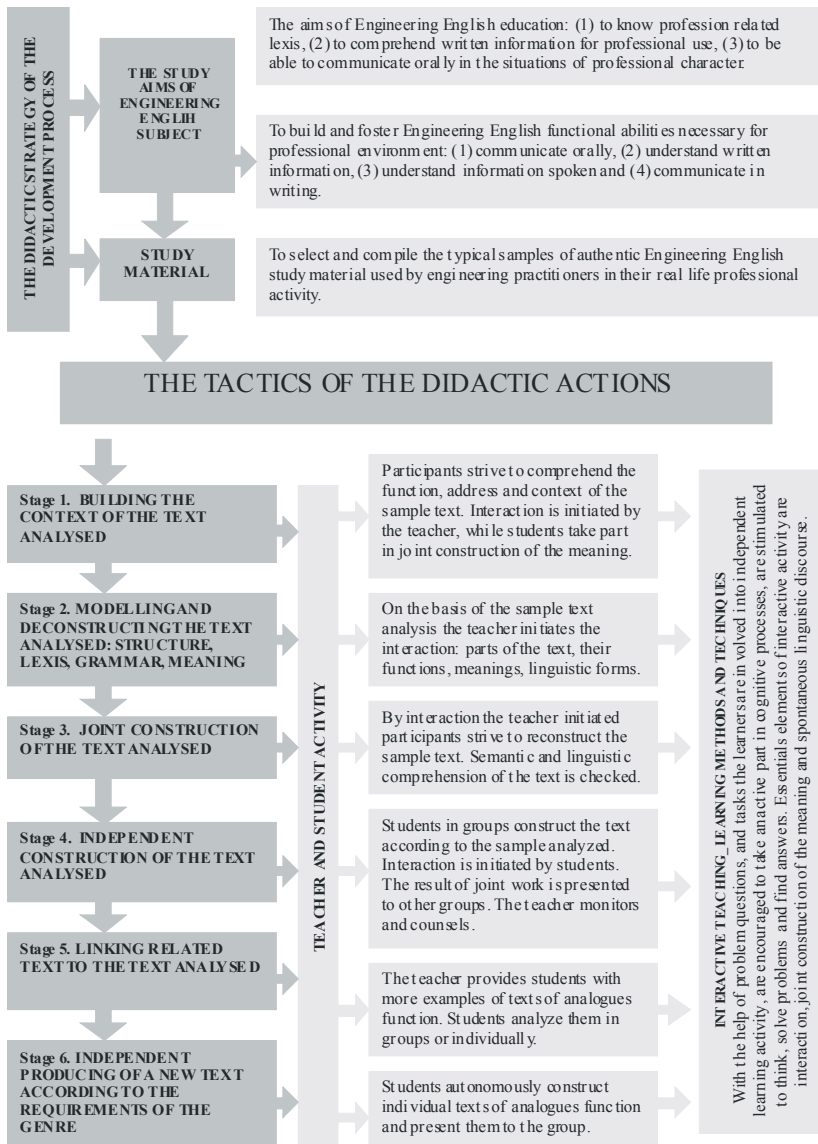


Figure. The scheme of the didactic model for the development of Engineering English functional abilities

Results of the research are presented in the following publications:

