Experimental Verification of the Efficiency of Using Interactive Technology Tools in the Humanitarian, Professional and Practical Training of International Economists

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Abstract: The article deals with the issue of international economists' vocational training. The results of the pilot research have revealed a number of inconsistencies in the process of studies such as the growing load of educational material and inefficient traditional methods of its study; requirements to solve professional problem situations combined with rare practice of applying innovative pedagogical technologies that could enhance interpersonal interaction; the need to develop practical readiness to build functional relationships in a foreign-language and lack of interdisciplinary approaches, professional simulation and adaptation techniques. With the aim of eliminating the aforementioned problems a graphical model of vocational training of future international economists using interactive technologies has been developed on the basis of theoretical and empirical research which determines the main directions of the experimental work. The key constituents of the suggested model such as pedagogical conditions, components, criteria, indicators, levels, have been described. The article gives a comparative analysis of the research results which proves the efficiency of using interactive technology tools in the humanitarian and professional practical training of international economists: in the control groups the average indicator of students' readiness for foreign economic activity has changed during the course of studies from 3.03 grade points to 3.19 points (i.e. by 0.16 points), and in the experimental groups – from 2.98 points to 3.64 points (i.e. by 0.66 points), which is 0.5 points better than in control groups. The validity of the results has been verified with the methods of mathematical statistics proving the plausibility of the conducted experiment.

Keywords: *international economists; vocational training; interactive technologies; graphical model; experiment results.*

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1. Introduction

In the modern world of globalization and integration, active international cooperation, open borders, strengthening cultural ties with other countries there is growing necessity for training a new generation of specialists in the sphere of economic international relations in accordance with the demands of society, science and practice. Promoting and safeguarding priorities and national interests in the sphere of foreign political and economic activity, strengthening the positions and authority on the international stage, ensuring national security depend on the ability of international economists to react to the rapidly changing economic and social development trends, to predict and analyze these changes, to interact with partners from different cultures and countries at all levels, to be active participants in foreign economic processes in the implementation of economic strategy and policy of each state.

Theoretical foundations of the international economist professional training have been revealed in specialized literature on the basics of foreign economic activity and theses by Heizerska (2008), Stepanenko (2008), Otroshchenko (2010), Savchuk (2007), Fedorova (2006) et al. However, the vocational training of international economists has some peculiarities, i.e. in addition to a high level of training in economic subjects they need to develop interpersonal skills to the level of international professional communication which bring about an urgent need in applying special pedagogical innovations in international economists' training that may promote active interpersonal interaction, implementation of professional and adaptation processes in education. Such pedagogical innovations include interactive technologies whose features and advantages for training specialists in higher education are substantiated in studies by such researchers as Ampilohova (2004), Andrushchenko (2011), Ivanishena (2006), Yevtukh, Yevtukh, & Fastovets (2010), Kashliev (2005), Klarin (2000), Melnychuk (2009), Yakovlieva & Yakovlieva (2014), Borzenko & Pavlishcheva (2019).

The analysis of studies concerning the issue of international economists' training has revealed a number of contradictions between the following aspects: the growing volume of educational material in the courses of fundamental and professional cycles and traditional methods of their study; requirements to professional qualities of a modern foreign economist, his / her skills to positively resolve professional problem situations and sporadic practice of applying innovative pedagogical technologies in higher

education for promoting productive interpersonal interaction; the need to form practical readiness of future international economists to build working interpersonal relationships in a foreign-language environment of foreign economic activity and lack of using interdisciplinary and integration approaches, professional simulations and adaptation techniques in student training.

The purpose of the study is to experimentally test the efficiency of using interactive technology tools in the humanitarian and vocational training of future international economists for professional activity.

2. A Professional Training Model

The method of modeling has been used to combine the findings of theoretical research, experimental methods of scientific investigation and the implementation of innovative approaches to the organization of vocational training of foreign economic experts into a structure of interrelated components. We suppose that creating a model as an object of theoretical quantitative and qualitative study of international economists' training using interactive technologies requires the development and construction of a holistic abstract image of the educational process, the result of which is students' readiness for professional activity in the foreign economic sphere.

