# Professional Training of Engineering-Teachers in the Food Industry: Evaluation of an Experimental Model

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***Abstract*** **– The article analyzes the peculiarities of the pedagogical experiment aimed at solving the contradiction between the needs of Ukrainian society for highly qualified teachers and the actual state of pedagogical education. The main research methods include mathematical statistics, in particular the calculation of the student's t-test and the non-parametric Pearson test. The hypothesis is that strengthening the personnel potential of vocational education is ensured by the readiness of future specialists to quickly adapt to changing working conditions in production and education. This is ensured by creating appropriate psychological and pedagogical conditions. The results of the study confirmed the effectiveness of the experimental model.**

***Keywords*** **– Structural-functional model, experiment, engineers-teachers, food industry, professional activity.**

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## 1. Introduction

The concept of the development of pedagogical education provides for the improvement of the system of training new generation pedagogical workers, the creation of conditions for the involvement of specialists from other professions in pedagogical activities and the provision of resources for the integration of modern alternative models of continuous professional and personal development of pedagogical workers. According to the Pedagogical Educational Development Concept, the competitiveness of a pedagogical worker, in particular an engineer-pedagogue, is determined by his professionalism, depends on the qualification level, educational experience, mastery, the presence of professionally significant qualities, particularly mobility, personal responsibility for one's own continuous professional development, disposition to perceive new, ability to personal creative development, innovative searches and discoveries. A successful teaching career requires constant learning and the ability to adapt to rapid changes. The key factors in a teacher's professional growth are the desire for self-improvement and self-education, which contribute to the expansion of his professional opportunities, cognitive interests, and the development of creative individuality. This process, which must be constant and systematic, is inseparable from professional growth and raising the level of pedagogical skill, and is also characterized by the gradual achievement of the set goals [1].

In this context, there are issues that need to be resolved, in particular, the discrepancy between the quality of training of applicants of higher education institutions and the requirements of employers, as well as the imbalance between the needs of Ukrainian society for highly qualified pedagogical staff and the actual level of pedagogical education.

The purpose of the article is to evaluate the effectiveness of the experimental model of professional training of engineers-pedagogues in the food industry.

## 2. Literature Review

In modern conditions, experimental research is essential for scientific knowledge. In the fields of science, where the mathematical apparatus is used, many results can be theoretically justified on the basis of available empirical material. However, in pedagogy, the experiment is mainly the only way to confirm hypotheses and results of theoretical research. Checking the effectiveness of new methods of training future specialists in the context of the Concept of the Development of Pedagogical Education is of particular importance.

The analysis of dissertation studies in pedagogical sciences allows us to state that the majority of domestic scientists and representatives of the pedagogical community resort to testing the hypothesis precisely with the help of an experiment. Not an exception is research related to alternative training models for students of higher engineering and pedagogical education in Ukraine, particularly engineers-pedagogues in various profiles.

Researcher R. Horbatyuk created a model of a pedagogical system for the training of future engineers-pedagogues, which is aimed at developing an educational process that will affect the content of the professional component. The training of engineers-pedagogues with the computer profile involves a set of special competencies, socially significant qualities of the individual, which allow them to perform professional duties in a certain activity field [2]. Bryukhanova [3] substantiated and developed the professional pedagogical competence model of an engineer-pedagogue, which characterizes the interdependence of established professional pedagogical competences and structural elements of the personality of this specialist: each competence is revealed in the interrelationship with professional orientation, professional knowledge, abilities and skills, professionally important abilities and qualities and, on the contrary, each of the specified structural elements of the personality reflects methodological, creative, design, communicative, managerial and research competence. Khomenko [4] substantiated a structural dual content model of training by the future engineers-pedagogues with the computer profile, which contains dual professional competencies, their components (ability to perform specific activities and relevant knowledge and skills), characteristics of their formation process (the method of formation of these knowledge and skills and levels of their assimilation), content modules of technical and pedagogical disciplines. Joga [5] substantiated and developed a model of production and technological training of bachelors in the field of food technology in pedagogical institutions of higher education, which allows to realize the goals and tasks of student training to the maximum extent, taking into account the set of requirements proposed to him as a person and criteria as a subject of professional activity. In addition, in the conditions of martial law in Ukraine, special attention is paid to innovative methods of distance education [6], [8], [9], [10]. The results of the experimental studies proved the positive formation dynamics of the investigated indicators, the probability of which was confirmed by the mathematical statistic methods.

