



## Simulation of Educational and Professional Training of Students

### Simulación de formación educativa y profesional de estudiantes






Sergii D. Rudyshyn<sup>1a</sup>, Inna M. Koreneva<sup>2</sup>, Kateryna H. Yakushko<sup>3</sup>,  
Maryna V. Babenko-Zhyrnova<sup>4</sup>, Nataliya M. Lupak<sup>5</sup>

Olexander Dovzhenko Hlukhiv National Pedagogical University, Hlukhiv, Ukraine<sup>12</sup>

National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine<sup>3</sup>

Kyiv Cooperative Institute of Business and Law, Kyiv, Ukraine<sup>4</sup>

Ternopil Volodymyr Hnatiuk National Pedagogical University, Ternopil, Ukraine<sup>5</sup>

-  ORCID ID: <https://orcid.org/0000-0002-4483-9209><sup>1</sup>
-  ORCID ID: <https://orcid.org/0000-0002-1117-7624><sup>2</sup>
-  ORCID ID: <https://orcid.org/0000-0001-6977-8441><sup>3</sup>
-  ORCID ID: <https://orcid.org/0000-0002-1886-1234><sup>4</sup>
-  ORCID ID: <https://orcid.org/0000-0001-7868-8771><sup>5</sup>

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### Resumen

El estudio aborda los problemas de mejorar la eficiencia del proceso educativo mediante la simulación de la capacidad para trabajar de forma independiente. Es la capacidad para trabajar de forma independiente lo que se destaca como indicador de la eficacia de la simulación. Para el estudio, se utilizaron encuestas y cuestionarios, métodos de recopilación y procesamiento de información a distancia, métodos de diagnóstico de la motivación de aprendizaje de los estudiantes, motivación de la actividad profesional, una técnica de estudio de motivación para aprender en instituciones de educación superior, un método de distribución normal estándar. La evaluación del criterio motivacional mostró que solo el 7% de los estudiantes alcanzó el nivel creativo. Más del 80% de los encuestados cree que las actividades de investigación en las IES son una parte integral de la formación profesional. El 41% de los encuestados demostró el nivel óptimo de competencias. Se ha encontrado que los estudiantes tienen la oportunidad de resolver una serie de problemas académicos en el curso de la simulación. Como resultado, los estudiantes adquieren las competencias educativas necesarias. Se reveló que la introducción de tecnologías para la simulación de la formación educativa y profesional tiene consecuencias positivas para la preparación de los estudiantes para una mayor actividad profesional independiente.

**Palabras clave:** Eficiencia educativa, educación superior, educación moderna, competencia profesional, simulación de formación.

<sup>a</sup>Correspondencia al autor  
E-mail: [rud.prof.geo@gmail.com](mailto:rud.prof.geo@gmail.com)

## Abstract

This study addresses the issues of improving the efficiency of the educational process by simulating the ability to work independently. It is the ability to work independently that stands out as an indicator of the effectiveness of simulation. Surveys and questionnaires, methods of remote collection and processing of information, methods of diagnosing students' learning motivation, motivation of professional activity, a technique of studying of motivation for learning in higher educational institutions, a method of standard normal distribution were used. The evaluation of the motivational criterion showed that only 7% of students reached the creative level. More than 80% of respondents believe that research activities in HEIs are an integral part of professional training. 41% of respondents demonstrated the optimal level of competencies. It has been found that students get an opportunity to solve a number of academic problems in the course of simulation. As a result, students acquire the necessary educational competencies. It was revealed that the introduction of technologies for simulation of educational and professional training has positive consequences for the students' readiness for further independent professional activity.

**Keywords:** Education efficiency, higher education, modern education, professional competence, training simulation.

## Introduction

The problem of improving the simulation of professional training through the study of independent work of students, its role in the development of professional competencies remains urgent. Such interest in this issue is due to the desire to improve the educational process and the search for optimal tools to improve education (Hooshyar, Yousefi & Lim, 2018). The system of professional education is almost always the epicentre of contradictions, when it is necessary to take into account the changing paradigm of the educational market, socio-economic transformations (Dastani, 2021). New socio-educational priorities, dominants, innovations and their evolutionary development are the source and subject of target innovative pedagogical research (Balve & Albert, 2015). In this regard, continuing professional education is a source and result of innovative development of the process of training future specialists (Farajpour, Samavi & Javdan, 2019).

Innovative development has gone from the innovations of individual educational institutions to the joint activities of higher education institutions at the national level (Klochkov et al., 2019). A regional system of continuing professional education began to take shape on the basis of systemic changes. The joint innovative activity of multilevel and multidisciplinary educational institutions to create a regional system of continuing professional education has become the basis for the implementation of the state-level educational project (André et al., 2017).