While creating a model for training future international economists using interactive technologies we were guided by the fact that reference and scientific literature defines the modeling method as a method of studying phenomena and processes with the help of created models which presupposes indirect examination of the objects under study. A model (Latin *modulus* – measure, sample) is “an imaginary or materially implemented system that reflects, reproduces or imitates the structure and function of any object under study (natural or social) and is used to gain new knowledge about it” (The Great Modern Ukrainian Explanatory Dictionary, 2009, p. 683). A specially designed, schematically depicted pedagogical model reflects fundamental properties of the prototype object, helps to identify key features of the analyzed processes, to study their dynamics, to find out structural, functional, genetic, cause and effect relationships between its elements. The pedagogical model also has a prognostic aspect that links the information image of the present with the theoretical image of the future.

As a result of theoretical study, application of experimental methods of scientific research and implementation of innovative approaches to the organization of professional training of foreign economic experts we have

developed a model of professional training of future international economists by means of interactive technologies (Fig. 1).

The model reflects the combination and interconnection of such components as the *aim* of professional training of future international economists by means of interactive technologies, *pedagogical conditions* of students' education, *criteria*, *components*, *indicators* and *levels* of students' readiness for professional activity which is demonstrated as a result of the conducted experimental research – formed readiness of future international economists for professional work in the field of foreign economy.

The *aim* of the developed model is to ensure the formation of international economists' readiness for professional activity by means of interactive technologies in the humanitarian training.

In order to achieve this goal we have specified and implemented *pedagogical conditions* for the optimal use of interactive technology tools in the study of psychological and pedagogical courses and the German language. The following conditions have been singled out: creating professional motivational environment through the use of motivational trainings; providing an integrative approach in the professional training of future international economists while using interactions in the study of psychological and pedagogical courses; implementing professional and adaptation processes to optimize practical and professional focus of students' interaction during foreign language training. The peculiarity of the pedagogical conditions was that they were implemented in a complex way by combining and complementing each other which is reflected in the model.

The efficiency of providing a set of pedagogical conditions is the formation of students' readiness for future professional activity that includes the following: professional and motivational, interdisciplinary and integrative (integrative and content-based), professional and adaptation components.

The *criteria* for determining students' readiness for professional activity include: formed *incentives* of professional training; using the outcomes of *psychological and pedagogical training* in interactive communication; revealing professional skills of interpersonal interaction in *foreign language professional communication* which confirms the implementation of professional and adaptation processes.

Indicators of *professional incentives* show students' striving for professional training, expressing desire and activity in professional interaction which include the following components:

- students are interested in professional development and improvement during their studies at universities;
- students have desire for cooperation and demonstrate creativity in simulated professional situations;
- responsibility for decisions in the process of interactive communication;
- striving for deepening their knowledge, abilities and practical skills in humanities and foreign languages;
- developing a sense of confidence in their position and skills of free professional behavior in various professional situations.

Indicators of the efficient use of psychological, pedagogical and conflict management training outcomes in interactive communication are students' skills and abilities:

- to identify main ideas in communication and formulate their own opinions, to express them accurately, to prove their own points of view, to argue and discuss on the basis of thorough psychological and pedagogical training;
- to listen to the interlocutor following the rules of active listening, developed cooperation skills; to avoid communication barriers;
- enrich their own social and professional experience of interaction through participation in simulated interactive situations of professional communication;
- to build functional relationships in a group, to determine one's place in it, to avoid conflicts, to resolve them, to seek compromises, to look for better ways of dialogic interaction, to respect other people's opinions;
- to conduct conversations, to be able to persuade interlocutors and discuss professional topics using mechanisms of asking questions, predicting answers, public speaking skills, constructive thinking regarding other participants' statements and decisions.