- Jasnauskaitė R. (2008). Kolegijos studentų interaktyvaus skaitymo strategijų taikymo problemos inžinerijos anglų kalbos savarankiškų darbų metu // *Mokslas ir edukaciniai procesai*, Nr. 1(5), p. 43-51. ISSN 1822-4644.
- Jasnauskaitė R. (2008). Kolegijų inžinerijos specialybių studentų gebėjimo bendrauti anglų kalba žodžiu profesinėje aplinkoje plėtojimo aktualumas // *Mokslas ir edukaciniai procesai*, Nr. 2(6), p. 27-38. ISSN 1822-4644.
- Jasnauskaitė R. (2008). Anglų kalbos, kaip bendrojo dalyko, didaktikos ir tikslų sąsajos // *Mokslų taikomieji tyrimai Lietuvos kolegijose*, Nr. 5, p. 59-67. ISSN 1822-7244.
- Jasnauskaitė R. (2008). The Scope of English Functional Abilities Necessary for Engineering Professional Environment // *Global Cooperation in Engineering Education: Innovative Technologies, Studies and Professional Development. Second International Conference Proceedings. October 2-4, 2008, Kaunas University of Technology International Studies Centre, Kaunas, Lithuania*. Kaunas: Technologija, p. 90-95. ISSN 1822-8070.
- Jasnauskaitė R. (2008). Specialybės anglų kalba taikomosios lingvistikos ir praktinio taikymo požiūriu // *Šiuolaikinio specialisto kompetencijos: teorijos ir praktikos dermė. Tarptautinė mokslinė-praktinė konferencija. 2008 m. gegužės 28 d. Straipsnių rinkinys*. Kaunas: Kauno kolegijos leidybos centras, p. 50-54. ISBN 978-9955-27-109-3.
- Jasnauskaitė R. (2008). Inžinerines specialybes studijuojančiųjų kolegijoje funkcinių anglų kalbos gebėjimų plėtra // *CLILL (Content Language Integrated Learning) metodas integruotame specialybės ir užsienio kalbų mokyme/si: perspektyvos ir problemos. Respublikinė mokslinė-praktinė konferencija 2008 m. sausio mėn. 17 d. Kauno kolegija. Mokslinių straipsnių rinkinys [CD]*. ISBN 978-9955-27-063-8.

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Since 2008: lecturer and vice dean of Kėdainiai Jonušas Radvila Faculty in Kaunas College.

REZIUMĖ

Temos aktualumo ir mokslinės problemos pagrindimas

Šiuolaikinio profesinio rengimo svarbiausias tikslas yra ugdyti kvalifikuotą, kompetentingą, gebantį savarankiškai veikti ir priimti sprendimus specialistą. Tai pažymima švietimo politiką ir strategiją formuojančiuose bei profesinį rengimą reglamentuojančiuose dokumentuose: *Europos Komisijos Mokymosi visą gyvenimą memorandumas* (2000), *Lisabonos strategija* (2000), *Mokymosi visą gyvenimą užtikrinimo strategija* (2004), *Nacionalinė Lisabonos strategijos įgyvendinimo programa* (2005), *Lietuvos švietimo plėtotos strateginės nuostatos: švietimo gairės 2003–2012 metai* (2002), *Lietuvos Respublikos švietimo įstatymas* (2003). Juose nurodomas gerai parengto aukštojo mokslo specialisto esminis vertinimo bruožas – konkurencingumas Europos Sąjungos darbo rinkoje. Gebėjimas konkuruoti profesinėje veikloje ir būti mobiliam tiesiogiai siejasi su šiandieninio specialisto geru užsienio kalbų mokėjimu.

Užsienio kalbos mokėjimas, kurio siekia aukštojo mokslo institucijos, švietimo politiką sąlygojančiųjų dokumentų yra įvardijamas kaip būtina prielaida specialisto profesinėms kompetencijoms ir tinkamai kvalifikacijai įgyti. Profesinių kompetencijų plėtros pagrindą sudaro specialybės žinios, specialiųjų gebėjimų formavimas(is) ir patirtis, įgyjama praktinio taikymo metu. Orientacija į praktinę veiklą ir praktinės veiklos patirtimi grindžiamas ugdymo(si) procesas charakterizuoja aukštojo neuniversitetinio lygmens profesinio rengimo specifiką ir paskirtį.

Bendrasis technologijos mokslų (inžinerijos) studijų srities reglamentas (2005) užsienio kalbos mokėjimą profesinio rengimo požiūriu akcentuoja kalbos praktinio taikymo gebėjimų formavimo bei plėtros poreikį. Todėl čia stebimas tradicinės, orientuotos į mokymą, bet ne į mokymąsi, pedagoginės paradigmos nepajėgumas spręsti šiuolaikinius profesijos anglų kalbos ugdymo(si) uždavinius ir grindžiamas paradigminės kaitos būtinumas. Išskyla poreikis pažvelgti į individo kognityvinės plėtros ir raidos prielaidas bei galimybes pragmatiniu konstruktyvistiniu aspektu, skatindamas ieškoti naujų, derančių su moderniąja ugdymo(si) sistema didaktinių modeliavimo kelių. Principinių nuostatų į mokymą(si) kaitos būtinybę akcentuoja J. Dewey (1938, 2008), J. Bruner (1966, 1973), C. Argyris, D. A. Schön (1974), L. Vygotskij (1982, 1999), D. A. Kolb (1984), L. V. Wertsch (1990, 1991), V. Džeimsas (1995), R. Arends (1998), E. Jensen (1999), P. Jarvis (2001), J. Piaget (2002), M. Bakhtin (2008), pabrėždami mokymosi, ne tik mokymo, ugdytinio kaip aktyvaus kognityvinio subjekto,

