

DEVELOPMENT OF ARGUMENTATION SKILLS IN IBT/L CONTEXT: A COMPLEX CASE STUDY OF TEACHER PROFESSIONAL DEVELOPMENT PROGRAMME

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Contemporary educational paradigms focus not only on the production of knowledge, but are beginning to focus more and more on the effective application/ integration/ manipulation/ etc. of existing information and knowledge. In such context inquiry based teaching and learning (IBT/L) is especially relevant because of its investigation via argumentation nature. For this reason the research presented in the current paper is designed for the diagnostics of the existing teachers' argumentation skills and their development after the dissemination and implementation of European Council Framework 7 Programme project S-TEAM ideas on the argumentation in IBT/L. The analysis of scientific literature sources highlighted the structure, types of arguments and the model of argumentative competence. The main research method is the complex case study, the data analysis of which enabled to identify the prevailing teachers' argumentation skills and their development after the seminars presented for students of teacher professional development programme in Kaunas University of Technology via distant learning classes.

Keywords: IBT/L, argumentation, argumentation competence.

РОЗВИТОК НАВИЧОК АРГУМЕНТАЦІЇ В КОНТЕКСТІ IBT/L: СКЛАДНИЙ ПРИКЛАД ДЛЯ ВИВЧЕННЯ ПРОФЕСІОНАЛА УЧИТЕЛЯ ПРОГРАМА РОЗВИТКУ

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Сучасні освітні парадигми фокусуються не лише на виробництві знання, але дедалі усе більше починають зосереджуватися на ефективному застосуванні/інтеграції/маніпуляції тощо існуючих знань та інформації. У такому контексті особливої актуальності набуває дослідження ефективності практичного застосування результатів навчання/учіння (IBT/L), зокрема дослідження природи аргументації. Тому дослідження, що висвітлюється у даній статті, було зосереджене на діагностиці існуючих навичок аргументації у вчителів та їх розвитку після поши-

рення і впровадження Європейською Радою ідей проекту S-TEAM відносно аргументації в IBT/L, який виконувався в межах 7 Рамкової програми.

Аналіз наукових літературних джерел дозволив виділити структуру, типи аргументів і модель аргументаційної компетентності. Основний метод дослідження – комплексний аналіз кейсів, який дозволив визначити найбільш поширені навички аргументації у вчителів та їх розвиток після семінарів, проведених для студентів, які пройшли дистанційну підготовку за програмою розвитку педагогічної майстерності у Каунаському Університеті Технологій.

Ключові слова: розвиток педагогічної майстерності, IBT/L, аргументація, аргументаційна компетентність.

INTRODUCTION

The 21st century education might be characterized as interactive, cooperative, collaborative, inter-disciplinary process with clear priorities of competent usage of modern technologies, development of problem solving skills, abilities to evaluate learning needs and outcomes. Such characteristics highlight the active functioning of interactive education paradigm which leads to enabling of learning paradigm.

The context of educational paradigm shift implies the priority of educational processes, which would involve such educational activities that would lead from teacher-centeredness to learner-centeredness. So as teachers point out, students and teachers alike are taken out of their current comfort zones that are usually provided by teacher-centered instruction models and led towards a multi-perspective view of learning and instruction. It means that alongside with quite difficult theoretical studies there should go involving and attractive experimental activities, the intention of which is to direct young people towards original research and discussion.

Forming teacher's multi-perspective view of learning and instruction requires a revision of traditional teacher training programmes. For this reason the teacher training programme «Pedagogy» of Kaunas University of Technology (Lithuania) underlines the relevance of such processes that harmonize learners' critical and creative thinking. For this reason the current European Council Framework 7 programme project S-TEAM experience of IBT/L was introduced into the programme «Pedagogy».

According to the majority of IBT/L definitions [25; 2; 12; 11; 24; 4; 13; 6; 23; ect.], inquiry-based teaching is an interactive research-based strategy (method) that actively involves students in the exploration of the content, issues, and questions surrounding a curricular area or concept. Active involvement in the investigation leads to IBT/L, which may be characterized as 'learning by doing' and can be accelerated by active problem solving revealed via argumentation progress. Here comes the relevance of the research leading to the investigation of the possibilities to integrate argumentation learning into teacher training process. As action research can also be characterized as an interactive inquiry process, it has been chosen as a leading learning method for the development of argumentative skills of «Pedagogy» future teachers.