Let it note that the results of educational activities are reflected in the purpose of education, answering the question “Why we teach?”. It is obvious that this goal as well as the results are considered differently by the three subjects (educational organization, students and employer) of educational and professional activities (Bolshanina, 2016). Therefore, a common understanding of the objective and the goal-setting process by all subjects of educational and professional activities is needed, as this will lead to the formation of a professionally developed personality prepared for the reproduction and development of material and spiritual culture (Berezovska et al., 2020). It must harmoniously combine state, public, corporate and personal goals and values (Kiani, Nazari & Shahbazzpour, 2019). This research concretizes and reveals one of the fundamental provisions of the conceptual understanding of the solution of the stated problem (D’elia, 2019).

### ***Marco teórico***

Professional competence is a system of professional knowledge, skills, abilities and generalized ways of professional actions necessary for satisfactory fulfilment of standard requirements and solution of typical problem situations in professional activity in accordance with the given powers (Xiaoqin & Chunquan, 2020). Professional competence is an integrative professional and personal quality (ability and willingness to perform professional activities effectively), consisting of a system of general cultural, professional and corporate competencies manifested in the activities, as well as professionally important qualities (Shymkova, Tsvilyk & Harkushevskyi, 2019).

Professional and social mobility is an integrative professional and personal quality that reflects the level of development of professional competence. It is manifested in the willingness and ability to change production tasks, jobs, specialties and social roles under the influence of socio-economic and scientific-technological factors (Moye, 2009). Therefore, defining independent work of students as a component of the educational process in HEI, which includes all its types (in-class independent work, extracurricular work under the teacher’s guidance, individual extracurricular work), allows considering it as a type and component of independent educational activity (Zukhra et al., 2020).

This transformation is effective due to personal motives of professional education, the value of the chosen profession and the acquired skills of independent learning activities of students (Galvão, Marques & Marques, 2018). So, the structure of professional competence has determined the stages of the process of its development; the gradual process of development of professional competencies and taking into account the factors of efficiency of independent

work, in turn, allowed to determine the pedagogical conditions for the organization of independent work of students (Table 1).

**Table 1**  
*Pedagogical conditions for the organization of independent work aimed at the development of professional competencies*

Stage of the development of professional competence	The content of the problem of organizing independent work	Pedagogical conditions for organizing independent work
<i>Invariant level</i>		
Diagnostic	Different level of entrants (students) from the standpoint of the key general educational competencies, skills of independent work.	Diagnostics of students based on the results of diagnostics of correction and development of skills of independent educational activity, independent work of students.
Motivational and value	Different degree of student motivation, including motivation for independent work (activity).	Implementation of individual and differentiated approach to the organization of independent work of students based on the results of self-diagnosis of personal characteristics by students
Control and analytical	Insufficient provision of independent work	Material, methodical, technical support for the organization of independent work.
<i>Variant level</i>		
Diagnostic	Lack of individual approach in the organization of independent work, taking into account the personal characteristics of students	Implementation of individual and differentiated approach to the organization of independent work of students based on the results of self-diagnosis.
Theoretical, practical	Insufficient orientation of the assignments for independent work on the subject on the development of professional competencies.	The ratio of the assignments for independent work in each subject with the developed professional competencies.

Source: Vaganova (2019).

A number of scholars were working on this issue. Saeed (2018) dealt with the relationship between academic self-efficacy and emotional intelligence with anxiety of students in the context of distance learning. Shapiro and Stefkovich (2016) study ethical leadership and decision-making in education. Garnevska (2018) considers the possibility of introducing communication technologies in teaching Technology and Entrepreneurship. The paper of

Pometun and Gupan (2018) covers the study of history as an educational space for the development of critical thinking of students. Vaganova (2019) studies the organisation of practical classes in HEIs using modern educational technologies. Cabo and Van der Wal (2021) consider simulation of Bayesian structural equations in the educational process. Cabo and Klaassen (2018) are engaged in the study of active learning on the redesign of mathematics courses for engineering students. Hu (2017) discusses the relationship between meeting needs and motivation to learn. Manganelli, Cavicchiolo and Mallia (2019) consider the relationship between self-determined motivation, self-regulated cognitive strategies and previous achievements in predicting success. Klochkov et al. (2019) consider the parameters of simulating the semantic compatibility of educational information.

In this light, the aim is to study the level of professional competencies in the course of simulating educational and professional training of HEI students by studying the readiness for independent work. The aim involved the following objectives: first, selection of the experimental framework and determination of the control and experimental groups; second, conducting a summative study of indicators of readiness for independent work according to selected criteria; third, control diagnostics according to the selected criteria, analysis and processing of the obtained results.

## **Methodology**

### ***Design***

The experimental work involved three stages. Stage I of the experiment (September 2020 - February 2021) is summative. Experimental work at this stage included a study of the process of simulating educational and professional training of students; an analysis of factors that may reflect the effectiveness of simulating the educational and professional training of students; a determination of the criterion to be studied; and preparation for the study.