The success of pedagogical experiments depends on how the results are organized, planned, conducted, and interpreted. Planning includes determination of the goals and tasks in an experiment, choosing the dependent variable, determining the influencing factors and their levels, the required number of observations, the sequence of conducting the experiment, and checking result methods. The experiment must be clearly organized and conducted according to the plan. At the stage of interpretation, data is collected, analyzed, and statistics are used to test working hypotheses.

Therefore, planning, organizing, and conducting an experiment are key research working components. The analysis of pedagogical research reveals the active efforts of scientists in search of new contents, forms of organization of the educational process, as well as methods and means of learning for applicants of higher education institutions. However, the training by the future engineers-pedagogues in the food industry remains relevant for today.

## 3. Methodology

In accordance with the defined goal, the following tasks were set: on the basis of the analysis of normative and legal documents, modern theory and practice, to determine the peculiarities of the pedagogical experiment in relation to the subject of research; characterize the process of organization and implementation of an experimental study to evaluate the effectiveness of an experimental model of training future engineers-pedagogues of the food industry for creative professional activity [11], [7].

To realize the goal and solve the tasks, a complex of interrelated research methods was applied, including the analysis of regulatory and legal acts, psychological and pedagogical literature and current research to determine the peculiarities of the pedagogical experiment in relation to the subject of the study; content analysis for clarifying and concretizing the conceptual and categorical understanding experimental apparatus research constructs; synthesis, comparison, and generalization of the received diagnostic data to evaluate the effectiveness of the experimental model of training future specialists; statistical methods (data processing in quantitative and qualitative dimensions, graphical representation of results) to track changes in the levels of readiness; formulation of conclusions and prospect determination for the further research in this direction [11].

The pedagogical experiment is defined as a set of methods aimed at convincingly confirming the initially formulated hypothesis, which is based on the assumption that the strengthening of personnel potential in the field of vocational education is achieved due to the ability of future specialists to quickly adapt to changing working conditions in industry and education. This is achieved by the orientation of professional training on the formation of readiness for creative activity and the creation of appropriate conditions: strengthening the creative content of practice-oriented learning content; the use of elements of creative activity in the forms of organization of the educational process, methods and means of teaching; psychological and pedagogical support of individual and creative professional formation of students.

The general hypothesis is specified by partial ones, such as: the developed training model will be effective if:

- achieving readiness for the specified activity is the expected result of the educational process, which is based on the principles of student-centeredness and the implementation of systemic, synergistic, competence-based, creative and problem-based approaches;
- there is a relationship between the selected components of readiness;
- create conditions for the interconnection of all readiness components.

Therefore, the experiment provides an opportunity to evaluate the effectiveness of the implemented pedagogical innovation - the model of training future engineers-pedagogues of the food industry.

The experimental model should illustrate the educational process that contributes to the achievement of the set goals in the performance of professional tasks.

The experimental model of training future engineers-pedagogues in the food industry for creative professional activity consists of interrelated and interdependent blocks: target, methodological, content-procedural and evaluation-resultative; ensures the readiness formation by the future engineers-pedagogues in the food industry for creative professional activity; involves the integration of updated content, new forms of organization of the educational process, as well as modern methods and teaching tools; is implemented thanks to the created psychological and pedagogical conditions [11].

According to the experimental model, the driving forces that influence the formation of readiness (psychological-pedagogical conditions of the educational process and educational and methodological support) and the components that are subject to changes as a result of this influence (motivational-value, cognitive-active, personal-reflective components of readiness) are determined ). Within the framework of the parallel experiment, experimental (EG) and control (CG) groups were created. The educational process of the experimental group (EG) was carried out with the introduction of selected driving forces, in the control group (CG) - on the basis of traditional practice.