Here comes the main task of this research paper: to perform the diagnostics of the existing future teachers' argumentation skills and their development after the dissemination and implementation of S-TEAM ideas on the argumentation in IBT/L context.

In order to fulfill the main task, there were set the following objectives:

- to analyse the theoretical possibilities of the development of argumentation skills in IBT/L context;
- to perform complex case study the data analysis of which enabled to identify the prevailing future teachers' argumentation skills and their development after the seminars presented for students of teacher professional development programme in Kaunas University of Technology via distant learning classes.

The prevailing research method of the development of teachers' argumentation skills is a complex case study consisting of seven personal action research case studies of «Pedagogy» students, which are later joined into a unique case study.

The research consists of two parts: the survey of theoretical literature on IBT/L and argumentation and the analysis of complex action research case study, the data of which reveal the possibilities to develop the argumentative competence of future teachers, who participate in the KTU programme «Pedagogy».

THEORETICAL SURVEY OF ARGUMENTATIVE COMPETENCE DEVELOPMENT IN THE IBT/L CONTEXT

The research was performed according the theoretical and methodological concepts that enable of multi-dimensional approach to argumentative competence development in IBT/L. To begin with there are underlined educational attributes of Conceptual society [14; 22] which highlight the necessity of active balance between creative and critical thinking. Active balance between creative and critical thinking might be provided with the help of IBT/L.

According Chiappetta and Adams [5] IBT/L criteria include a research question; inquiry activities that involve students; scientifically argumentated (based on analysis of presented data) answer to the relevant question. The theoretical premises for the development of argumentative competence are based on Kline's [15] conception on four argumentation competencies the expression of which provide successful critical discussions of proposals, creating consensus about problematic situations, advocating proposals, facilitating behavioral commitment, and integrating identities.

The capacity for logical thought is one of the things that make us human. But in a world of ubiquitous information and advanced analytic tools, logic alone won't do. What will distinguish «those who thrive» will be their ability to tell a story, not just present an argument. This suggests that creative thinking is at least as important as critical thinking. The educational tradition of problem solving points out that learning is made especially attractive when students face problem-solving context, and their responsibility is to solve these problems. In such context creativity and critical mind go hand in hand while highlighting the issue of argumentation and argumentative competence.

Researchers of inquiry based teaching [25; 2; 12; 11; 24; 4; 13; 6; 23; ect.] point out inquiry based teaching/learning strategies that provide teaching and learning integration in such a way that staff and students become partners in the learning process, where both sides (teachers and students) strive to develop scientific investigation, argumentative reasoning and personal learning skills. Students learn by identifying and engaging with the questions and problems of their discipline, becoming participants in the research process. They direct their own lines of inquiry-which often means designing their own open-ended questions-and identify appropriate methods and resources with which to address and argument them. The tutor acts as a 'walking resource', guiding the students' inquiries without undermining the students' autonomy, which is crucial in inquiry approaches.

Inquiry process is closely connected with argumentation and the development of argumentative competence (see Fig.1).

The argumentative competence model is formed while relying on the general competence concept, underlying knowledge, skills and attitudes. It has four elements: holistic understanding of argumentative competence, 3 levels of argumentative skills, 4 major argumentative competencies, and 6 levels of argumentative performance. Argumentative competence is the set of knowledge, skills, attitudes and values which enables to prove the set thesis, to present clear, reliable, ethical, correct arguments to guarantee the successful construction of the information, its coding, decoding and interpretation.

