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# Interactive Augmentation of Learning Environment for International Students

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**Abstract**

This article analyzes approaches towards technology design aimed at creating an interactive learning environment for international students taking the pre-university courses in the higher educational establishment. The methodological basis of research involves provisions of dialectical materialism about the theory of knowledge and methodological conceptions of personality formation in education. Research results indicate that primary equal control and test groups took different paths and reached different points by the end of the course. As a conclusion, the found solution of a learning environment allows us to shape and put a new vision of teaching and learning into the common system design.

**Keywords**: learning, environment, interactive, students, education.

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# Aumento interactivo del entorno de aprendizaje para estudiantes internacionales

**Resumen**

Este artículo analiza los enfoques hacia el diseño de tecnología con el objetivo de crear un entorno de aprendizaje interactivo para estudiantes internacionales que toman cursos preuniversitarios en el establecimiento de educación superior. La base metodológica de la investigación implica disposiciones de materialismo dialéctico sobre la teoría del conocimiento y las concepciones metodológicas de la formación de la personalidad en la educación. Los resultados de la investigación indican que el control primario igualitario y los grupos de prueba tomaron diferentes caminos y alcanzaron diferentes puntos al final del curso. Como conclusión, la solución encontrada de un entorno de aprendizaje nos permite dar forma y poner una nueva visión de la enseñanza y el aprendizaje en el diseño del sistema común.

**Palabras clave:** aprendizaje, medio ambiente, interactivo, estudiantes, educación.

## 1. INTRODUCTION

Modern conditions of learning environment development necessitate a revision of approaches to its organization and improvement to a more teachable format both in Ukraine and generally in the world (Antonova, 2010; Makar, 2013; Krasilnik, 2015). This is especially important for such fields as medicine and military training (Pavlenko et al., 2014; Alimpiev et al., 2017). The specific aspect of pre-university courses for international students is that groups are

formed in uneven manner and start the course on different dates. Students of different quality come from a wide range of countries that provide competency development to different extant. Besides, they may will to learn in Ukrainian (Russian), English or any other language. The learning process will have different effects on international students during the pre-university course basically because of the learning environment that has formed in the university and in the training centers (departments) (Antonova, 2010). At this point, the role of pre-university learning environment should be foregrounded, as it is a multi-member and multi-subject formation with potential to project influence on the professional personality development of a future specialist from abroad to ensure his/her readiness for professional activity in the chosen field (Gartner & Lipsky, 1987; Gontarovskaya, 2008). Therefore, the question arises: How can we improve the learning environment and adapt it to the learning requirements imposed on international students? Such an environment should contribute to professional/social competence development Stepanov et al. (2014), since a modern specialist has to get not only knowledge and skills within the higher educational establishment (university), but also become a competent specialist. At this point, shaping key competencies in an international specialist through a pre-university course is a priority. This goal should be achieved through not only a meaningful learning process, but also a specific learning environment (LE), to which the student adapts once starts the course. The purpose of this article is to design approaches to eliminating the contradiction between the existing approaches and methods applied for shaping key competencies in the international

students by major during the pre-university course. In order to achieve this goal, this article provides an augmentation methodology that will significantly increase the quality of training and allow achieving the required indices.

## 2. METHODOLOGY

The methodological basis of the research involves:

— provisions of dialectical materialism about the theory of knowledge, the leading role of activity in personality development, and the dialectical unity of theory and practice;

— Methodological conceptions of personality formation in education.

This goal was achieved through an analysis of special philosophical, psychological, pedagogical, and methodological literature on the research problems, as well as through the analysis of teaching files. The experiment was conducted as a questionnaire survey with 250 students in order to assess the quality of the learning environment.