To establish the presence or absence of the effectiveness of the experimental model, the following procedures were carried out:

1. A control section was conducted in the experimental (EG) and control (CG) groups to check the homogeneity of the initial level of readiness.
2. The educational process in the control (CG) and experimental (EG) groups of future engineers-pedagogues of the food industry was organized according to the research program, and the evaluation of intermediate results was also performed.
3. The final cut was conducted in both groups and the formed readiness level was diagnosed.
4. The results of the initial and final sections in both groups were compared and the magnitude of their changes was determined in relation to the formation of readiness in general and its components.
5. The amount of control (CG) and experimental (EG) group shifts by the future engineers-pedagogues in the food industry was compared.
6. The results of the sections were processed using the mathematical statistic methods, their probability is determined.
7. Conclusions regarding the effectiveness of the experimental model were formulated based on the results of the pedagogical research.

The following institutions of higher education were chosen as the base of the experimental research: Ukrainian Engineering and Pedagogical Academy (Kharkiv), Hryhoriy Skovoroda University in Pereyaslav (Pereyaslav), Mykhailo Drahomanov Ukrainian State University (Kyiv) and Uman State Pedagogical University named after Pavel Tychyna (Uman city).

The pedagogical experiment aimed at checking the effectiveness of the experimental model was carried out in three stages during 2019–2023 years.

At the first stage of the research (2019-2020), the following tasks were outlined and solved: the peculiarities of the professional activity by the future engineers-pedagogues in the food industry and the educational requirements for their training were clarified; the essence of creative professional activity and the requirements for its implementation are substantiated; the structure of readiness by the future engineers-pedagogues in the food industry for creative professional activity is determined, criteria, indicators and levels are characterized.

At the second stage of the research (2020–2022), the following tasks were implemented: diagnostic sections were performed (the state of formation of readiness components was established); the research hypothesis is specified; an experimental model was substantiated, developed and implemented; the psychological and pedagogical conditions for introducing the developed experimental model into the educational process of future engineers-pedagogues of the food industry were identified and substantiated; intermediate results were measured; adjusted the tested model; control diagnostic sections were made. The second stage provided for the completion of ascertaining, formative and control experiment.

The purpose of the ascertainment experiment is to find out the real professional training state by the future engineers-pedagogues in the food industry and the level of the studied characteristics at the beginning of it.

The formative experiment is aimed at studying the investigated phenomenon directly in the process of implementing the experimental model.

The transition to the formative experiment was carried out on the basis of the teachers' awareness of the experimental research bases of the requirements for the implementation of the developed experimental model, namely:

1) in scientific and theoretical work: study of the terminological apparatus of research, methodological approaches, criteria, indicators and levels of readiness; with diagnostic research tools and elements of the experimental model; tracking the specifics of the researched process, measuring intermediate results, adjusting the psychological and pedagogical conditions of creative training of future specialists;

2) in scientific and methodological work: introduction of the updated practice-oriented component content of the discipline professional and practical training cycle ("Psychology", "Professional pedagogy", "General technologies of food production" and "Professional training methodology") into the educational training future specialists; approbation of forms, methods and means of creative training of future engineers-pedagogues of the food industry according to the developed experimental model;

3) in organizational work: agreement on the implementation of the experimental model in the educational process of the research base; implementation of means of communication with the participants of the pedagogical experiment; information control over the course of the pedagogical experiment in a specific experimental group (EG); solving problems and tasks related to the organization with the educational process according to the experimental model within the functional duty limits;

4) other types of work: demonstration of accumulated experience at department meetings (scientific and methodological seminars, conferences, etc.).

The purpose of the control experiment was to compare the results of the experimental (EG) and control (CG) groups. Conclusions regarding the dynamics of the formation of readiness according to all criteria and levels have been formulated.

At the third stage (2022-2023), the results of the experimental research were summarized and systematized: the math statistics choice methods were substantiated; the main conclusions and recommendations regarding the implementation and application of the experimental model are formulated.

So, the pedagogical experiment was carried out on the basis of the developed experimental model.