For the other hand, stage II of the pedagogical experiment (February - May 2021) was formative. At the formative stage, the content of the experimental work included: development of the Experimental Work Programme; introduction of pedagogical conditions for monitoring the effectiveness of simulation of educational and professional training of students; control over the course of the pedagogical experiment with the help of questionnaires; analysis and processing of the results obtained during the experiment; and summarizing the results of the pedagogical experiment. Finally, stage III of the pedagogical experiment (May - June 2021) was the last process. The content of this stage of the experiment involved arrangement and generalization of the results of experimental work, drawing conclusions.

### ***Shows***

The study used a nest sample, which involves the selection of several courses from the general population of the continuous survey. The number of respondents in these courses should ensure the representativeness of the sample. Monitoring of students' motivation to study during the research of simulating the effectiveness of educational and professional training of students was carried out on the basis of the Department of Theory and Methods of Teaching Natural Sciences at Olexandr Dovzhenko Hlukhiv National Pedagogical University (Sumy) and the Department of English for Technical and Agrobiological Majors of the National University of Life and Environmental Sciences of Ukraine. The study involved 350 students of 1<sup>st</sup>-4<sup>th</sup> years of study and graduates.

The draw method was used to determine the study participants. It took place in several stages. At the first stage, all elements of the general population were pre-numbered and their numbers were printed on the cards. In the second stage, the required number of cards was selected from the pack after careful shuffling, which corresponds to the sample size. The selected cards were set aside, thus an irreversible selection was made.

All respondents were warned in advance about the need to answer questions honestly and independently. Ethical requirements of integrity, competence, respect for the individual, scientific nature, anonymity in answering the questions were set for the respondents themselves, as well as the questionnaires used, which is why the personal data of each respondent were encrypted. In this way we managed to achieve the most truthful answers. The objectivity and impartiality of the results of the study is beyond doubt. The survey methods used in the study meet the criteria of validation and reliability. This is ensured by repeated use of these methods in research and obtaining representative results.

Such a sample allows covering a sufficient number of respondents to ensure a high level of validity of the results. The respondents participated in the study through a remote survey using Google Forms. The main limitations of the study are the final number of respondents who would meet the conditions of the sample; conducting research among students of one HEI. This, in turn, does not distort the reliability of the results obtained because the sample is formed in such a way as to cover all students studying in the average HEI of Ukraine.

### ***Instruments***

Google Forms features were used for the survey. Data entry and processing was performed in Microsoft Excel and SPSS Statistics 18.0. All data are given in relative (% of the number of respondents) values.

### ***Procedure***

The following methods were used in the study: General scientific methods of working with special literature: analysis, synthesis, generalization. The reliability of the scales was determined using the Cronbach's criterion  $\alpha$ . The survey was conducted with the help of such questionnaires as: methods of diagnosing students' learning motivation (A.A. Rean and V.A. Yakunin, modified by N.Ts. Badmaieva). According to the Cronbach's criterion  $\alpha$ , the following reliability values were obtained: "Critical" - 0.78%, "Acceptable" - 0.72%, "Optimal" - 0.64%, "Creative" - 0.80%. Motivation of professional activity (method of K. Zamfir, modified by A. Rean). According to the Cronbach's criterion  $\alpha$  the following values of reliability were obtained: "Promotes the development of creative and communicative competencies" - 0.72; "Promotes the development of creative abilities" - 0, 78; «Promotes the development of communication skills» - 0, 71; "Does not contribute to the development of any abilities" - 0.74. A technique of studying motivation for learning in HEIs by T.I. Ilina (Osypova, 2009). According to the Cronbach's criterion  $\alpha$ , the following reliability values were obtained: "Critical level" - 0.79; "Acceptable level" - 0, 75; "Optimal level" - 0, 78; "Creative level" - 0.78.

### ***Statistical analysis***

Since the study is irreversible and random, estimating the quantitative values of the selection of qualitative variables expressed in a nominal scale (answers to the questionnaire), it is correct to use the following expression to assess the sample size:

$$n = (Z^2 pq N) / (\Delta^2 N + Z^2 pq) \quad (1)$$

The meaning of the elements of this formula is as follows: Z-value of the critical point of the standard normal distribution for our chosen level of significance (confidence level). It is taken from Table 1. For a given confidence probability  $P=0.95$  (95%) we obtain  $Z=1.96$ . In this case,  $Z^2$  will be equal to 3.84 (Table 2).

**Table 2***Values of critical points of the standard normal distribution for different levels of significance*

Z – value	Confidence probability
1.645	0.90 or 90%
1.960	0.95 or 95%
2.575	0.99 or 99%

Source: Osypova (2009).

$p$  — the total share of the answers to some questions of the questionnaire for all respondents in the sample, that is the share of dividing the number of choices by the number of respondents.

$q$  — the share of the failures to choose the appropriate answers to the questionnaire. Obviously,  $q+p=1$ . Consequently:  $q=1-p$ . The authors took the methods and constants presented in the work of as a basis.

