



Formation of linguistic culture in the process of teaching lexical disciplines to university students

Formación de cultura lingüística en el proceso de enseñanza de disciplinas léxicas a estudiantes universitarios

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Received: 03/08/2019 • Approved: 24/11/2019 • Published 25/11/2019

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ABSTRACT:

The novelty of the work lies in precisely determining how realistic it is to integrate the process of learning the language and culture. The authors determine the possibility of such integration based on a complex combination of the processes of preparing students as future specialists and the need to learn the culture of the state of a foreign language when learning a language, and not just while staying there.

Keywords: Linguistic culture, teaching, formation of competence, education, development.

RESUMEN:

La novedad del trabajo radica en determinar con precisión cuán realista es integrar el proceso de aprendizaje del idioma y la cultura. Los autores determinan la posibilidad de dicha integración en función de una combinación compleja de los procesos de preparación de los estudiantes como futuros especialistas y la necesidad de aprender la cultura del estado de un idioma extranjero al aprender un idioma, y no solo durante su estancia.

Palabras clave: Cultura lingüística, enseñanza, formación de competencias, educación, desarrollo

1. Introduction

Integration processes and socio-economic changes, the development of business contacts and the increasing role of the English language as a means of professional communication necessitate the training of new generation specialists, for whom communicative ability to a foreign language in the areas of their activities in oral and written forms is a condition for their competitiveness in the labor market (Romaine and Gorenflo, 2017). In order to fulfill the objectives of improving the quality of foreign language education of future specialists in certain legal documents, the problem of finding effective ways of developing an English-speaking linguistic culture with emphasis on mastering terminological vocabulary as a prerequisite for practical acquisition of professionally oriented English (De Costa *et al.*, 2018) is particularly relevant. One of the solutions to the above problem is the introduction of modern trends in higher education in terms of interactive teaching methods, which predominate in the educational activities of students of the elements of problematic, scientific search and creativity, the use of gaming, stimulating, organizational

techniques during the pair-group and collective speech interaction teacher and students (Mowbray, 2011; Fateev and Fateeva, 2016).

The goal of our research is to identify and analyze the didactic prerequisites for the formation of an English-speaking linguistic culture in the interactive teaching of students to terminological vocabulary in the structure of the economy, to justify the expediency and benefits of their learning lexical material by means of interactive teaching (Chu, 2014). Then one should reveal his own interpretation of the general didactic and methodological principles of teaching vocabulary (Goppel, 2019).

2. Literature review

Despite the analysis of the nature and types of forms and methods of interactive learning, in choosing interactive tools that are appropriate for the process of forming lexical competence, we focus on the Pan-European recommendations, where students are invited to conduct conversations, debates, interviews and negotiations, joint planning and focused to stimulate speech interaction and cooperation (Chen *et al.*, 2006).

Adequate and optimal tasks for ensuring the process of interactive formation of linguistic culture and effective acquisition of foreign language vocabulary by students can be such (Moore, 2008):

- 1) role-playing games with the help of which the educational communication is organized in accordance with the developed plot, the roles distributed between students and conditional relations;
- 2) problem situations that involve the performance of actions through critical reasoning, assumptions, guesses, interpretation of facts, reasoning, etc.;
- 3) free (spontaneous) communication, which has the following features in the classroom: its content is not always provided, active mobilization of speech and mental reserves and previous language experience is required, various communication strategies are used that allow the content of the utterance to be conveyed when the linguistic base is insufficiently developed. Material for tasks of this type are usually situations of real communication.

Summarizing the above types of tasks and organizational forms, and interactive learning tools, we can assume that all of them can and should be creatively used in the process of forming a linguistic culture (Sonntag, 2009). The above-described qualitative properties of interactive learning should be extrapolated to the students' training practice in order to expand the range of professional vocabulary and conduct training for its use in professionally oriented communication (Brodhead *et al.*, 2014). Positive results of learning activities in acquiring special vocabulary can be achieved in the process of collectively resolving debatable questions, during the construction of structural and logical schemes for expressing one's own judgments using adequate word plans, as well as during situational modeling, which is accompanied by constant practice in using the lexical units (McComas *et al.*, 2011). Despite the game character, interactive training with vocabulary forms the intellectual skills necessary for future professionals, and can be conducted using IT-technologies (Al-Kahtany, 1996).