## 4. Results and Discussion

The purpose of the statistical processing of the obtained data of the pedagogical experiment was to evaluate the effectiveness of the use of the experimental model.

To conduct the pedagogical experiment, an experimental group (EG) and a control group (CG) of students with higher education in specialty 015 vocational education (Food technologies) with a total ammount 255 people were selected. The control group (CG) include 130 people whose training was carried out according to traditional methods.

The experimental group (EG) included 125 people, whose training was carried out with the introduction of the developed experimental model.

The objectivity of the results of the experimental study, aimed at checking the effectiveness of the developed model, is ensured by the equivalence of two samples of higher education students, that is, the homogeneity of the control (CG) and experimental (EG) groups in terms of the level of readiness for creative professional activity at the beginning of the experiment.

### *4.1. Determination of the Initial Level of Readiness Formation and Verification of the Statistical Discrepancy Presence or Absence*

In order to determine the initial level of readiness formation for creative professional activity and check the presence or absence with statistical differences as series, individual values of test answers by the future engineers-pedagogues in the food industry were taken. Each level is assigned a corresponding score: intuitive - 1; reproductive - 2; searching for engine - 3; creative - 4. The average score calculation of the initial readiness level for creative professional activity is given in the Table 1.

*Table 1. Calculation of the average score of the initial level of preparedness*

| Control group | | | | Experimental group | | | |
|---|---|---|---|---|---|---|---|
| Point | Ammount of higher education graduates | Total points | Average value | Point | Ammount of higher education graduates | Total points | Average value |
| 1 | 35 | 35 | | 1 | 32 | 32 | |
| 2 | 54 | 108 | | 2 | 56 | 112 | |
| 3 | 30 | 90 | | 3 | 25 | 75 | |
| 4 | 11 | 44 | | 4 | 12 | 48 | |
| ∑ | 130 | 277 | 2,130 | ∑ | 125 | 267 | 2,136 |

According to the Table 1 mean score in the control (CG) and experimental (EG) groups has a slight difference as 0,006. The vast majority in both compared categories are higher education graduates with intuitive and reproductive readiness levels for creative professional activity: 68,4% - in the control and 70,4% - in the experimental groups.

Using the t-test calculation, the reliability of matches and differences between the control (CG) and experimental (EG) groups was determined. For this, two hypotheses were formulated.

Hypothesis $H_0$: the differences between the levels of preparedness of the experimental (EG) and control (CG) groups are not significant.

Hypothesis $H_1$: the differences between the levels of preparedness of the experimental (EG) and control (CG) groups are quite significant.

The value of the t-criterion was determined by Formula 1:

$$t = \frac{|M_1 - M_2|}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}} \quad (1),$$

where $M_1$ and $M_2$ are the average value of the first and second samples;

$S_1$ and $S_2$ - variance (root mean square deviation) for the first and second samples;

$N_1$ and $N_2$ are the assessments number in the first and second samples.

To calculate this indicator, the dispersion was determined according to Formula 2:

$$S^2 = \frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{N-1} \quad (2),$$

where $(x_i - \overline{x})^2$ is the square of the individual value deviation features from the arithmetic mean;

N is the number of features.

The calculation of the variance of the readiness formation by the future engineers-pedagogues for creative professional activity is given in the Table 2.

*Table 2. Calculation of the variance of readiness formation*

| Groups | $i$ | $\overline{x}$ | $x_i - \overline{x}$ | $(x_i - \overline{x})^2$ | $n_i(x_i - \overline{x})^2$ | $S^2$ |
|---|---|---|---|---|---|---|
| EG | 1 | 2,136 | -1,136 | 1,290496 | 1,290496 | 0,1408 |
| | 2 | | -0,136 | 0,018496 | 0,036992 | |
| | 3 | | 0,864 | 0,746496 | 2,239488 | |
| | 4 | | 1,864 | 3,474496 | 13,897984 | |
| CG | 1 | 2,130 | -1,13 | 1,2769 | 1,2769 | 0,136 |
| | 2 | | -0,13 | 0,0169 | 0,0338 | |
| | 3 | | 0,87 | 0,7569 | 2,2707 | |
| | 4 | | 1,87 | 3,4969 | 13,9876 | |

From the Table 2, it can be seen that the blurring of the score distribution in relation to the average arithmetic value is not significant.