## 3. DATA, ANALYSIS, AND RESULTS

Current efforts of domestic and foreign scientists are towards a creation of scientific and methodological basics for LE development (Zelinsky, 2009; Gurevich et al., 2013). They believe that the information environment of a higher educational establishment does not meet modern requirements, habits of youth, ways of access to information, its selection and perception. However, its advantages are clear: all methodological issues (learning process organization, application of methods, tools, etc.) are adapted to the student: his/her personal needs, abilities, ambitions, intelligence, and language of communication. The solutions for different environments to design and launch are applied vt scientists when establishing general scientific, pedagogical and psychological aspects. An extended framework of papers is devoted to the problems of IT penetration in education and globalization (Burbules, 2000; Monkman, 2000). Kilpatrick (1924) proposed to organize the learning process as if it was a tool for the orchestrating personality's social behavior by enriching his/her personal experience. By that time, his views were reflected in the innovation-driven teaching and learning processes, and specifically in co-education, team learning, and individualization of learning and experimental teaching methods. The LE development requires an integrated system to be created that would tie together the creative activity of teachers and the desire for self-development of students with modern opportunities for information technology intended for such an environment to design. Such a system should also integrate various types of activities, interactive teaching methods, and student-

specific learning paths, and allow the teachers to accumulate and generalize the experience in teaching international students (Clark, 1986; Bratko, 2015; Karabayeva, 2016). The LE components are certainly linked subsystems: person-centered, axiological-semantic, informative, activity-related and preventive (Pelgrum, 2001; Bratko, 2015). The technology component defines the normative methods and technologies for achieving desired results.

However, scientific papers devoted to the innovative learning environment provide not enough aspects of international student development within the innovative learning environment (Lawn & Lingard, 2002; Kramsch, 2006; Pridatko & Renkas, 2010). The complex integrative nature of such thing as the *learning environment* necessitates the conceptual approaches to its formation to have grounds to stand on. These approaches are below:

— *Humanistic Approach* is a person-centered approach towards the development of modern social environment; it is about harmonizing the learning and social relations, and shaping a holistic view of the world, spiritual and teaching culture in future teachers;

— *Acmeological Approach* allows substantiating the laws of creative development;

— *System Approach* is aimed at improving the learning

process in higher education, at connecting the various components of the learning process and at defining the LE as an integrated system shaping future specialists;

— *Informational Approach* allows reaching a sufficient level of information culture in future teachers, contributes to a nice effect of teaching by introducing modern computer technologies in education;

— *Innovation-Based Approach* contributes to an innovative and creative interaction between the participants (students and teachers) while shaping readiness in students for future professional activity. Such an environment transforms all the participants into a factor of integrative influence on the process of personality development and realization (Savchenko et al., 2013; Borozenets et al., 2014).

The analysis of research papers on this subject matter revealed that the existing approaches to LE design did not take into account the process specification to augment the teaching and learning process using an interactive approach (Pavlenko et al., 2010). Thus, this field requires additional studies that will take into account the current state of information technology. At the same time, the competency-based approach is a reference point of the national education system, while the introduction of the latest interactive technologies is dictated by time. The peculiarity of interactive learning is that learning occurs in a constant active interaction between all its liable participants. The

analysis of factors affecting the success of teaching international students revealed that the leading factors are the following (Gartner & Lipsky, 1987; Gontarovskaya, 2008; Antonova, 2010; Makar, 2013; Krasilnik, 2015):

— Basic educational background;

— Life experience and desire to learn;

— Desired field (engineering, economics, humanities, medicine etc.);

— Supporting technologies;

— Education plans designed by the teaching staff for international students and the corresponding organization of pre-university training;

— individual activity assessment and the number of additional practical sessions, consultations and one-to-one sessions;

— Personal traits of international students taking the pre-university course.

We propose augmenting the process by introducing the latest

achievements in education and IT in the learning process as a way of solving the above-stated problem and eliminating the contradiction between the required standards for shaping key competencies and the pre-university course outcomes. This will allow reconsidering the approaches to creating a new LE. Such a process is about creating learning conditions that fit the following requirements. The interactivity of the learning environment should be ensured by the computer-aided student-subject interaction aimed at overcoming the barriers between the theoretical knowledge and the information gained through the senses and practice, as well as by providing students with an individual path to necessary competencies. It should also be ensured by the interaction between students and teachers for timely pedagogical diagnosis and assignment correction, as well as by flexible response to education-related requests that arise for the first time. It should also be ensured by a close interaction between students aimed at mutual learning and control, as well as by shaping teamwork skills. Principles of such interaction are in Figure 1. Learning environment becomes interactive as filled tight with teaching units for necessary and sufficient educational background of students and their readiness to apply knowledge, skills and experience they gained when learning something new. Learning environment can be teachable as filled with ever-developing IT that allow shaping the necessary mental states, acquiring skills and experience under the teacher's guidance, and with moderation technology.