Based on the results of modern scientific and pedagogical research on the problems of didactics, psychology and methods of teaching foreign languages and considering the above analysis of the problem, it seems reasonable to combine or vary the organizational forms of conducting interactive learning as an effective means for effective learning of lexical material by students (Samoilenko, 2016). A variety of forms of educational speech interaction is best facilitates the assimilation of vocabulary and stimulates its use in oral and written speech when solving professionally significant tasks for students according to a specific situation or learning environment (Henry, 1995). Taking into account the above, we believe that the use of pair-group and collective forms of work on the study of foreign language lexical material in student-managed and independent work of students lies at the heart of the methodology of interactive formation of linguistic culture (Parsons, 1988).

Appropriate prerequisites are needed to translate this methodology into practice (Novotná and Moraová, 2005). The study of scientific and pedagogical literature and analysis of the teaching of the humanities disciplines suggests that the social-economic and didactic prerequisites for the introduction of lexical competence development methods by interactive learning are: modern processes of restructuring and transformation of the national education system based on the principles of humanization and democratization of the educational process; the processes of adaptation of domestic educational standards to international standards in connection with the entry into the world educational system; the rapid development of IT- and telecommunication

technologies in the field of education; the promotion of alternative forms of organization of the educational process in higher education; the formation of the student body and the development of senior students' organizational and analytical skills necessary for the implementation of interactive learning; students' interest and motivation to learn a professionally oriented foreign language in order to achieve high competitiveness in the labor market (Bonvillain, 1985).

3. Materials and methods

In the context of our study, the model of organization of teaching foreign language vocabulary by students of economists is considered as a detailed scheme for managing interactive learning activities, acquisition of students' knowledge of English economic vocabulary and achieving a sufficient level of development of skills and abilities to use terminological units to communicate in situations of professional economics (Luiz, 2015). Thus, the proposed model of organizing teaching vocabulary should provide students with a sufficient level of formation of an English-speaking linguistic culture, for which purpose it is necessary to use means for organizing and conducting training and games, modeling, communicative-dialogue activities with vocabulary. Considering the practice of allocating in some universities additional study hours for the in-depth study of one or two foreign languages by economics students at the senior level of education at the expense of a regional or university component, methodologists consider it necessary to push students to learn the first foreign language at the level of an independent experienced user (Romaine, 2006).

Another objective factor is the fact that the economics students studied two foreign languages, and a significant number of them choose English as the main language after studying German (or another foreign language) in a secondary school (Peltokorpi and Clausen, 2011). That is, students just in the first year of economics begin to learn English as the first foreign language, which requires intensive training to achieve the level of proficiency in a foreign language provided for high school graduates. Considering the above, we believe that the proposed model of interactive teaching of English economic vocabulary is supposed to provide students of the educational level "bachelor" with the opportunity to learn the professional vocabulary necessary for professional communication in the field of foreign economic activity and acquisition of foreign language in the "advanced" level (Pérez-Milans, 2015).

First of all, let us analyze the results of the experiment, the purpose of which was to test how the proposed learning model provides for the process of the formation of a linguistic culture and if it necessary to make adjustments. At first it was necessary to hold a cut of the students' initial level of knowledge of terminological vocabulary and the level of skills to use it in speech and writing, for which students performed a diagnostic test cut. This cut also served as a feedback function in order to identify the degree to which the chosen strategy and tactics of training corresponded to real needs. Thus, diagnostics of students' knowledge of terminological vocabulary and the ability to use it in written and oral speech, which was the object of control, as well as diagnostics of students' needs for studying selected professional vocabulary as a condition for mastering professionally directed English were carried out.

The test we prepared for students to control the level of professional vocabulary consisted of twenty test cases (multiple and alternative choices, substitution of terminological vocabulary, etc.). To determine the score in the frames of the adopted 100-point scale, each correct answer was multiplied by 4. The maximum number of points for the test is 100. To control the level of skills to use terminological vocabulary in a written speech, students performed tasks to compile their own written messages. These were essays, reports, individual study and research assignments that students performed independently. It was widely practiced to provide students with advice and methodological assistance on writing essays (reports) during individual classes in extracurricular time under the guidance of a teacher.