### Results

The development of professional competencies in the course of simulating educational and professional training in case of implementation of pedagogical conditions will be effective, that is will promote personal and professional development, if independent work will correspond to the structure and stages of the development of professional competence. A study of the level of readiness for independent work was conducted to assess the effectiveness of simulating educational and professional training. Sample evaluation can be obtained in two ways. First, by choosing the maximum value of their product. Second, by assessment in the pilot study process. In the first case, you can see that the scope of the product  $pq$  is in the interval:

$$0.09 = 0.1 * 0.9 \leq pq \leq 0.5 * 0.5 = 0.25 \quad (2)$$

It is this circumstance that allows for a rough estimate of  $n$  to take  $p=q=0.5$ . Therefore, we can use the value  $pq=p(1-p)=0.25$ .



**Table 3**

*The results of previous studies of the level of the students' readiness for independent work*

Indicators	1 <sup>st</sup> year of study	2 <sup>nd</sup> year of study	3 <sup>rd</sup> year of study	4 <sup>th</sup> year of study	MA course	Σ
j	1	2	3	4	5	
Surveyed	38	31	35	35	42	181
x <sub>1</sub>	10	10	9	8	10	47
x <sub>2</sub>	20	15	12	17	22	86
...	...	...	...	...	...	...
X <sub>15</sub>	15	9	8	8	8	48
Σ	120	103	90	85	122	522

Source: authors.

In the second case, these shares can be taken from pilot studies involving 5 institutes ( $n_5 \leq N$ ), the results are given in Table 3. Taking the number of respondents and the number of answers they chose, we obtain  $p_1$  and  $q_1$  for the first answer to the first question  $x_1$ .

$p_1$  — the total share of choices of the answer to the first question for all respondents in the sample, that is the share of dividing the number of choices by the number of questionnaires. In our case  $p_1 = 86/181 = 0.48$ . Accordingly,  $q_1 = 1 - p_1 = 1 - 0.48 = 0.52$ . As mentioned above, their product:

$$p_1q_1 = 0.48 * 0.52 = 0.2496 \cdot 0.25 \tag{3}$$

This confirms the validity of using the value of  $p = 0.5$  in the previous case. We can also estimate (4) for the second line, etc.

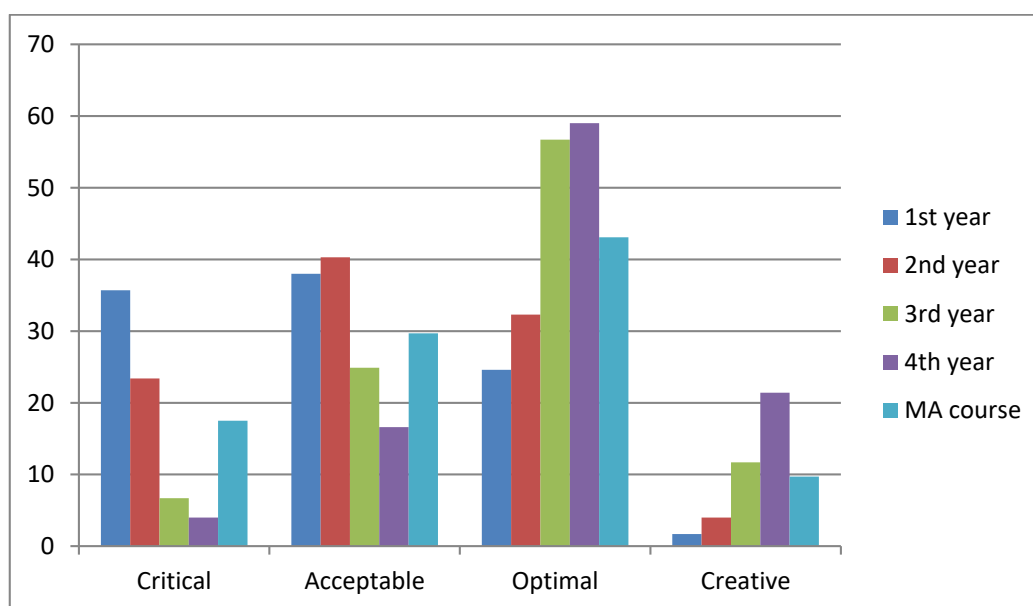
$$p_2q_2 = (47/181) * (134/181) = 0.26 * 0.74 \approx 0.19 \tag{4}$$

Then we can take their average value and substitute in formula (1). We use the approximate value of  $pq \approx 0.25$ . Substituting the values of  $Z^2$ ,  $PQ$  and  $N$  in Formula (1) and setting the marginal error of a unique random sample  $\Delta$ , which describes the deviation of the sample mean from the mean of the general population equal to 0.05, that is equal to 5%, we estimate  $N$ :

$$n = (Z^2pqN) / (\Delta^2N + Z^2pq) = (3.84 * 0.48 * 0.52) * 5525 / [(0.05 * 5525) + (3.84 * 0.48 * 0.52)] = 0.96 * 5525 / (0.0025 * 5525 + 0.96) = 3132 / (8.16 + 0.96) = 3132 / 9.12 \approx 343 \tag{5}$$