Argumentative skills may be characterized by 3 levels:

- I level of argumentative skills is formed, when new knowledge is created avoiding questioning and relying only on factual arguments;
- II level of argumentative skills is formed when the presented information is questioned and the quality of presented arguments is being checked;
- III level of argumentative skills is formed when new knowledge is being created while relying on valid original arguments.
- 4 argumentation competencies are associated with critical discussions of proposals: creating consensus about problematic situations, advocating proposals, facilitating behavioral commitment, and integrating identities [15].
- As argumentative performance is linked to the language quality and communication, argumentative performance levels are defined [1] according the model of the «Common European Framework of Reference for Languages: Learning, Teaching, Assessment» [32]: A1 – «I can find the main arguments in written and spoken texts»; A2 – «I can examine written and spoken texts to find the main arguments and trace their development»; B1 – «I can examine written and spoken text to find, evaluate and correct incorrect reasoning»; B2 – «I can examine written and spoken text to find and assess correct, incorrect and counter-arguments»; C1 – «I can examine and written and spoken text available to assess their fair or false arguments and present their arguments and counter-arguments»; C2 – «I can discuss the development of complex, dialectical, arguments within the text, revealing contradictions».

- This model of argumentative competence was introduced and researched within the framework of KTU teacher training programme «Pedagogy».