4. Results and discussions

The tests results performed by students showed that the level of knowledge of vocabulary by students of EG1 after studying the educational material of a comprehensive module was an average 83.43 points. Accordingly, the level of knowledge of vocabulary on the test results of students of EG2 was an average of 82.83 points; EG3 – 74.93; EG4 – 73.33. Qualitative analysis of the performed module tests showed that despite some mistakes in the identification of terms, in their understanding, the students basically completed the tasks and reached a satisfactory level of training, since the average mark for the test to check the level of knowledge of terminological vocabulary in all EGs was 79.63 points

To check the written assignments and to edit them, improve the content and / or graphic design, students first, as a rule, exchanged works among themselves, then made the necessary adjustments and handed over to the teacher for testing. Using certain criteria for assessment, mark was given (up to 23 points for each criterion) and a total score was derived that was not higher than 100. The results of the control of skills to use terminological vocabulary (in written works) in the context of the EG were as follows: EG1 – on average – 78, 7 points; EG2 – respectively 86.5; EG3 – 78.65; EG4 – 80.8. The total indicator of the level of training, which we received as a result of adding the average values and dividing them by the number of groups, was 81.21 points, which is considered sufficient. A qualitative analysis of the written assignments revealed the ability of students to use vocabulary in accordance with the context, it is logical to match and transform them. The average amount of writing was in accordance with the task 3-5 pages of typed text. However, the grammatical and stylistic accuracy of the writing and use of terms for expressing opinions in a foreign language needed further improvement.

To test the level of students' ability to use terminological vocabulary in oral speech, they performed tasks on building their own statements with a new vocabulary. For this, students were offered situations in which they demonstrated not only the ability to use terminological vocabulary, but also the ability to argue, dispute, persuade, and showed their level of intellectual activity.

Students' answers were recorded on data medium and evaluated according to previously defined criteria. The maximum number of points for one criterion is 20; just for the test – 100 points. The results of monitoring the level of students' skills to use vocabulary in oral statements are as follows: EG1 – on average – 77.65 points; EG2 – 87.45 respectively; EG3 – 84.4; EG4 – 87.65. The total indicator of the level of training in all groups, which we received as a result of adding the average values and dividing them by the number of groups, was 84.78 points and is sufficient.

A qualitative analysis of the oral messages of students, their statements in the process of performing interactive exercises in the form of discussions and role-playing / business games showed that students had the skills to adequately use lexical units in accordance with the situation, they had enough volume of necessary terms for expressing opinions, and using speech terms marked by relative accuracy. It should be noted that when evaluating speech skills, we were guided not by absolute, but by relative accuracy of speech; therefore, it was not the number of language mistakes that influenced the assessment of the achieved level of competence in speaking, but the degree of solving the communicative problem. In addition to sufficiently formed skills to use vocabulary in speech, students in the course of performing interactive forms of work were observed activating their thinking, developing the skills of active listening and adequate behavior and response in difficult situations.

Thus, with the help of tests, it was possible to carry out a control and to reveal the level of formation of linguistic culture according to the results of students' training during the experiment. To obtain final results that show the attained level of linguistic culture, we summed up the average results of the tests carried out and divided the amount by the number of tests. The total indicator of the level of linguistic culture formation in all EGs (Figure 1) after the experiment was 81.89 points. So, according to the results of the survey experiment, we can state that the students showed a sufficient level of knowledge of terminological vocabulary and skills of its use, which was due to the use of a set of exercises and tasks of interactive nature in experimental training.