So, the size of the representative sample must be at least 343 respondents. We took 360 people with a reserve. The dynamics of change of indicators can be assessed according to the substantive characteristics of the levels of independent work of students during the experiment. Any of the criteria of the experiment allows assessing important indicators of student’s professional development and may be of particular research interest. At the same time, a set of all indicators, the sum of which allows us to assess the level of independent work aimed at the development of professional competencies, is interesting.

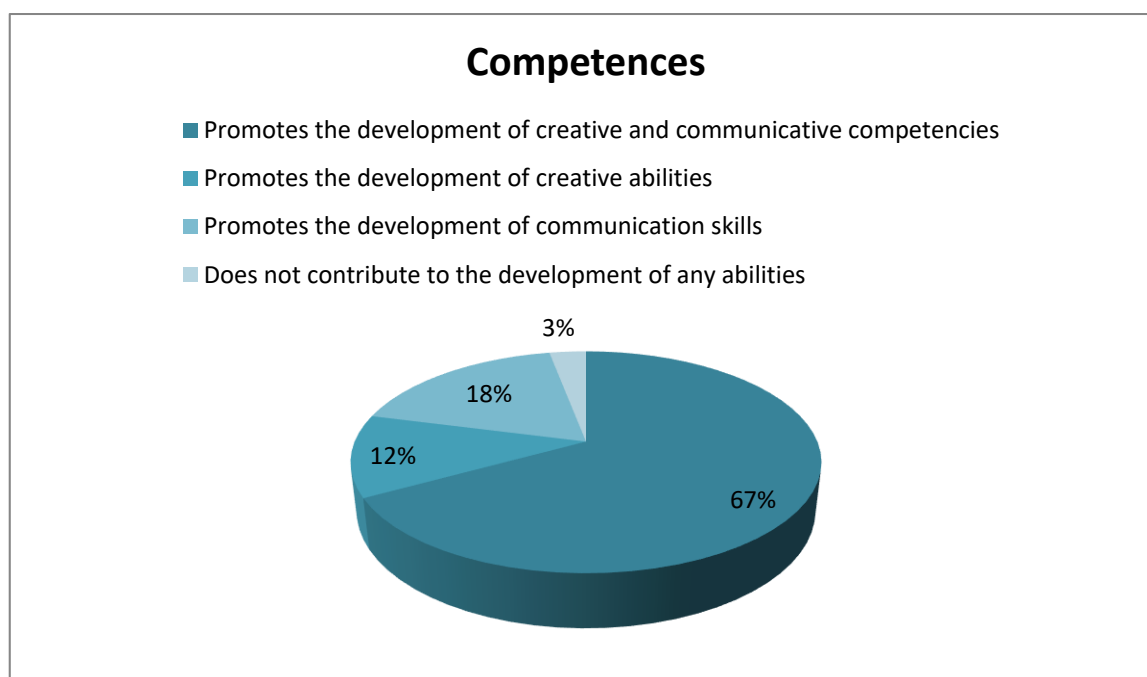
The dynamics of indicators of independent work of students, which ensures the development of professional competencies, is explained by the implementation of a set of pedagogical conditions at the formative stage of pedagogical experiment as monitoring the effectiveness of simulating educational and professional training of students. The results of the interview with the respondents allowed concluding that about 90% of first- and second-year students understand the importance of independent work in the acquisition of professional competencies and in professional and personal development in general. The results of the summative diagnostics to determine the level of students’ independent work skills, which ensures the development of professional competencies, are presented in Figure 1.



**Figure 1.** The results of the summative stage of the pedagogical experiment  
Source: authors

A similar assessment of the motivational criterion on the motivation for professional education showed only 7% of students with the creative level in the third year and 45% — in the fourth year in the complete absence of creative level in the first and second years of study. Of course, the field study and internships contribute to the development of professional motivation of students, while the results obtained do not correspond to the level of quality professional education. Obviously, it is not entirely correct to combine the indicators of the first year and the fourth year of study, but it is permissible to identify trends in the indicators.