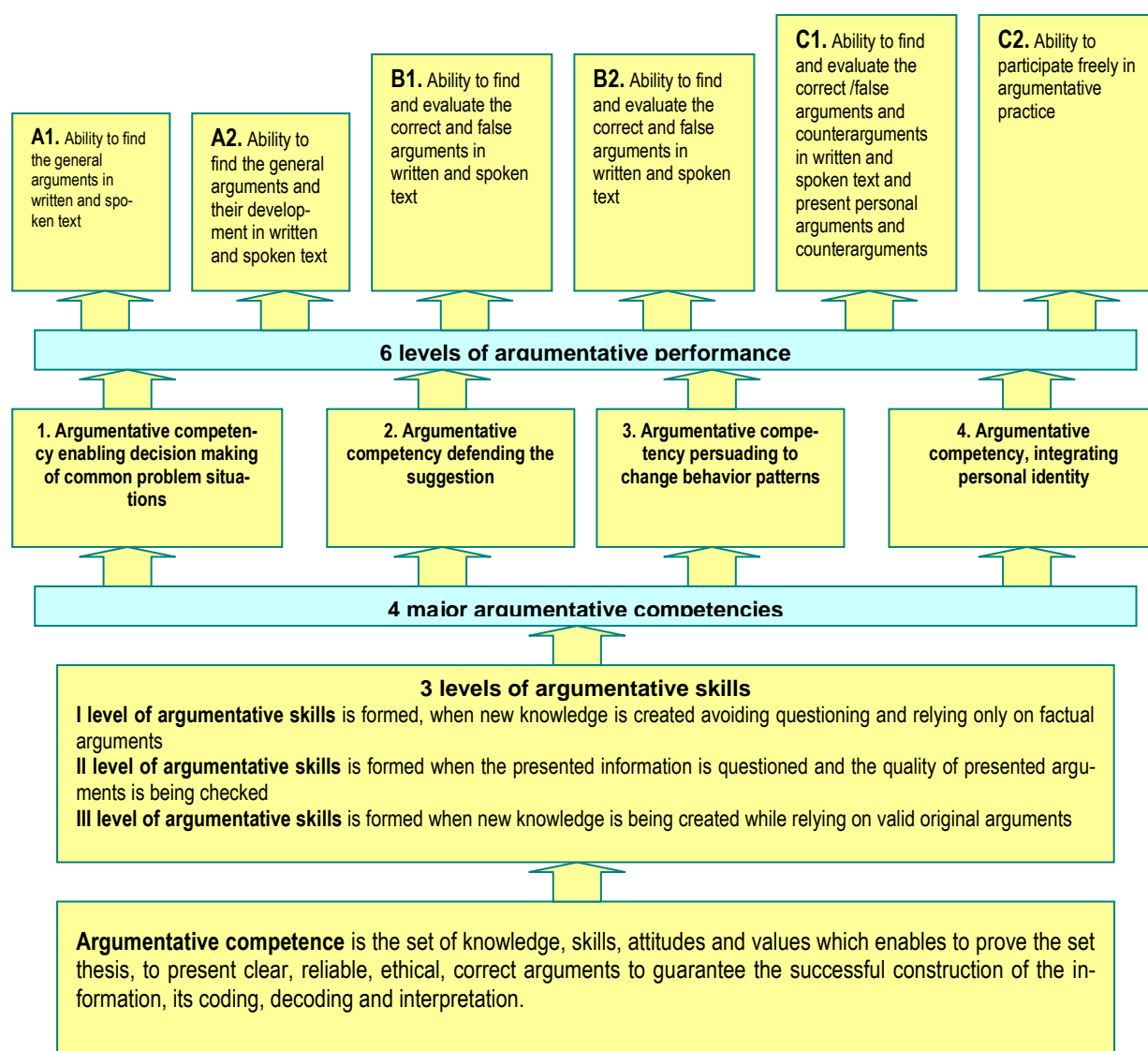


Fig.1. The model of argumentative competence

THE RESEARCH DESIGN AND THE DATA ANALYSIS

The research investigating the development of future teachers' argumentative competence is performed in a qualitative research paradigm.

The research was performed in Kaunas University of Technology (Lithuania) while working within the framework of teacher training programme «Pedagogy». The major learning method is action research. Action research is an interactive inquiry process [18] that balances problem solving actions implemented in a collaborative context with data-driven collaborative analysis or research to understand underlying causes enabling future predictions about personal and organizational change [4; 23]. S-TEAM project outcomes were introduced to all students of the programme «Pedagogy» while presenting them seminars on IBT/L and argumentation. Seven students – science teachers – expressed their willingness to participate in the research.

This research paper proposes a multi-dimensional approach to analyze argumentative competence of future teachers. The method of case study is chosen as a main research method because it enables to reveal uniqueness and complexity of the research phenomenon. The case study consists of seven personal case studies of «Pedagogy» students. For this reason it is called complex. The complex case study of the development of teachers' argumentation skills is designed around three major argumentation performance lines. First argumentation performance line was called A line.

It is teachers' personal line, revealing argumentation skills while performing personal action research connected to the voluntary chosen research question. B line – argumentation in the final thesis, which is related to the quality of argumentation while working with the research focus group and scientific advisor. C line investigates argumentation presented during the defence of final thesis defence. Students argumentative responses to questions are: «Could you explain the benefits of IBT/L for your pupils?» «What difficulties of IBT/L have you encountered?» were recorded in the defence minutes.

All these three lines include tasks for development of argumentation competence. It was required that "Pedagogy" students while performing action research should analyse IBT/L cases in their pedagogical practise using theoretical concepts, continuously warrant, qualify or argue against solutions to the problems until they converge towards a joint solution and include at least three different kinds of epistemic activities: to construct the problem space, the conceptual space, and relations between conceptual and problem space [30]. The *construction of problem space* is required for the understanding of a problem [30]. Future teachers select, evaluate, and relate single components of action research problem information. The *construction of conceptual space* comprises summarizing, rephrasing, and discussing theoretical concepts and principles. The *construction of relations between conceptual and problem space* can indicate how learners approach a problem in detail, can indicate knowledge application on the basis of the concepts that learners resort to in order to analyze the problem, as well as how learners construct and balance arguments and counterarguments in order to prove possible resolutions to these problems [29].

According the structure of argumentative competence model (see Fig. 1) the discourse corpora of students final theses was segmented into meaningful units of argumentative reasoning with respect to (1) the construction of arguments, (2) the construction of sequences of arguments [8; 28; 9; 21; 17; 3], and (3) the content of arguments highlighting in line A research question motivation, in line B – the development of teacher professional competence, in line C – usefulness and difficulties of IBT/L. The research data are analysed according the Descriptor of Teachers' Professional Competencies [20].

The meaningful units of all three A, B, C argumentation performance lines were analyzed according to principles of content analyzes referring to methodological attitudes of Miles and Huberman [19]. The analysis stages were as follows:

- 1) reading of segmented meaningful units by distinguishing essential aspects related to the phenomenon being analysed;
- 2) identification of notional elements, searching semantically related responses and basic concepts;
- 3) distribution of notional elements to categories and subcategories;
- 4) interpretation of categories and sub-categories, integration of categories into the context of the phenomenon being analysed.