Indicators of using professional skills of interpersonal interaction in professional foreign language environment is the ability to perform efficient professional communication in German which involves the formation of:

- ability to speak German fluently at the level of every day communication and to be able to speak German in professional environment;

- skills of reading and translating economic articles based on the knowledge of the language of economics;
- ability to translate negotiations, to participate in conversations on any current topic as well as to hold business correspondence in German, that is to have developed skills of business communication in a foreign language in oral and written forms;
- knowledge of economic, financial and commercial vocabulary in German which will enable students to improve their competitiveness and open up new business prospects through professional adaptation while studying at university;
- ability to evaluate other points of view, to make independent choices and to justify the chosen position in business German;
- ability to do communication exercises and tasks in the German language to polish skills and abilities of business communication in oral and written forms in professional situations;
- skills of fast bilateral translation.

Students' readiness for professional activity was determined as high, sufficient, satisfactory and low which corresponds to the grades of 5, 4, 3 and 2 respectively.

The *high level* of readiness for professional activity can be defined by the following features: the student actively participates in all interactions showing creativity and responsibility for his/ her decisions in situations of interactive communication. The future international economist demonstrates a desire for professional growth, confidently offering original options for the optimal solution of problematic or conflict situations of professional dialogic interaction based on education and psychological training; he/ she is able to conduct a convincing logical conversation on a professional topic in foreign language environment which is characterized by excellent knowledge of the German language, skills of fast bilateral translation. The active use of professional vocabulary in business communication is an indicator of high level of implementing professional and adaptation processes.

The *sufficient level* of readiness for professional activity has the following markers: the student clearly and responsibly performs all the tasks specified in the interactive exercises; sometimes the student offers his/ her own options for resolving professional problems; he/ she quickly gains confidence in performing professional activities and has mastered skills of professional behavior using the benefits of humanitarian training and based on other students' professional function patterns; the student is able to apply the rules of active listening and avoid communication constraints mostly in professional situations that are used in the courses of psychological,

pedagogical and conflict management training. However, as far as foreign-language dialogic interaction is concerned the student uses only the prepared German clichés in professional environment. Consequently, the student's foreign language skills need improvement, so he/ she is keen on increasing his/ her readiness for professional foreign economic activity by persistent work on communication exercises and tasks in German in business situations.

The *satisfactory level* of readiness for professional activity has the following characteristics: the student only sometimes expresses interest in interactive exercises and, for the most part, as an observer. The unwillingness of such students to participate in professional interaction in the foreign language may be explained by the fact that they have a satisfactory level of psychological, pedagogical and conflict management training. They are unsure of their abilities and skills to demonstrate an example of free professional behavior in a particular professional situation. The students passively watch the analysis of other students' points of view regarding the performance of simulated professional functions in interactive exercises, do not express their opinions, do not participate in discussions, they often agree with the opinion of groupmates. Conducting a professional conversation is limited to short answers and simple questions and is characterized by lack of public speaking skills. The knowledge of German is assessed by the grade of three and is limited to the ability of reading and translating most words with the help of a dictionary and poorly developed business communication skills, i.e. using 2-3 standard phrases.

We determine the *low level* of students' readiness for future professional activity in foreign economic sphere using the following criteria. The student's intention to specialize in International Economics is largely due to external motives, so his/ her desire to gain knowledge, skills and competences in humanities and foreign languages comes down to getting a satisfactory grade. Such students are reluctant to be engaged in interactions because they are not able to build functional relationships in professional situations. They are passive in conversations which makes it difficult for other participants to perform interactive exercises. Such students have only elementary knowledge of German, which makes it impossible for them to carry out professional discussions while studying business German. They lack the skills of reading and translating economic articles due to poor knowledge of the foreign economic language, so bilateral translation is based solely on the use of dictionaries.

3. Pedagogical Experiment

In order to test the validity of the proposed model at Khmelnytskyi National University we conducted a pedagogical experiment that lasted during 2016-2019. 12 teachers and 119 students took part in the experiment. The beginning of the formative phase of the experiment in the control group (CG) that was taught by traditional teaching methods saw 59 students in the first year. There were 60 students in the first year in the experimental groups (EG) that were trained using the experimental method. Due to changes in the number of students in these groups in the second and third years the final stage of the experiment involved 53 students in the CG and 58 students in the EG.