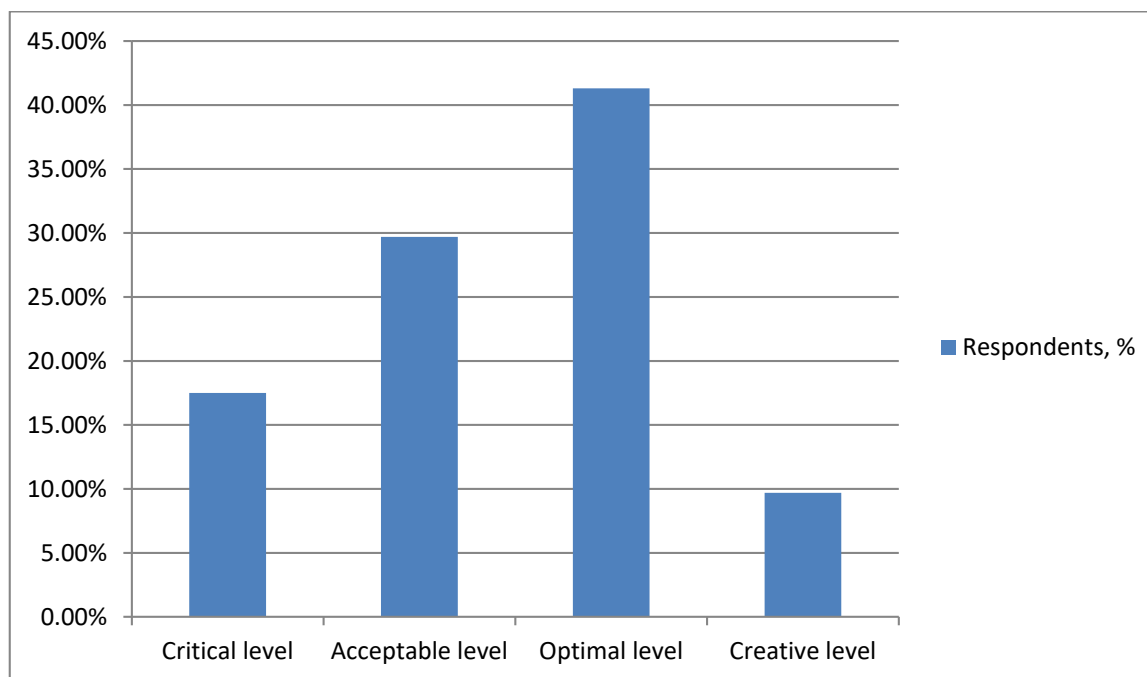
Different methods were used to determine the level of research competence for each criterion: questionnaires, analysis of students' academic achievements, expert assessment, self-assessment, mutual assessment. It was found as a result of studying the motivational and value component that 80% of students believe that research is an integral part of modern life (Figure 2).



**Figure 2.** Development of communicative and creative abilities in simulating educational and professional training of students. Source: authors

The criterion evaluation system allowed carrying out a summative diagnostics, the processing of the results of which led to the following conclusions. The summative diagnostics showed, first, the tendency of positive dynamics of indicators from the first to the fourth year of study that is explained by natural and logical personal and professional development of students in the period of professional training from year to year. Second, the results of evaluation of indicators, such as the development of skills of independent work, motivation for

educational activities, motivation for professional education, self-regulation, reflection, showed a general lack of development in all students. Third, according to the theoretical conclusions, the set of indicators allowed to divide all respondents into four groups according to the levels of independent work: critical, acceptable, optimal, creative. As a result, the total number of respondents was divided into four groups (Figure 3):