We obtained the variance, calculated the value of the t-test:

$$t = \frac{|2{,}130 - 2{,}136|}{\sqrt{\frac{0{,}136}{130} + \frac{0{,}1408}{125}}} \approx 0{,}128$$

The tabular value of student's t-criterion is greater than the calculated value ( $t_{tab.}$ (1,969) $t_{calc.}$ (0,128) ).

Thus, the null hypothesis is not rejected, both samples belong to the same general population, that is, they are homogeneous for the 0,05 confidence level (5% probability), which, in turn, allows us to assert the insufficient significance of the difference in the readiness level by the future engineers-teachers in the food industry of the control (CG) and experimental (EG) groups and are conditionally equal.

The reliability of the matches and differences of the control (CG) and experimental (EG) groups regarding the formation of readiness components at the beginning of the experiment was analyzed separately in order to prevent possible errors at the formative stage: motivational-value (MV) - 0,213; cognitive-activity (CA) - 0,271; personal-reflexive (PR) - 0,492.

### *4.2. Comparative Formative Characteristics of the Readiness Components*

In the pedagogical experiment process, a comparative formative characterization of the readiness components for creative professional activity was carried out according to motivational, ethical-professional, cognitive, operational-active, personal-creative, and evaluation-resultative criteria.

The obtained experimental data regarding positive changes in the formation of readiness (Table 3) give grounds for asserting the effectiveness of the developed experimental model.

*Table 3. Systematized experimental results on the levels of formation of readiness components*

| | | Intuitive | | Reproductive | | Searchable | | Creative | |
|---|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | n | % | n | % |
| MV | CG | 21 | 16,15 | 48 | 36,93 | 37 | 28,46 | 24 | 18,46 |
| | EG | 16 | 12,8 | 29 | 23,2 | 48 | 38,4 | 32 | 25,6 |
| CA | CG | 22 | 16,92 | 47 | 36,16 | 39 | 30,0 | 22 | 16,92 |
| | EG | 14 | 11,2 | 30 | 24,0 | 50 | 40,0 | 31 | 24,8 |
| PR | CG | 23 | 17,69 | 40 | 30,77 | 41 | 31,54 | 26 | 20,0 |
| | EG | 12 | 9,6 | 25 | 20,0 | 52 | 41,6 | 36 | 28,8 |

### *4.3. Generalized Dynamics of the Level of Readiness*

The dynamics of the readiness level by the future engineers-pedagogues for creative professional activity are summarized in the Table 4.

*Table 4. Dynamics of the readiness formation (%)*

| Readiness level | From the beginning of the experiment | | | | Final experiment | | | |
|---|---|---|---|---|---|---|---|---|
| | CG = 130 | | EG = 125 | | CG = 130 | | EG = 125 | |
| Intuitive | 35 | 26,9 | 32 | 25,6 | 22 | 16,92 (-9,98) | 14 | 11,2 (-14,4) |
| Reproductive | 54 | 41,5 | 56 | 44,8 | 45 | 34,62 (-6,88) | 28 | 22,4 (-22,4) |
| Searchable | 30 | 23,1 | 25 | 20,0 | 39 | 30,0 (+6,9) | 50 | 40,0 (+20,0 |
| Creative | 11 | 8,5 | 12 | 9,6 | 24 | 18,46 (+9,96) | 33 | 26,4 (+16,8 |

### *4.4. Comparative Analysis of Absolute Average Qualitative Changing Values in the Readiness*

A comparative value analysis of the absolute average qualitative changing value in the readiness level for creative professional activity in the control (CG) and experimental (EG) groups made it possible to conclude that the positive qualitative changing dynamics in CG (averagely) = 8.43%) is due to traditional training, and in EG (averagely = 18.4%) - the result of training with higher education applicants according to the experimental model. Graphically, the qualitative changing dynamics in the readiness by the future engineers-pedagogues in the food industry during the pedagogical experiment are presented in Fig. 1.