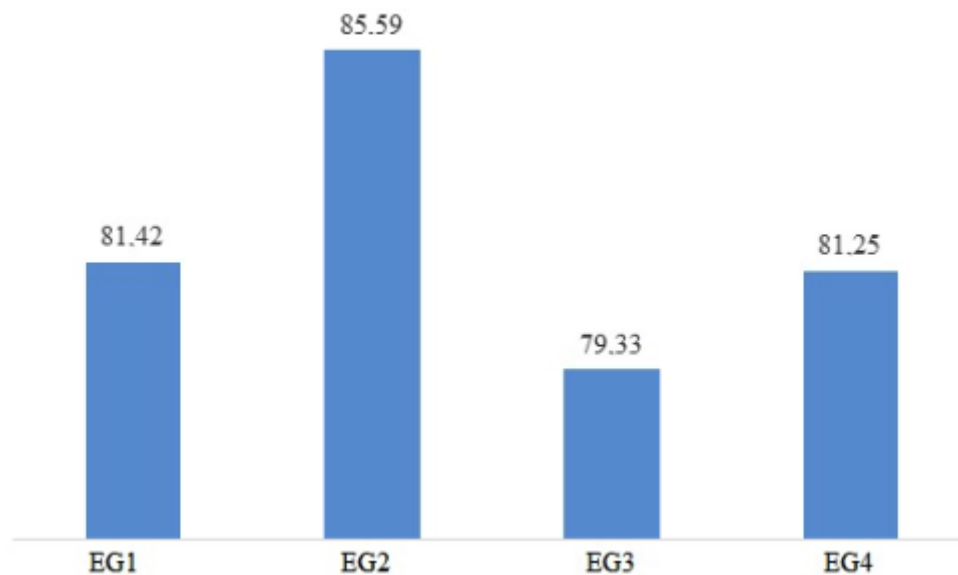
Observations during the experiment revealed an increase in students' interest in learning professional vocabulary, because doing exercises in practical classes and in the process of individual and independent work using interactive forms of learning, such as role-playing and business games, discussions on read texts, presentations of prepared essays and reports turned ordinary classroom lessons into non-standard, unusual, and therefore effective conference-classes, contests-classes, games-classes. In general, this had a positive effect on the quality of the assimilation of terminological vocabulary and the general level of formation of students of English-speaking linguistic culture.

In the course of the experiment, the developed model of learning vocabulary was corrected, instructions for some exercises were improved. For example, it was necessary to reorient interactive forms and methods of working with vocabulary into exercises at all stages of the formation of a linguistic culture, using the potential of students' individual and independent work. It was decided to make adjustments to some of the exercises in order to give them a communicative direction. It also turned out to be inappropriate to write essays using a computer,

because some of the works were not prepared on their own. This called into question the results obtained by controlling the level of ability to use terminological vocabulary in writing.

The task of the experiment was also to observe the educational process and find out the opinions of EG students regarding the effect of the developed set of exercises on expanding their background knowledge, increasing the effectiveness of learning English in a professional way. To this end, after the experiment was completed, we conducted a survey of all of its participants (57 people) and analyzed the answers of the respondents. Analysis of these answers showed that as a result of the use of a set of exercises for teaching terminological vocabulary, students from the EG improved significantly (10.5% of respondents) and generally improved (43.8% of respondents) knowledge of terminological vocabulary, as well as enriched factual knowledge of economic disciplines. On the other hand, it should be noted that 5.2% of the students surveyed did not improve their knowledge of terminological vocabulary when performing the developed exercises. This can be attributed to absenteeism from some students or insufficient attention to the quality of their studies.

Figure 1
Average success rates by groups, in points



The texts and tasks proposed by the students in the exercises turned out to be quite informative, educational and interesting. As evidenced by the analyzed answers of students, tables, charts, diagrams, etc., available in the exercises stimulated oral speech, increased the argumentation of messages, and contributed to the visualization of the educational process. A large number of exercises of a playful nature provided the process of learning vocabulary of personal orientation and emotionality as well as motivated students to communicate in other languages. Most of the developed exercises and tasks turned out to be feasible to perform, adequate to form and improve lexical knowledge and skills. Consequently, the conclusion obtained from the survey of students is that it is advisable to use the exercises developed in the educational process in the English language.

The experiment created prerequisites for conducting a basic experiment, the need for which was due to a number of objective and subjective factors. Therefore, in order to confirm the proposed hypothesis of the experiment and obtain reliable results on the effectiveness of the complex of exercises developed by us as the basis of the methodology of forming a linguistic culture by means of interactive learning, we organized the run-up and conducted a basic experiment in accordance with the methodological requirements and recommendations. Next, we will focus on a detailed analysis of the results of pre-experimental, post-experimental and delayed sections to control the level of formation of linguistic culture among students of EG1 and EG2.

The objects of control, as already noted, were students' knowledge of terminological vocabulary and the ability to use it, which makes up the structure of linguistic culture.

In order to determine the initial level of professional vocabulary knowledge by students of EG1 and EG2, we conducted a test, which consisted of 50 tasks of alternative and multiple choice. The development of such a test was due to the fact that it meets the main indicators of quality, that is, validity, reliability, discriminatory power, practicality and cost-effectiveness. The test was carried out simultaneously in two formed EG.