Table 1. Structural Changes of Control and Experimental Groups during the Formative Stage of the Experimental Study

Group type	Training period and number of students					
	1st year (2nd semester 2016-2017)		2nd year (2nd semester 2017-2018)		III year (II semester 2018-2019)	
	No. of students in the group	Total No. of students	No. of students in the group	Total No. of students	No. of students in the group	Total No. of students
CG-1	30	59	30	58	27	53
CG-2	29		28		26	
EG-1	29	60	29	58	29	58
EG-2	31		29		29	

In practical classes, while studying “Fundamentals of Pedagogy and Psychology”, future international economists tried to apply the method of building interpersonal relationships in the course of performing interactive exercises adapted for the training of foreign economic specialists. Readiness of future international economists for professional activity continued to be formed in the second year (II semester) during the study of “Conflict Management and Theory of Negotiations”. Students were able to use the previously acquired knowledge and skills of functional interpersonal communication formed during their participation in interactions.

The complex introduction of definite pedagogical conditions continued during the main stage of the forming experiment, i.e. the study of the German language. A training and methodical complex of interactive exercises had been developed for this purpose. In these classes the students of the experimental groups were able to use the abilities and interpersonal communication skills formed during the systematic participation in interactions while studying “Fundamentals of Pedagogy and Psychology” and “Conflict Management and Negotiation Theory”. Through interconnected interactive exercises students have developed and refined their reasoning skills and have advanced business thinking in German; they have mastered skills of prepared and unprepared oral communication, free professional behavior in certain professional situations and active interaction with others; they have acquired skills of using virtual professional experience in practice, they have improved their ability to concentrate on professional situations and have developed professional imagination in group work and foreign language communication. The description of some tasks used for the complex of exercises in the German language training can be found in L. Maksymchuk’s article (Maksymchuk, 2013). Some English warming-up activities to enhance target-language performance are suggested by a group of Ukrainian researchers (Karpushyna et al., 2019).

The initial control was carried out using such methods as “Diagnosis of Professional Positions” (Melnychuk, 2011), Yu. Orlov’s “Need for Achievement” (Iliin, 1998), Ye. Iliin and N. Kurdiukova’s “Direction to Gaining Knowledge” (Iliin, 1998) and was supplemented with observing students during their participation in interactive exercises in the first practical lesson in “Fundamentals of Pedagogy and Psychology” (I year) and in foreign language classes. The final control was carried out using the same methods in the third year during the students’ participation in specially developed professional interactive exercises in German classes.

The level of readiness of future international economists for professional activity was established in the process of observation during the students’ participation in interactive exercises according to the following characteristics:

- the desire to cooperate in professional situations, interest in professional growth and improvement, a developed sense of confidence in their position and skills of free professional behavior in particular professional situations;
- ability to listen to the interlocutor following the rules of active listening, avoiding barriers to communication and developed cooperation skills; ability to single out main ideas in communication and formulate their

own opinion, to express it correctly, to prove their own point of view, to argue and discuss on the basis of thorough psychological and pedagogical training;

- ability to enrich their own socio-professional experience of interpersonal communication through participation in professional interactive situations; to develop functional relations in the group, to determine their place in it, to avoid conflicts, to resolve them, to seek compromises, to look for best ways of dialogic interaction, to respect other people's opinions; be able to persuade the interlocutors and to have a discussion on professional topics, using questions, predicting the answer, applying public speaking skills, showing constructive thinking regarding statements and decisions of others;

- ability to speak German fluently at the communicative level and to be able to speak German in a professional environment; demonstrating skills of reading and translating economic articles based on the knowledge of foreign economic language, i.e. developed skills of business communication in a foreign language in oral and written forms;

- ability to evaluate other points of view, to make independent choice and to justify the chosen position in business German; ability to do communication exercises and tasks in the German language in order to enhance abilities and business communication skills in professional situations.

In accordance with the indicators of future international economists' readiness for professional activity the "Individual table for establishing students' readiness levels for professional activity as international economists" has been made; it determines the quantitative value of students' readiness for professional activity.

The analysis of the individual tables of each student in the control and experimental groups has enabled us to establish the level of readiness of future international economists for professional activity at the final stage of the research. The comparison of the established indicators of students' readiness levels at the initial (IC) and final control (FC) stages was carried out using Table 2.