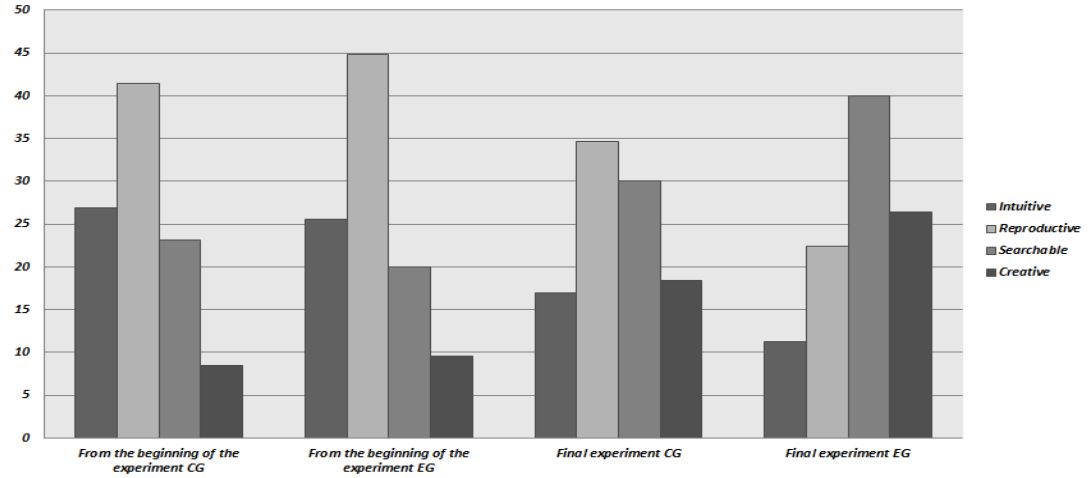


*Figure 1. Qualitative changing dynamics in the readiness formation of control (CG) and experimental (EG) groups*

### *4.5. Determining the Level of Readiness and Checking the Presence or Absence of Statistical Discrepancies at the End of the Experiment*

The results of the experiment were confirmed by the methods of mathematical statistics, in particular, by calculating the non-parametric Pearson test – $x^2$. For this, statistical hypotheses were put forward:

$H_0$: the experimental model does not affect qualitative changes in the level of preparedness, and the obtained results are random.

$H_1$: the readiness level changes under the influence of the experimental model.

We determined the relative frequencies of $f'_E$ and $f'_K$ and calculated the value of the criterion $x^2$ (Table 5).

The obtained value of the Pearson test $x^2 = 12,98$. Therefore, ($x^2_{exp.} > x^2_{crit.}$ (12,98 > 7.8). The results of the calculation of the Pearson criterion are the basis for rejecting the null hypothesis $H_0$ and accepting the alternative hypothesis $H_1$, which confirms the influence of the experimental model on the development of the readiness of future engineers-pedagogues of the food industry for creative professional activity.

*Table 5. Working table for calculating the $x^2$-criterion*

| Levels | $f'_E$, % | $f'_K$,% | $f'_E - f'_K$ | $(f'_E - f'_K)^2$ | $\frac{(f'_E - f'_K)^2}{f'_K}$ |
|---|---|---|---|---|---|
| Intuitive | 11,2 | 16,92 | -5,72 | 32,71 | 1,93 |
| Reproductive | 22,4 | 34,62 | -12,22 | 149,32 | 4,31 |
| Searchable | 40,0 | 30,0 | 10,0 | 100,0 | 3,33 |
| Creative | 26,4 | 18,46 | 7,94 | 63,04 | 3,41 |

The student's t-test was used to test the differences between the experimental (EG) and control (CG) groups in terms of readiness. Data on the average score of the level of readiness for creative professional activity at the end of the experiment are presented in the Table. 6.