jo įgytos ir įprasmintos patirties svarbą ugdymo(si) procese. Konstruktyvistinės didaktikos, kurios esminis bruožas yra interaktyvi ugdytinių veikla, aktualumą šiandieniniame profesiniame rengime akcentuoja R. Laužacko (2000, 2005), M. Teresevičienės, D. Oldroyd, G. Gedvilienės (2004), A. M. Juozaičio (2005), R. Laužacko, E. Stasiūnaitės, M. Teresevičienės (2005), L. Šiaučiukėnienės, O. Visockienės, P. Talijūnienės (2006), P. Juzevičienės (2007) darbai.

Inžinerijos anglų kalbos ugdymo(si) sistemos, orientuotos į funkcinių gebėjimų plėtrą, modeliavimas taip pat yra siejamas su naujomis edukacinėmis ir lingvistinėmis nuostatomis į specialiesiems tikslams skirtos užsienio kalbos mokymo(si) procesą. Instrumentinis požiūris į funkcinius profesijos anglų kalbos vartosenos gebėjimus pabrėžia realių kalbos diskursų analizės ir produkavimo pratybų svarbą. Tyrimai, atlikti S. Feez (2001), A. Hewings, M. Hewings (2001), M. Lewis (2001), M. H. Long (2004), U. Clark (2007), N. Coupland (2007), M. A. K. Halliday, C. Yallop (2007), akcentuoja kalbos formos ir reikšmės nedalumą. Kalbos studijoms naudojamų autentiškų, profesinės veiklos situacijose funkcionuojančių kalbos tekstų reikšmė atskleidžiama S. Bacon, M. D. Finnemann (1990), S. McGinnis, Ch. Ke (1992), D. R. Hall (2001) darbuose. O specialiesiems tikslams skirtos anglų kalbos komunikacinis tikslas T. Hutchinson, A. Waters (1987), T. M. Cabre (1992), J. Hawthorn (1998), N. Holden (1998), M. Tisdell (1998), E. Frenco (2005) yra identifikuojamas kaip gebėjimas atpažinti šiam tikslui tinkamo kalbos teksto lingvistines charakteristikas, būti įgudusiam dekoduoti semantinę turinį ir gebėti perduoti informaciją, laikantis konkrečią funkciją atliekančio kalbos žanro reikalavimų.

Kalbos, kaip komunikacinio instrumento, kurio pragmatinis tikslas yra tenkinti ugdytinių kalbinius profesinius poreikius, tyrimai atlikti M. McCarty, R. Carter (2001), W. Savage, G. Store (2001), P. Knight (2004), N. Noordin, A. A. Samad (2005), pabrėžia poreikį pradėti inžinerijos anglų kalbos funkcinės vartosenos gebėjimų ugdymo(si) sistemos didaktinį modeliavimą nuo šiai profesinei veiklai būdingų kalbos vartosenos formų ir jų funkcijų raiškos identifikavimo. J. Sinclair, M. Coulthard (1975), W. Damon, E. Phelps (1989), J. L. Patry (1999), D. R. Hall, A. Hewings (2001), P. Gibbons (2004), N. Mercer (2004), L. van Lier (2004), P. Skehan (2004) išskirti reikšmingi didaktinės veiklos elementai – interakcija, pedagoginė parama, bendras reikšmės kūrimas ugdymo(si) procese, kalbinės patirties perkėlimas į realios veiklos situacijas – įgalina konstruoti modernistinį inžinerinės anglų kalbos didaktinį modelį, sujungiantį visas profesinei kalbos vartosenai būdingų gebėjimų raiškos formas į vientisą ugdymo(si) sistemą,

sudarantį visų funkcinių profesijos kalbos gebėjimų plėtotės tarpusavio dermę.