It is necessary to take into account that the process of creating an interactive learning environment for international students will be effective if the outlined methodology provides a reliable upward movement of indices. Besides, the assumption that interactive learning environment is much more reasonable against the traditional learning model should be provided with evidence. Stated problem has no unique solution when the standard approach is applied to creating an interactive learning environment (Pelgrum, 2001). Thus, we suggest creating a new learning environment with regard to language factor – the first language that will be the language of teaching during the pre-university course, and the second language for further courses. Ideally, each student should learn in a specially created learning environment in a corresponding language. Teachers often have a helping hand when preparing international students, who will assist them with the translation part, so they can deliver information to the student, assess his answer and realize how the material was assimilated. However, such a method may be a wrong turn, especially when the student has to learn another language. Therefore, there is a contradiction between the language approach and learning objectives.

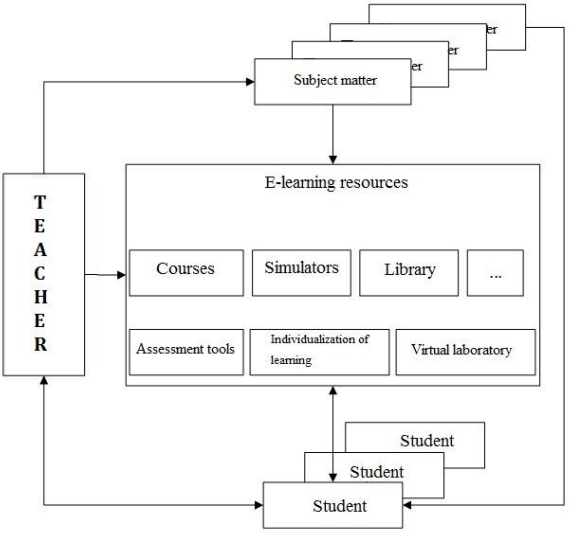


Figure 1. The Structure of Interactive Learning Environment

Interactive learning technologies allow not only creating a language environment, but also controlling time spent speaking in native and non-native languages and driving from one language to another by time. Delivering the course in one language only may deepen the knowledge gained and shape stable subject-specific skills. This approach can be applied through a new structure of interactive learning environment (Figure 2).

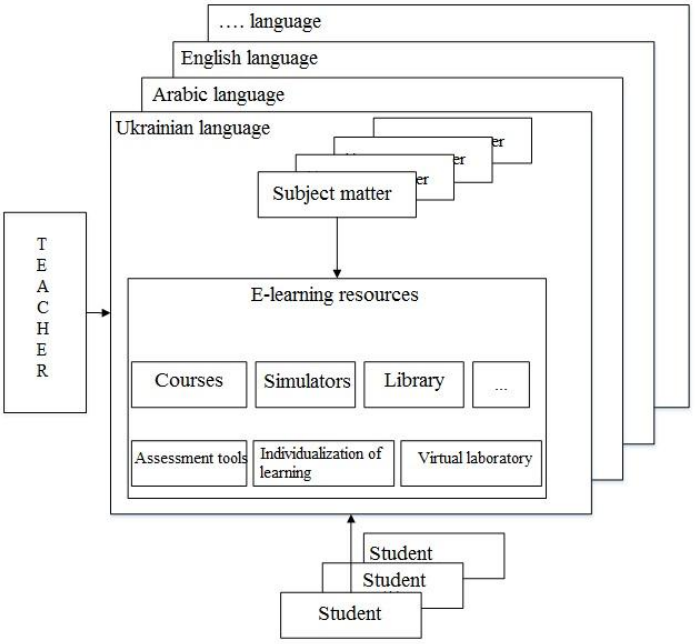


Figure 2. Multi-Lingual Interactive Learning Environment

The main drawback of this approach is that filling the database with teaching materials will take time, but it still can be done gradually. Teachers can also go for refresher courses to improve and adapt their teaching materials so that fit the frame of another language. We designed and implemented a program for studying the differences between the learning outcomes of international students to test our hypotheses for validity. Those, who took the pre-university course, were divided into a test

group (students, who will learn within an interactive learning environment) and into a control group (students, who will learn within a traditional learning environment).