*Table 6. Calculation of the average score of the level of preparedness at the end of the experiment*

| Control group | | | | Experimental group | | | |
|---|---|---|---|---|---|---|---|
| Point | Number of higher education graduates | Total points | Average value | Point | Number of higher education graduates | Total points | Average value |
| 1 | 22 | 22 | | 1 | 14 | 14 | |
| 2 | 45 | 90 | | 2 | 28 | 56 | |
| 3 | 39 | 117 | | 3 | 50 | 150 | |
| 4 | 24 | 96 | | 4 | 33 | 132 | |
| ∑ | 130 | 325 | 2,5 | ∑ | 125 | 352 | 2,816 |

According to the obtained data, the average score in the control (CG) and experimental (EG) groups is significantly different, the difference is 0,316.

The majority with higher education seek for the control group (CG), 34,61%, are at the reproductive readiness level for creative professional activity, 40% of the experimental group (EG) are at the exploratory level.

Using the t-test calculation, the reliability of matches and other differences between the control (CG) and experimental (EG) groups was determined. According to this, two hypotheses were formulated.

Hypothesis H0: differences in the level of readiness of the experimental (EG) and control (CG) groups are not significant.

Hypothesis H1: differences in the level of readiness of the experimental (EG) and control (CG) groups are quite significant.

To calculate the t-test, the variance was determined. The calculation of the dispersion readiness form by the future engineers-pedagogues in the food industry for creative professional activity is given in the Table. 7.

*Table 7. Calculation of the readiness dispersion*

| Groups | $i$ | $\overline{x}$ | $x_i - \overline{x}$ | $(x_i - \overline{x})^2$ | $n_i(x_i - \overline{x})^2$ | $S^2$ |
|---|---|---|---|---|---|---|
| EG | 1 | 2,816 | -1,816 | 3,297856 | 3,297859 | 0,0833 |
| | 2 | | -0,816 | 0,665856 | 1,331712 | |
| | 3 | | 0,184 | 0,033856 | 0,101568 | |
| | 4 | | 1,184 | 1,401856 | 5,607424 | |
| CG | 1 | 2,5 | -1,5 | 2,25 | 2,25 | 0,0969 |
| | 2 | | -0,5 | 0,25 | 0,5 | |
| | 3 | | 0,5 | 0,25 | 0,75 | |
| | 4 | | 1,5 | 2,25 | 9 | |

We obtained the variance, calculated the value of the t-test:

$$t = \frac{|2,5 - 2,816|}{\sqrt{\frac{0,0969}{130} + \frac{0,0833}{125}}} \approx 8,45$$

The tabular student's t-criterion value is less than the calculated one ( $t_{tab.}$ (1,7033) < $t_{calc.}$ (8,45) ). This indicates that the null hypothesis is rejected, and the H1 hypothesis about the presence of differences in the level of readiness for creative professional activity between the experimental (EG) and control (CG) groups is accepted with a probability of 95%.

## 5. Conclusion

The key stages of conducting a pedagogical experiment include organization, planning, implementation, and evaluation of results.

The organization of the experiment to check the effectiveness of the experimental model involves: identifying the driving forces that influence the formation of readiness and the components that change under this influence; performing a set of procedures to confirm or refute the effect of exposure to experimental factors; selection of the research base and implementation of scientific-theoretical, scientific-methodical, organizational and other types of activities aimed at familiarizing teachers with the requirements for the implementation of the experimental model.

According to all parameters, statistically significant changes in the level of preparedness were recorded, which gives reason to conclude about the effectiveness of the experimental model.

The analysis of the experimental data of the control group (CG) showed qualitative changes at the intuitive level of readiness, manifested in a decrease in the number of students in this category by 9.98% during the experiment. Search and creative levels of preparedness also showed positive changes, with an increase in the number of students by 6.9% and 9.96%, respectively. In the "reproductive level" category, qualitative changes were manifested in a decrease in the number of students by 6.88% during the experiment.

The analysis of the experimental data of the experimental group (EG) showed qualitative changes at the reproductive level of readiness, manifested in a decrease in the number of students in this category by 22.4% during the pedagogical experiment. Search and creative levels of preparedness also showed positive dynamics, with an increase in the number of students by 20% and 16.8%, respectively. In the "intuitive level" category, qualitative changes were manifested in a decrease in the number of students by 14.4% during the experiment.

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