Disertacinio darbo aktualumą patvirtina anksčiau pateiktų Lietuvos ir pasaulio edukologų tyrimų dėmesys ugdymo(si) paradigmų kaitai, aukštojo mokslo profesinio rengimo situacijos analizei, mokymo(si) procesui ir daktikai. Universitetų studentų mokymosi aspektai taip pat sulaukė tyrėjų dėmesio: metakognityvines strategijas nagrinėjo V. Zuzevičiūtė (2005), universitetų studentų užsienio kalbų mokymosi strategijas analizavo N. Mačianskienė (2004), Vengrijoje T. Bajzát (2007) atliko universiteto inžinerijos specialybių absolventų bendrosios anglų kalbos vartojimo poreikio profesinėje aplinkoje kiekybinį tyrimą.

Ugdymo(si) sistemų kaitos sąlygotas didaktikos raidos kontekstas suformuluoja šio disertacinio darbo **probleminį klausimą: kaip modeliuoti modernistinę kolegijose studentų inžinerijos anglų kalbos ugdymo(si) sistemą, optimizuojančią funkcinių gebėjimų plėtrą?**

Tyrimo pradžioje iškelta **hipotezė** teigia, kad **inžinerijos profesinėje veikloje reikalingų funkcinių anglų kalbos gebėjimų ugdymo(si) sistema gali būti sėkmingai modeliuojama, kai yra grindžiama interaktyvios besimokančiųjų veiklos didaktika.**

Tyrimo objektas – inžinerijos anglų kalbos ugdymas(is) kolegijose.

Tyrimo dalykas – inžinerijos anglų kalbos funkcinių gebėjimų ugdymo(si) sistemos modeliavimas kolegijose.

Tyrimo tikslas – teoriškai apibrėžti ir empiriškai pagrįsti inžinerijos anglų kalbos funkcinių gebėjimų ugdymo(si) sistemos didaktines sąlygas ir veiksnius.

Tyrimo uždaviniai:

1. Atlikti tyrimo konstrukto turinio analizę ugdymo(si) paradigmų kaitos aspektu ir pagrįsti modernistinės anglų kalbos funkcinių gebėjimų didaktikos taikymo aktualumą teoriniame lygmenyje.
2. Nustatyti reikšmingus inžinerijos anglų kalbos funkcinių gebėjimų ugdymo(si) kolegijose sistemos modeliavimo veiksnius:
 - 2.1. Apibrėžti inžinerijos anglų kalbos funkcinių gebėjimų raišką ir pagrįsti šių gebėjimų taikymo svarbą profesinėje aplinkoje.
 - 2.2. Identifikuoti inžinerijos funkcinių gebėjimų ugdymo(si) didaktines sąlygas ir galimybes kolegijose.
 - 2.3. Nustatyti inžinerijos anglų kalbos didaktinių modelių prioritetus ir įvertinti funkcinių gebėjimų plėtros rezultatų sąsajas su didaktinių modelių taikymo praktika.
3. Remiantis tyrimo rezultatais, sudaryti inžinerijos anglų kalbos didaktinį modelį, orientuotą į kalbos funkcinių gebėjimų plėtotę.