The analysis of *construction of single arguments* is based on Toulmin's model of arguments with the elements *claim*, *ground with warrant*, and *qualifier* [26; 10]. Claims are statements that advance the position learners take. Segments are regarded as claims if they do not serve as grounds or qualifiers for other claims. Grounds with warrants present the reason why a claim is valid. Grounds are evidences, e.g., observations or experiences, and warrants are logical connections between the grounds and claims that indicate how a claim is supported by the grounds. Qualifiers are statements that limit the validity of a claim to specific circumstances. With the help of word indicators ("because", "therefore" etc.) and by logical coherence, claims may be identified as warranted claims based on grounds. Qualifier and ground with warrant are independent attributes of claims. Thus, a claim may be simple, warranted, qualified or both, warranted and qualified. Claim, ground with warrant and qualifier of an argument may be distributed over several micro-segments. *Sequences of arguments* consist first of all of at least one *argument* in favor of a specific point [31]. Any new (warranted / qualified) claim is coded as an argument that has not been preceded by a conflicting argument. *Counterarguments* consequently attack the existing arguments by putting up contrary or alternative claims. Any claim, which challenges and contradicts the earlier argument, is coded as a counterargument in addition to and independent of its coding as warranted / qualified claim. *Replies* consider and differentiate at least two preceding arguments or take the discussion to a higher level. Any claim supporting points of more than one line of preceding arguments is regarded as a reply [31].

When carrying out the research the following ethical principles were considered: responsibility of a researcher for possible negative outcomes as well as rendering of information on the research aim, participation of respondents in the survey voluntarily, anonymity of the research by guaranteeing confidentiality, as well as principle of justice by not giving questions about personal life of the respondents.

RESULTS AND FINALIZING

Line A is devoted to the reasoning of the students' action research question which is presented in order to demonstrate the research problem relevance «How I could help my pupils to develop x subject skills while performing action research?» Line A demonstrated teachers' personal practical experience which motivate programme students' decision for the voluntary chosen research question.

According the argumentation competence model (see Fig. 1) the analysis of construction of single arguments skills that have emerged in line A may be defined as II and III level argumentative skills which are formed when the presented information is questioned and the quality of presented arguments is being checked (5 cases) and which are formed when new knowledge is being created while relying on valid original arguments (2 cases) (see APENDIX 1). Only three cases present the full sequence of argument [26; 10].

From the point of view of sequences of arguments there prevails the first argumentative competency [15] enabling decision making of common problem situations and the second argumentative competency defending suggestion. None of the analyzed cases have counterarguments in research question reasoning. The data of the investigation allow stating that A line arguments may be characterised as linear arguments, prevailing in the simple discussion (see APENDIX 1).

Successful students of programme «Pedagogy» (2 cases) go beyond the particular level of case information and relate to theoretical concepts, the rest of the students (5 cases) focus on the construction of problem space while neglecting other epistemic activities and use retelling rather than interpretation of their problem [31].

Line B is the analysis of argumentation presented in «Pedagogy» students' final thesis which demonstrates teachers' development and expansion of pedagogical professional, common and multicultural competencies in argumentation process while performing action research. (see APENDIX 1).

According the argumentation competence model (see Fig. 1) the analysis of *construction of single arguments* skills that have emerged in line B may be defined as III level argumentative skills which are formed when new knowledge is being created while relying on valid original arguments (all 7 cases). While writing the final theses students of «Pedagogy» followed more detailed sequence of arguments.

Students of programme «Pedagogy» in all cases use rational statements supported by experiential evidence neglecting theoretical ground while analysing their pedagogical competence change in inquiry process.

But the traits of construction relations between theoretical concepts or distinguishing concepts from each other may be visible in other parts of final theses. The data of the investigation allow stating that though B line arguments mostly may be characterised as linear arguments, still there are clear traits of dialectical argumentation. Counterarguments are presented in 3 cases when the students reason their success in professional development. It means that B line context already demonstrates some future teachers' abilities to produce and polish scientific arguments which are later defended in C line (see APENDIX 1).