Table 2. Indicators of Students' Readiness for Professional Activity at the Initial and Final Control

Groups			CG		EG	
Control stage			IC	FC	IC	FC
No. of students			59	53	60	58
Indicators of students' levels of readiness for professional activity	High (5 points)	No. of students	0	2	0	10
		%	0	3.77	0	17.24
	Sufficient (4 points)	No. of students	16	17	14	21
		%	27.12	32.08	23.33	36.21
	Satisfactory (3 points)	No. of students	29	23	31	23
		%	49.15	43.4	51.67	39.65
	Low (2 points)	No. of students	14	11	15	4
		%	23.73	20.75	25.0	6.9
	Average		3.03	3.19	2.98	3.64

The analysis of the indicators in Table 2 leads to the following generalizations.

1. According to the results of the entrance control the level of students' readiness for professional activity in control and experimental groups had almost the same average value: 3.03 points – in CG and 2.98 points in EG. It shows equal terms for students to enter the experimental research process.

2. According to the indicators of each level at the stage of the entrance control the readiness for professional activity of students of CG and EG had also close values: no high level in any group category; 27.12% of students with a sufficient level in CG and 23.33% in EG; 49.15% of CG students and 51.67% of EG students had a satisfactory level; 23.73% of students in CG and 25.0% in EG were with low level of readiness. We have compared all indicators in percentage terms because the numbers of students in the control and experimental groups did not differ much at the beginning of the experiment (59 and 60 students respectively), but the difference was quite significant at the final stage (53 and 58 students respectively).

3. The comparison of the results obtained at the initial and final control stages proves the efficiency of our experimental method of preparing future international economists for professional activity:

- the number of *high* level indicators in CG has increased from 0 to 3.77% (by 3.77%), while in the EG it has risen from 0 to 17.24% (by 17.24%), which is 13.47 % more than in CG;
- the *sufficient* level in CG has seen an increase in the number of students from 27.12% to 32.08% (by 4.96%) and in EG – from 23.33% to 36.21% (by 12.88%), which is 7.92% more than in CG;
- the number of students demonstrating the *satisfactory* level in CG has had a decrease from 49.15% to 43.4% (by 5.75%) and in the EG – from 51.67% to 39.65% (by 12.02%), which is 6.27% more than in CG;
- as far as the *low* level in the CG is concerned it has shown a decrease from 23.73% to 20.75% (by 2.98%), while in EG it has fallen from 25.0% to 6.9% (by 18.1%), which is 15.12% more than in CG.

The efficiency of using the suggested method for preparing future international economists for professional activity is also confirmed by the dynamics of average indicators of students' readiness for foreign economic activity. Thus, students in control groups had this indicator changed during the course of study from 3.03 grade points to 3.19 points (i.e., 0.16 point increase), the experimental groups had higher results: an increase from 2.98 points to 3.64 points (by 0.66 points) which is 0.5 points better than in CG.

4. Verification of the Results

Methods of mathematical statistics have been used to check the efficiency of the implemented methodology for the professional training of future international economists by means of interactive technologies in the process of the formation stage of the study of pedagogical conditions. For this purpose, specialized literature has been used to make it possible to apply statistical methods of research in professional pedagogy (according to Kyverialg (1980)) for processing the results of the pedagogical experiment.

Methods of comparing the general population parameters (averages and variances) using the F-criterion have been applied. To compare the numerical values of the empirical and theoretical criteria, we have analyzed the table of F-values (Heizerska, 2008, p. 278). According to the null hypothesis of our study the difference in the levels of readiness for professional activity of students in control groups does not depend on the methods of teaching but is the result of the natural course of the educational process. The alternative hypothesis has been formed on the assumption that

the difference between the initial and final control indicators in the experimental groups is due to the purposeful use of interactive technologies in the psychological, pedagogical and foreign language training of future international economists.

The comparison of the null and alternative hypotheses has been performed to test the validity of the study outcomes. Kyverialg's formula has been used to determine the F-criterion – F (Heizerska, 2008, p. 277):

$$F = \frac{\sigma_1^2}{\sigma_2^2}, \text{ where}$$

σ_1^2 is the variance determined by the results of the initial control;

σ_2^2 is the variance determined at the final stage of the experiment.