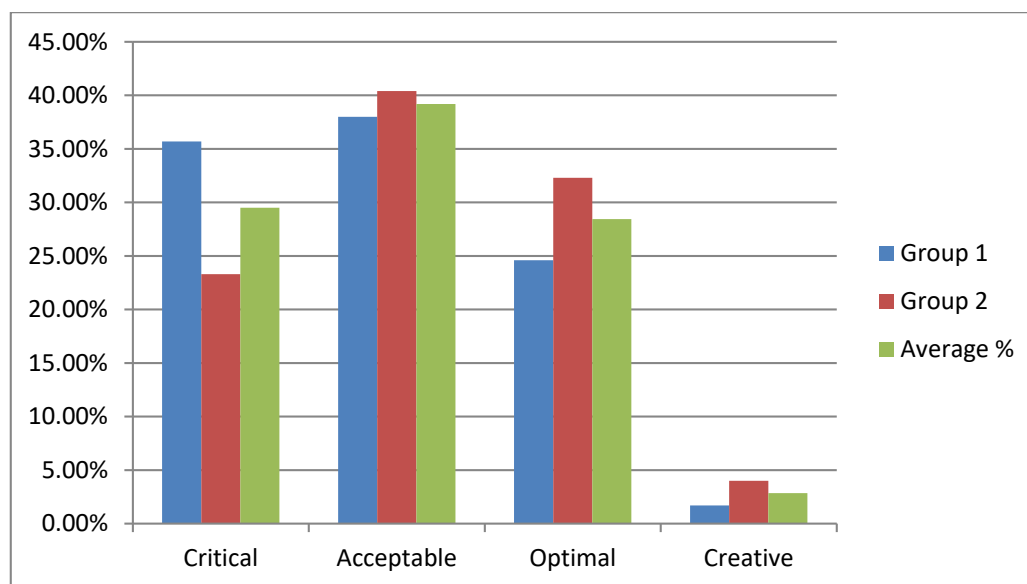


**Figure 3.** Combined indicators of distribution by four groups of criteria.  
Source: authors

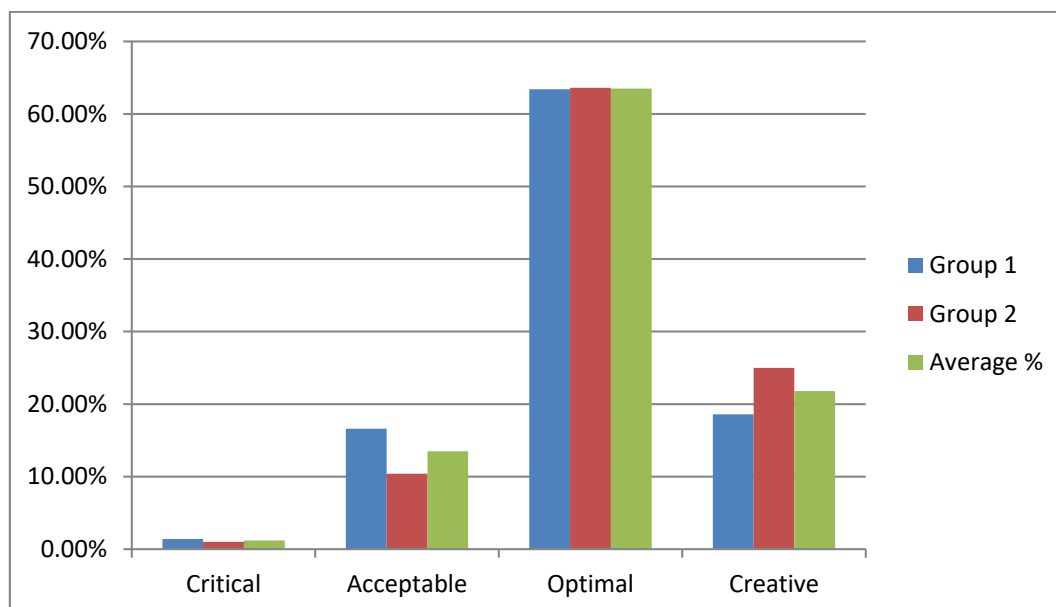
Prospects for improving the process of independent work as a component of the educational process of HEI in the development of professional competencies are obvious and almost limitless. Meanwhile, the period of internships reveals a contradiction between the expectations of potential employers and the insufficient level of students' professional competencies. The contradiction reveals insufficient attention to the development of professional competencies in students during the period of professional training and leads to the fact that the graduate does not demonstrate professional competencies, but only the willingness to acquire them. As a result, young specialists gain experience in practical professional activities for several years, developing professional competence.

The results of student diagnostics within the implementation of the pedagogical condition would allow each teacher to take an individually oriented approach to students in the development of professional competencies, correction of skills of independent work, to form

motivation for professional education taking into account individual characteristics (Figure 4). This is provided by the following pedagogical condition — the implementation of individual and differentiated approach to the organization of independent work of students based on the results of diagnosis and self-diagnosis of students (Figure 5).



**Figure 4.** Distribution of students according to the summative level of independent work of students of the control group (%). Source: authors



**Figure 5.** Distribution of students according to the summative level of independent work of students of the experimental group (%). Source: authors

The pedagogical experiment, which was to prove the effectiveness of theoretically sound pedagogical conditions for the organization of independent work of students aimed at the development of professional competencies in the period of professional training of students in HEI, yielded the results to draw the conclusions provided below. The choice and justification of criteria and indicators in assessing the effectiveness of independent work, which ensures the development of professional competencies of students as a result of the implementation of pedagogical conditions, proved to be correct and allows to solve experimental problems. The chosen criteria included: the educational criterion, indicators of which are the academic performance of students (represented by the average score), the level of skills of independent work; motivational criterion with indicators of the degree of motivation for professional training and professional choice; personality criterion, which was assessed by the indicators of the level of self-regulation and the level of reflection.

The following pedagogical conditions for the organization of independent work of students, which ensures the development of professional competencies were substantiated in the theoretical part and tested during the pedagogical experiment: 1) diagnostics of students (the level of skills of independent activity, motives of educational activity and professional choice); 2) correction and development of skills of independent educational activity, independent work of students on the basis of results of diagnostics; 3) preparation of teachers for the organization of effective independent work of students aimed at the development of professional competencies; 4) material, methodical, technical support for the organization of independent work of students aimed at the development of professional competencies.