Checking of this test was carried out on the keys, and the assessment was derived on the basis of the developed test formula. In this case each correct answer was estimated at two points and then a total score was given of the one-hundred points scale described above. The test results showed that the initial level of knowledge of terminological vocabulary among students of EG1 was 63.8 points, and in EG2 – 69.8 points, which is below a sufficient level of training. A qualitative analysis of the test revealed low and insufficient knowledge of students of professional vocabulary. In particular, students experienced difficulties in recognizing and differentiating terminological words, were inattentive in their choice of the necessary term, could not apply analytical skills and background knowledge of economic disciplines.

To control the initial level of students' ability to use terminological vocabulary in writing, a test was developed that, using test tasks for transformation, compression, extension of terms, allowed them to identify the ability to transform, produce and use terms at the level of words, phrases and sentences. The advantage of such a test is that students should not only choose a word from the proposed but change or create a term themselves, make up their own way of completing a certain wording, or answer questions, demonstrating their ability to use terminological vocabulary in a given context and generally use terms in writing speech.

Considering the limited number of study hours this test was conducted at the same practical lesson as the test for checking the knowledge of vocabulary that is the duration of the two tests was 2 academic hours. The test was checked using keys (tasks 1-3), and specially developed criteria were used to evaluate answers with freely constructed answers (tasks 4-5). Since the fulfillment of tasks for producing your own written text in comparison with the choice or transformation of a word is considered to be the most difficult for each correct answer when performing tasks 1-3, you were awarded 2 points (you could get up to 50 points) each correct one (according to above criteria) the answer when performing the fourth task was estimated at 3 points (up to 30 points in total) and the fifth – at 4 points (up to 20 points in total). The maximum number of points for the test is 100.

The test results are as follows: EG1 – 64.0 points, EG2 – 62.6 points which is also considered to be an insufficient learning coefficient. Analysis of students' written answers gives reason to believe that students have a narrow range of used terminological units, lack the ability to logically combine terms and build phrases or sentences with them, insufficient skills to transform lexical units and correlate them with grammatical accuracy. The students' answers to the questions do not quite correspond to the language norm; they are marked by an inadequate choice of the necessary terminological units for expressing thoughts and achieving the goal of communication. So, the written tests revealed an insufficient level of training of almost all EG students, which was due in our opinion to a long break (summer vacation) in learning a foreign language.

The control of the level of students' skills to use terminological vocabulary in oral speech was carried out with the help of setting assignments that require students to have the skills of free and adequate construction of statements with the studied vocabulary in a test situation.

The answers of the subjects were evaluated using the previously defined criteria and the scores were entered by the teacher in the evaluation sheets prepared in advance. For the correspondence of statements to each criterion, up to 20 points were set, the maximum number of points for each student's oral response was 100. The results of the control of skills to use terminological vocabulary in oral speech are: EG1 – 66.3 points, EG2 – 63.9 points. Analysis of students' oral answers showed a lack of skills to use professional vocabulary at the level of a coherent text, the inconsistency of their statements of the situation, the low level of skills of spontaneous selection of the necessary terminological unit, its logical combination with others to build detailed statements. The results of the oral test showed that the level of skills of most EG students did not correspond to a sufficient learning rate.

Thus, with the help of tests, it was possible to conduct a control and reveal the level of knowledge and skills of students at the beginning of the basic experiment. The average results of the pre-experimental cut in the context of each EG (Table 1), for which we summarized the results achieved by the students for the tests described above and divided the amount by the number of tested, reflect the initial level of formation of the linguistic culture.

Table 1

The results of the control level formed linguistic culture among EG students (pre-experimental section).

| Group indices | Professional vocabulary | Ability to use professional vocabulary | Average score |
|----------------------|--------------------------------|---|----------------------|
|----------------------|--------------------------------|---|----------------------|

| | knowledge | | | |
|-----|-----------|------------|-----------|-------|
| | | in writing | in speech | |
| EG1 | 63.8 | 64.0 | 66.3 | 64.76 |
| EG2 | 69.8 | 62.6 | 63.9 | 66.08 |

As follows from the table, according to the results of the cut, it was necessary to conduct experimental training. Since the EG1 group demonstrated a low level of formation of a linguistic culture at the beginning of the basic experiment, in accordance with the principle of reinforcement of the opposing side known in experiment theory, this group itself was chosen for experimental training based on the developed set of exercises.