## 4. DISCUSSION

In order to test the research hypothesis, we created a proper interactive learning environment, adapted its content to the specific features of further training, and introduced a learning technology into the process of teaching international students. We provided free access to online learning resources within the framework of distance learning via the Internet. The knowledge gained through the learning platform was assessed on a constant basis (Pavlenko et al., 2010). The test group was learning within an interactive learning environment, while the control group – within a traditional one. Criteria for assessing the adaptability of our environment were the following: content, methodology, significance, result and instrumentarium. The quality of LE was tested with a specially designed tool – expert assessment cards, which content is in Tables 2-6 (Pavlenko et al., 2010). Accounting information about students, subjects, teachers and experts is in Table 1.

Table 1. Accounting Data for Assessing Learning Environment for Pre-University Course Participants

| | |
|---|---|
| Department | Department Number |
| Group | Group Number |
| Course | Course Unit |
| Assessment data/time | Learning Schedule (dates, duration) |
| Student | Forename, Patronym, Surname |
| Teacher | Position, Degree Level, Title; Forename, Patronym, Surname |
| Expert | Position, Degree Level, Title; Forename, Patronym, Surname |

The marking system for assessing the adaptability of created environment by the elements of selected criteria was suggested as follows: 5 (Excellent), 4 (Good), 3 (Satisfactory), 2 (Unsatisfactory), 1 (No Element). Partial estimates were found by each criterion and put into a final estimate made for the existing learning environment with regard to all the students and teachers that took part in the experiment (Tables 2-6).

Table 2. Assessing Learning Environment for Pre-University Course Participants by Content

| № | Upper Limit | Grade | | | | | Lower Limit |
|---|---|---|---|---|---|---|---|
| 1 | Learning goal is in compliance with its profound achievement | 5 | 4 | 3 | 2 | 1 | Learning goal is not in compliance with its profound achievement |
| 2 | Learning material covers all indicated teaching units | 5 | 4 | 3 | 2 | 1 | Learning material does not fit the topic |
| 3 | Content is structured by assimilation levels | 5 | 4 | 3 | 2 | 1 | Content is neither structured nor systematized |
| 4 | By complexity, elective content corresponds to the personal qualities of course participants | 5 | 4 | 3 | 2 | 1 | Material is compulsory and hard to understand |
| 5 | Content is variable by language | 5 | 4 | 3 | 2 | 1 | Material is delivered in one language only |

Table 3. Assessing Learning Environment for Pre-University Course Participants by Methodology

| № | Upper Limit | Grade | | | | | Lower Limit |
|---|---|---|---|---|---|---|---|
| 1 | Students are motivated at the beginning | 5 | 4 | 3 | 2 | 1 | Motivational stage is not realized |
| 2 | Range of developmental assignments is wide | 5 | 4 | 3 | 2 | 1 | No developmental assignments were introduced |
| 3 | Teacher is flexible, he/she is able to improve his/her actions against their operationally assessed efficiency | 5 | 4 | 3 | 2 | 1 | Teacher gives tasks with no regard to student profiles of cognitive activity |
| 4 | Learning material is appropriate | 5 | 4 | 3 | 2 | 1 | Learning material is inappropriate |
| 5 | Reflexive analysis is frequent | 5 | 4 | 3 | 2 | 1 | No reflection reviews |
| 6 | Dialogues and opinion exchange are frequent | 5 | 4 | 3 | 2 | 1 | Sessions imply only monologues |
| 7 | Teacher is competent in taking into account personal qualities of students to design individual learning paths | 5 | 4 | 3 | 2 | 1 | Teaching and learning process is adapted to those, who have average grades |
| 8 | Student are guided by a teacher | 5 | 4 | 3 | 2 | 1 | Individual activity of students is not guided by a teacher |

Table 4. Assessing Learning Environment for Pre-University Course Participants by Significance

| № | Upper Limit | Grade | | | | | Lower Limit |
|---|---|---|---|---|---|---|---|
| 11 | Activity level is high | 5 | 4 | 3 | 2 | 1 | Activity level is low |
| 22 | Questions for in-depth study are included | 5 | 4 | 3 | 2 | 1 | No questions for in-depth study are asked |
| 33 | Answers are adequate and complete | 5 | 4 | 3 | 2 | 1 | Answers bring to light student's failure to understand and assimilate the learning material |
| 44 | Answers are sophisticated | 5 | 4 | 3 | 2 | 1 | Answers are not sophisticated |