Argumentation content reveals the range of teacher's professional competencies and subcompetencies. The investigation revealed that participants of the investigation while performing action research are able to identify their competencies and the perspective of their development. They state that action research and IBT/L make a kind of synergy effect while developing their professional subcompetencies such as: pupils' motivation and support; knowledge about student's personality and the evaluation of student's achievements; management of learning process; building of learning environments; professional development (see APENDIX 1).

Line C is the analysis of argumentation presented in «Pedagogy» students' final thesis defence. The analysis of line C concentrates on students reasoning of two major questions presented to the students during the procedure of final thesis defence. These questions are: «Could you explain the benefits of IBT/L for your pupils?», «What difficulties of IBT/L have you encountered?»

According the argumentation competence model (see Fig. 1) the analysis of construction of single arguments skills that have emerged in line C may be defined as III level argumentative skills which are formed when new knowledge is being created while relying on valid original arguments (all 7 cases). For eg., one student stated, that while making investigating she felt the lack of communicative skills of her students. So she tried to motivate pupils to speak argumentatively, while introducing warrants. They even recorded personal speeches and were happy to find out that their talking became more grounded and expanded.

Similarly to line B students of programme «Pedagogy» in all cases use rational statements supported by experiential evidence neglecting theoretical ground while analysing their benefits of IBT/L for their pupils and commenting on encountered difficulties.

It is possible to state that students of the programme «Pedagogy» acquired the competence to present multifunctional argumentative discourse for their pupils/ students, for the written scientific text and for the oral public presentation. Such complex attitude to the development of argumentation competence allowed developing argumentation skills from their practical experience to the scientific argumentation. It also allowed highlighting the occurring argumentation fallacies and to enable teacher in training their argumentation competence.

APENDIX 1. The range of teacher's professional competencies and subcompetencies

Table 1. The subcategories and quotations of Category «The teachers' competency of planning and development of teaching material»

Subcategories	Quatations (Evidence)
Making teaching material clear for students	Sometimes I speak too scientifically, I tend to clarify the topic so, as if I were working with university students but not with the pupils. I use too many international words, use too complicated language structures.
Lack of lesson organizing skills	I feel that my classes lack finalizing ideas, which would enable summing up of a learning material. According students' opinion I could try to find more creative ways of presentation of teaching material.

Table 2. The subcategories and quotations of Category «The teachers' competency to evaluate students' achievements and learning progress»

Subcategories	Quatations
Lack of clear evaluation criteria and objectivity	Dissatisfaction of the evaluation is a frequent issue in an educational scientific literature. According to the opinion of the pupils, evaluation should be more clear and more objective.
Pupils involment in the evaluation process	I have chosen different types, ways and methods of the evaluation and assesment of students' achievements with the purpose to develop their learning potential.
Students' encouragement and urge to reach the purpose	According mother's opinion her son started to enjoy Lithuanian language classes. She admits that her son willingly makes the homework, if there are some questions asks mother for the help. It is clear that the boy needed the encouragement and urge to reach the purpose – to write without mistakes.

Table 3. The subcategories and quotations of Category «The teachers' competency of students' motivation and support»

Subcategories	Quatations (Evidence)
Threatening and punishment	I tried to shake his motivation only in very traditional and to some extent old fashioned ways – while writing negative marks. I expected that negative evaluations, my reproaches and urgings will wake the student up and help him to understand that his skills and abilities can be developed only via hard work. <...> Now I understand that i should have taken other measures.
Lack of skills to motivate students' information search	I understood that motivation of the students is a hard work. I have tried many ways to motivate students: I have tried to teach them and to support their efforts, but still the majority of the students think that literature is only for philologists
Lack of knowlegde of motivation methods	Moralizing and traditional punishment is not enough. The teacher must look for more fresh, more effective methods. What are these methods? To find them is my first task I have to fulfill in the shortest time.
Lack of skills to motivate collaboration	In the past I seldom motivated my students to collaborate. Now I do it constantly. At first I was not successful. Pupils were not willing to work in pairs, groups or teams. But they are slowly making progress and I am sure that such teaching/learning is useful for all participants.

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