After experimental training, which lasted three weeks, a post-experimental section was carried out. To control the initial level of formation of linguistic culture, students performed tests similar to those offered to them before the beginning of experimental training. That is, students performed tests to control the level of knowledge of English economic vocabulary and the ability to use it in speech and writing. The only difference in the new tests was their lexical content. The procedure for testing and verification was identical to the previous one. The results of the monitoring (Table 2) revealed sufficient indicators of student performance.

Table 2
Results of monitoring the level of formation of linguistic culture among EG students (post-experimental section).

| Group indices | Professional vocabulary knowledge | Ability to use professional vocabulary | | Average score |
|---------------|-----------------------------------|--|-----------|---------------|
| | | in writing | in speech | |
| EG1 | 84.5 | 83.75 | 81.4 | 83.21 |
| EG2 | 81.7 | 74.75 | 78.7 | 78.58 |

We briefly analyze the quality indicators of tests performed by students to control the level of vocabulary knowledge. The results indicate a generally sufficiently high level of knowledge of the selected vocabulary, the ability to choose a word in accordance with the context or interpretation is formed. However, the results of the EG1 group, which studied with the use of the developed set of exercises and tasks, showed the highest level of formation of linguistic culture. A qualitative analysis of the test for controlling the level of ability to use English vocabulary in writing showed sufficient ability of students to transform lexical units, choose adequate terms to complete statements or formulate their thoughts when answering questions posed. The control of the level of skills to use English economic vocabulary revealed their ability to adequately use the necessary lexical units in speech, to logically match words. The rate of students' speech and the saturation of professional vocabulary in statements is quite high, but the grammatical and phonological accuracy of words requires additional study. So, we analyzed the results of the post-experimental cut, on the basis of which we can assume that the exercises for which students of EG1 studied, are sufficiently effective and adequate for use in the educational process.

To control the strength of knowledge of vocabulary, the stability of lexical skill and the level of formation of lexical speech skills three weeks after the experimental training a delayed cut was made. Students from the EG performed identical post-experimental tests. The results of the delayed cut (Table 3) indicate that students have achieved a fairly high level of training. However, again, the students of the EG1 group, who studied on the basis of our set of exercises, showed a high level of formation of the English-speaking linguistic culture compared to the EG2 students.

Table 3
Results of control of the level of the formed linguistic culture among students of the EG (delayed section)

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

| Group indices | Professional vocabulary knowledge | Ability to use professional vocabulary | | Average score |
|---------------|-----------------------------------|--|-----------|---------------|
| | | in writing | in speech | |
| EG1 | 80 | 78.2 | 77.1 | 78.42 |
| EG2 | 77.4 | 68.3 | 74.2 | 73.19 |

A qualitative analysis of the tests performed by students to check the level of knowledge proved the presence and stability of students' professional vocabulary, although the number of lexical units held in the operational memory clearly decreased due to objective psychological forgetting processes. When performing tasks to control the level of skills to use English economic vocabulary in writing, the tastes discovered the ability to transform and select terminological units, the ability to formulate their thoughts using the learned vocabulary. Students showed the ability to choose words according to the plan logically to combine them and build connected pieces of speech according to a given situation. In general, we conclude that the highest indicators of the EG1 group are due to the interactive format of working with vocabulary when performing the developed set of exercises for the formation of a linguistic culture. Based on the test results (we present the average indicators of the level of formation of linguistic culture among EG students (Table 4).

Table 4
Comparative table of average indicators of the level of formation of linguistic culture among EG students, in points

| Group indices | Pre-Experimental cut | Post-Experimental cut | Increase | Deferred cut | Increase |
|---------------|----------------------|-----------------------|----------|--------------|----------|
| EG1 | 64.76 | 83.21 | 18.45 | 78.42 | 13.66 |
| EG2 | 66.08 | 78.58 | 12.5 | 73.17 | 7.11 |

As can be seen from the table, the increase in knowledge after conducting experimental training among students of EG1 was 18.45 points, and among students of EG2 was 12.5 points. Three weeks after the end of the experimental training the students demonstrated a sufficient indicator of learning and the increase in knowledge among students of EG1 and EG2 compared with the pre-experimental section was 13.66 and 7.11 points, respectively. In the first and second cases, students of the EG1 group who studied during the experiment on the basis of the developed exercises and tasks with an emphasis on the interactive nature of speech interaction when they were performed, demonstrated a higher level of professional vocabulary and skills to use it compared to EG2.