Table 5. Assessing Learning Environment for Pre-University Course Participants by Result

| № | Upper Limit | Grade | | | | | Lower Limit |
|---|---|---|---|---|---|---|---|
| 11 | Competence is developed in full measure – course participant is able to complete his/her functional tasks entirely | 5 | 4 | 3 | 2 | 1 | No competence is developed |
| 22 | Student is able to solve new problems independently | 5 | 4 | 3 | 2 | 1 | Student is unable to solve new problems independently |

Table 6. Assessing Learning Environment for Pre-University Course Participants by Instrumentarium

| № | Upper Limit | Grade | | | | | Lower Limit |
|---|---|---|---|---|---|---|---|
| 11 | Teaching and learning process is supplied with necessary tech aids (informational aids, tests, simulations) with language support | 5 | 4 | 3 | 2 | 1 | Tech aids are represents by one of the kind and are not applied to full scale |
| 22 | Quality of teaching aids (guides, manuals, e-books, news material) satisfy the needs of teachers and students | 5 | 4 | 3 | 2 | 1 | Teaching aids are designed in a touch and go manner without any system behind |

The introduced method implies an expert survey when the expert gives a grade that defines certain characteristics of a learning environment for international students as the course is being delivered. Grades given by the experts are put into the final table. This allows assessing the quality of the learning environment in general. Statistical data gained through the experiment on the quality of the learning environment by criteria are in Figures 3 and 4.

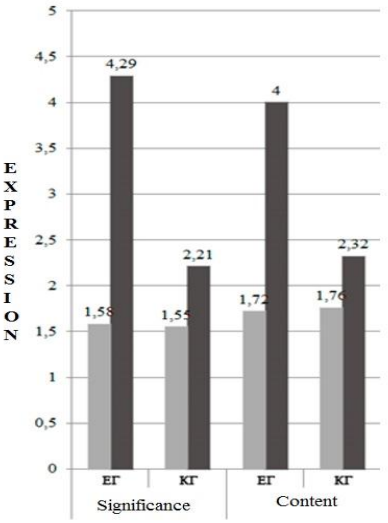


Figure 3. Final Grades by Significance and Content Criteria: Test and Control Groups

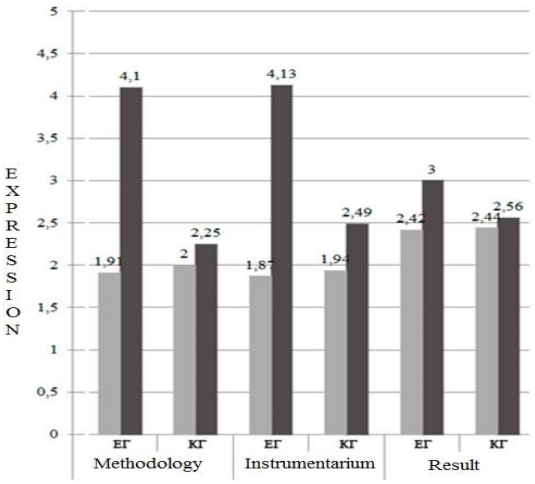


Figure 4. Final Grades by Methodology, Instrumentarium and Result Criteria: Test and Control Groups

The light-gray color on the bar graphs shows the average primary grades by the corresponding criterion in the test and control groups, while the dark-gray color stands for the grade given by the corresponding criterion at the end of the experiment.

## 5. CONCLUSIONS

Analysis of grades gained through the experiment indicates that there were no statistically significant differences between the control and test groups at the beginning of the experiment, although they arose at the end of the experiment. Thus, research results indicate that

primary equal control and test groups took different paths and reached different points by the end of the course. Research results confirm the research hypothesis and flatter the introduced approach toward the augmentation of the learning environment for international students taking the preparatory courses at the educational establishment. The learning environment was augmented by leveling language cooperation, taking into account the personal qualities and abilities of students, and boosting their activities through simulators and virtual laboratories. Such a system still requires significant improvements, but the found solution of a learning environment allows us to shape and put a new vision of teaching and learning into the common system design.

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