No matter at what stage of control the variance has been determined we use the formula below.

$$\sigma^2 = \frac{\sum f(x_i - \bar{x})^2}{N}$$

where f is the number of students with a certain level of readiness for professional activity that is marked by grade points: “5”, “4”, “3”, “2”;

$(x_i - \bar{x})$ is the difference between the digital values (5, 4, 3, 2) and the indicators of the average readiness of future international economists to work in the field of their specialization;

No. is the number of students in the categories of groups (control or experimental) where the variance is calculated.

The results of calculating the F-criterion for the control and experimental groups are presented in table 3.

Table 3. F-criterion Calculation Results

Groups		CG		EG	
Stage, No. of students		IC, 59	FC, 53	IC, 60	FC, 58
Average results		3,03	3,19	2,98	3,64
Indicators used for calculating F-	f	5	0	2	0
		4	16	17	14
		3	29	23	31
		2	14	11	15
	$(x_i - \bar{x})$	5	1,9661	1,8113	2,0167
		4	0,9661	0,8113	1,0167

	3	-0,0339	-0,1887	0,0167	-0,6379
	2	-1,0339	-1,1887	-0,9833	-1,6379
$\sum f(x_i - \bar{x})^2$		29,9322	34,1132	28,9833	41,3966
σ^2		0,5073	0,6436	0,4831	0,7137
F		1,27		1,48	

The analysis of the table data gives us grounds to summarize that the variance at the initial control (IC) stage in control groups (σ_1^2) is 0.5073 while the variance value at the final control stage (FC) in the CG (σ_2^2) is 0.6436. Therefore, the calculation of the F-criterion for the control groups (F-CG) has given the result of 1.27.

Corresponding calculations to determine the variance in the experimental groups at the stage of the initial control came up with a value of 0.4831, and at the stage of the final control the result was 0.7137. The F-criterion for the experimental groups (F-EG) is 1.48.

The validation of these indicators was aimed at proving the likelihood of the results of the experimental study. For this purpose, the indexes of empirical F-criterion (F-CG and F-EG) have been compared with the index of the theoretical F-criterion (Fcrit), the numerical values of which are given in the corresponding Kyverialg's table (Heizerska, 2008, table 52, p. 278). For this purpose, F_{crit} for our study has been determined by the number of degrees of freedom.

In the control groups, the number of degrees of freedom is 58 and 52, and in the experimental groups – 59 and 57. These values are determined by the following principle: it is necessary to subtract one from the number of students in control or experimental groups.

Provided that the number of degrees of freedom of the numerator ranges from 24 to infinity and the denominator ranges from 40 to 60, which corresponds to the figures in our study, then the Fcrit is within the range of 1.8 to 1.4.

Comparing the value of the calculated F-criterion for the experimental groups with the standard F_{crit} tables we have concluded that the value of F-EG = 1.48 is within the specified limits. This means that the outcomes of our study on shaping readiness of future international economists for professional activity through interactive technologies are plausible and confirm the validity of the experiment.

The F-CG indicator of 1.27 is beyond the bounds of probability, so the slight increase in the level of CG students' readiness for professional

foreign economic activity is due to the conditions of the traditional learning process.

5. Conclusions

Consequently, the efficiency of certain pedagogical conditions for our experimental study of training future international economists by means of interactive technologies has been confirmed by numerical indicators that are reliable, which has been proved by mathematical statistics calculations.

The analysis of students' levels of readiness for professional activity indicates that there are still some students with low levels of readiness in both Control and Experimental groups. Therefore, there is a need to continue improving the preparation of future international economists for professional activity with the help of our method which has yielded positive results in the experimental groups. Our experimental study has been structured to teach students during the first and third years and it was completed after the end of the third year. However, the study of the German language, the classes of which lay the grounds for carrying out the present research, goes on further in IV and V years. So, the introduction of our methodology for preparing future international economists for professional activity can be continued for undergraduate and graduate students in the future but this will be the subject of further research.

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