### **Discussions**

Based on Figures 4 and 5, we can conclude that the implementation of theoretically sound pedagogical conditions for the organization of independent work contributes to the development of professional competencies. Diagnostics of students (development of skills of independent activity, motives of educational activity and professional choice). Correction and development of skills of independent educational activity, independent work of students on the basis of diagnostic results. Preparation of teachers for the organization of effective independent work of students aimed at the development of professional competencies. Material, methodical, technical support of the organization of independent work of students, aimed at the formation of professional competencies.

Implementation of individual and differentiated approach to the organization of independent work of students based on the results of self-diagnosis of personal characteristics

by students. The ratio of the assignments for independent work in each subject with the developed professional competencies and stages of their development. In the course of pedagogical research, we achieved the aim, fulfilled all of the objectives, proved the hypothesis by the positive dynamics of all the studied indicators. The results of the summative diagnostics confirmed the theoretically predictable problems in the organization of independent work. The results of the diagnostics of motivational and personal criteria for fourth-year students cannot be called satisfactory.

The personality criterion with indicators of self-regulation and reflection did not reveal students with a creative level. The level of reflection for third- and fourth-year students is mostly medium (64% and 85%, respectively), while it has a low level for the first and second year (50% and 46%, respectively). Thus, it can be stated that senior students have higher levels of reflection compared to junior students. Such indicators contradict the study of Zukhra et al. (2020), which shows that the level of reflection is higher in junior students. However, studies by Xiaoqin and Chunquan (2020) confirm the results obtained in this study on the distribution of the level of reflection. Therefore, the implementation of pedagogical conditions for the organization of independent work, which ensures the development of professional competencies, is necessary, which is also confirmed by the previous research of Farajpour, Samavi and Javdan (2019). The pedagogical conditions were implemented at the formative stage of the pedagogical experiment, which involved first- and second-year students.

The results of the pedagogical experiment confirmed that substantiated and tested pedagogical conditions for the organization of independent work are necessary and sufficient in the development of professional competencies in students during training in HEIs, and allow to talk about the achieved aim of the research, fulfilment of all objectives. The results proved the hypothesis which contradicts the data of the study by Garnevska (2018), who states that the creation of special conditions is not required, however, the study of Vaganova (2019) confirms the conclusions made. The terms “expertise” and “competence” are not synonymous. Expertise is developed as an integrative personal quality of the subject as a result of the development of a certain set of competencies. The development of professional competencies is due to the personal qualities of the subject of activity, including the motivation of professional self-development of the individual in knowledge, skills, abilities, experience. Hu (2017) also shares this opinion in his study. Cabo and Klaassen (2018) hold the view in their study that these concepts are identical.

The level of competence cannot be assessed in a static state, its level is manifested in personally conditioned activities, which allows determining its component structure

(motivational-value, cognitive, activity, personal, reflective components). This view is shared by Cabo and Van der Wal (2021). In the studies of Manganelli, Cavicchiolo and Mallia (2019) competence is conversely considered as a more stable structure. The development of professional competence, which is not additive, has a procedural, phased nature (motivational, theoretical, practical, control-analytical), which is noted by André et al. (2017) in their study. In addition to the necessary knowledge, skills, experience, a factor in the development of professional competencies is the personal potential of the subject (student), including motivation, goal setting, self-regulation, reflection and other mechanisms of self-development, as evidenced by Balve and Albert (2015). At the same time, the study of D'elia (2019) does not find this connection. So, independent work as a type of educational activity, a form of educational process and a mechanism of self-education and self-development is a leading factor in the development of professional competencies and professional development in general in the process of transforming educational activities into educational and professional. The theoretical implications of the study include the development of a framework for the organization of simulation of educational and professional training of students to increase the effectiveness of training of future specialists.

The purpose and content of the use of simulation of educational and professional training is expanding. The practical results of the study are the development of a system of educational and cognitive assignments for learning and the use of simulation of educational and professional training in the development of professional competencies in future specialists. The main limitation of the study is the difficulty of identifying the results of the study due to the limited sample of students. The difficulty is also the development and use of modern multimedia technologies, the adequacy of the methods used to the research objectives, taking into account the needs of the modern education system. It was difficult to test the research materials in the real educational process because of the quarantine restrictions caused by the COVID-19 pandemic.

### **Conclusions**

The issue of improving the training of future specialists will never lose its topicality, so the study of methods to improve the effectiveness of monitoring will always be the subject of research. The effectiveness of pedagogical conditions for the organization of independent work ensuring the development of professional competencies of students was evaluated in the course of the pedagogical experiment, and the results showed positive dynamics of all indicators on all these criteria and on the dynamics of levels of independent work in general. The analysis of



the problem of the organization of independent work of students is not limited to this research, it can be expanded by further research of the individual approach to the organization of independent work of students and application of modern pedagogical, as well as information and communication technologies. The results of the study are of great theoretical and practical importance and can be used by both students and teachers to organize the simulation of educational and professional training in order to increase competence. Future research on this issue may deal with certain aspects of simulation, the quality of monitoring student achievements, methods of organizing independent work of students, means of identifying personal development trajectory.

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