Mokslinio tyrimo metodai, panaudoti šioje disertacijoje

- **Mokslinės literatūros ir dokumentų analizė**, kurios metu buvo nagrinėjamos modernistinės ugdymo(si) sistemos teorijos ir identifikuoti reikšmingi inžinerijos anglų kalbos funkcinių gebėjimų didaktinio modeliavimo veiksniai teoriniame lygmenyje.
- **Kokybinis ir kiekybinis tyrimai**, kurių tarpusavio dermė pasižymėjo skirtingo dominavimo dizainu: kokybinis tyrimas identifikavo didaktiniam modeliavimui reikšmingus veiksnius ir sąlygas, o kiekybinis tyrimas pagrindė inžinerijos anglų kalbos didaktinio modelio, orientuoto į funkcinius gebėjimus, taikymo pranašumą.
- **Kokybinio tyrimo metodai: interviu metodas** padėjo apibrėžti inžinerijos profesinėje veikloje reikalingų anglų kalbos funkcinių gebėjimų turinį ir pagrįsti jų ugdymo(si) aktualumą bei išskirti pagrindinius didaktinio modelio elementus. **Turinio analizės metodas** taikytas kokybinio tyrimo duomenų analizės metu.
- **Kiekybinio tyrimo metodai: apklausos raštu metodas** nustatė kolegijose taikomų profesijos anglų kalbos ugdymo(si) didaktinių modelių pasirinkimo prioritetus ir empiriškai pagrindė į funkcinių gebėjimų plėtrą orientuotos didaktinės praktikos ir mokymo(si) rezultatų įsivertinimo sąsajas. **Statistinės analizės metodai** naudoti kiekybinio tyrimo rezultatų analizei: **Cronbach Alpha** testas – klausimyno teiginių patikimumui nustatyti, **faktorinė analizė** – taikomiems didaktiniams modeliams identifikuoti, **Kaiser-Meyer-Olkin** testas – klausimyno rezultatų tarpusavio ryšiams įverti, **Kolmogorov-Smirnov Z** kriterijus – normaliųjų skirstinių nustatymui, **Kruskal-Wallis H** kriterijus – rezultatų skirstinių dėsninimumui pagal informantų grupes patvirtinti, **Student t** kriterijus – dviejų nepriklausomų imčių rezultatų vidurkiams palyginti, **Chi kvadrato** kriterijus – dviejų skirstinių rezultatų procentinei išraiškai palyginti, **vienfaktorinė dispersinė analizė**, **Fischer** statistika **ir Bonferonni** kriterijus – įverčių vidurkių skirtumams tarp nepriklausomų imčių identifikuoti, **Spearman koreliacija** – įverčių sąsajoms nustatyti. Statistinė duomenų analizė atlikta SPSS 12 ir SPSS 16 programomis.

Tačiau atlikta teorinių šaltinių analizė parodė, kad šiandieniniame mokslinių tyrimų kontekste pasigendama gilesnių išvalgų į inžinerijos anglų kalbos vartosenos raiškos formų įvairovę ir sąsajų su ugdymo(si) proceso didaktika kolegijose. Šis darbas prisideda prie aktualių ugdymo(si) pro-

blemų tyrinėjimo, įnešdamas mokslinio naujumo į bendrą edukacinių tyrimų kontekstą. Disertacinio darbo **mokslinį naujumą** sudaro:

1. Pirmą kartą išsamiai tiriama inžinerijos anglų kalbos mokymo(si) procesas Lietuvos kolegijose.
2. Remiantis sudarytu tyrimo instrumentu, diagnozuota kolegijų inžinerijos anglų kalbos funkcinų gebėjimų ugdymo(si) didaktinių modelių taikymo praktika ir įvertintos jų kaitos sąsajos su *Bendruoju technologijos mokslų (inžinerijos) studijų srities reglamentu* (2005).
3. Identifikuotas inžinerijos specialistų funkcinės anglų kalbos gebėjimų profesinėje aplinkoje turinys ir empiriškai pagrįstas šių gebėjimų ugdymo(si) modelis.

Disertacinio darbo **praktinį reikšmingumą** sudaro rekomenduojamas inžinerijos anglų kalbos funkcinų gebėjimų ugdymo(si) didaktinis modelis, kurio praktinis taikymas leis užsienio kalbų dėstytojams modernizuoti edukacinį procesą, laiduos rezultatyvesnę studentų praktinio kalbos taikymo profesinėje veikloje gebėjimų plėtrą bei padės kuriant naujas ir tobulinančias vykdomas studijų programas.

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1977–1982: Vilniaus universitetas, Filologijos fakultetas, romanų-germanų kalbų ir literatūros specialybė, filologo, anglų kalbos dėstytojo kvalifikacija.

1982–1993: anglų kalbos mokytoja Kėdainių 2-ojoje vidurinėje mokykloje.

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2001–2003: Šiaulių universitetas, Edukologijos fakultetas, edukologijos krypties magistrė.

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