Consequently, the results obtained give us reason to believe that the developed set of exercises, which were carried out within the framework of the cyclical-thematic model of interactive learning, is an effective and adequate means for the formation of a linguistic culture among economist students. This confirms the hypothesis put forward by us at the beginning of the experiment.

To prove the credibility and reliability of the results obtained in the course of the experiment and the justification of the conclusions made, we used the statistical evaluation of the data using single-factor analysis of variance developed by mathematical statistics.

The essence of this analysis is the decomposition of the variation of the indicator according to the sources of formation. The number of sources of variation depends on the number of factors by which groups are formed. In single-factor analysis of variance, there are two components of the variation:

intergroup, due to the action of the factor underlying the grouping; intragroup, random variation.

The basic identity of univariate analysis of variance is presented as the relationship between the sums of squared deviations:

$$Q_{start} = Q_{factor} + Q_{unic} \quad (1)$$

where Q_{start} is the sum of the squares of deviations of individual observations from the general average, Q_{factor} is the sum of the squares of deviations of the group means from the general, Q_{unic} is the sum of the squares of the deviations of the individual observations within the groups from the group means. Based on the sum of squares of deviations, we calculate three estimates of the variances by sources of variation, namely:

$$D_{start} = \frac{Q_{start}}{n-1}$$

– total dispersion (2)

$$D_{factor} = \frac{Q_{factor}}{m-1}$$

– intergroup or factor dispersion (3)

$$D_{unic} = \frac{Q_{unic}}{n-m}$$

– intragroup or dispersion of random factors (4)

The denominators for the variance estimates are the degrees of freedom of the respective sources of variation. The ratio of intergroup and intragroup variation (based on one degree of freedom) allows you to check the basic or zero statistical hypothesis. The ratio of the number of degrees of freedom ($m - 1$) and ($n - m$), where m is the number of groups, n is the number of observations, determines the critical value of the Fisher criterion F for the significance level α . This leads to the basic principle of mathematical verification of the statistical hypothesis: if $F > F_{1-\alpha}(m-1; n-m)$, the null hypothesis is rejected; otherwise, if $F < F_{1-\alpha}(m-1; n-m)$, then there is no reason to reject the null hypothesis.

To organize a one-factor analysis of variance, it is necessary to measure the value of some dependent variable the response at two levels of the quality factor, which are interactive means of learning vocabulary in the developed set of exercises. Considering this, we conducted three cuts of the level of formation of linguistic culture. The first (pre-experimental) section showed the level of formation of linguistic culture among students at the beginning of the basic experiment. The second (post-experimental) slice revealed the level of formation of linguistic culture among students, which they achieved after experimental training. The third (delayed) cut allowed to establish the level of formation of linguistic culture among EG students three weeks after the end of experimental training.

The obtained experimental results were processed using a statistical data processing package. First of all, we compared the results of pre-experimental and post-experimental sections of the level of formation of English-speaking linguistic culture among students of both EGs (Tables 5 and 6). We will briefly comment on the results of the statistical and mathematical processing of these results.

Table 5
EG1 univariate analysis of variance.

| Results | | | | |
|--------------------------|--------------|------------|-------------|-------------------|
| Groups | Score | Sum | Mean | Dispersion |
| Line 1 | 20 | 1295.25 | 64.7625 | 27.01585132 |
| Line 2 | 20 | 1664.26 | 83.213 | 24.09963263 |
| Variance analysis | | | | |

| Source of variation | SS | df | MS | P | P- value | F critical |
|---------------------|----------|----|----------|-------------|-------------|-------------|
| Between groups | 3404.21 | 1 | 3404.21 | 133.1968022 | 5.49688E-14 | 4.098171661 |
| Inside groups | 971.1942 | 38 | 25.55774 | | | |
| Total | 4375.404 | 39 | | | | |

Table 5 presents the characteristics of the groups: frequencies, total and average values, variances. Group averages suggest that when teaching students of the EG1 group based on the developed set of exercises, the level of formation of linguistic culture increases compared to the level achieved by students of the EG2 group as a result of exercises with similar lexical content but without using interactive teaching tools from 64, 76 to 83.21 points.

The column "Variance analysis" (Table 5) shows the sources of variation, the estimates of dispersions are intergroup (3404.21: 1 = 3404.21), intragroup (971.1942: 38 = 23.33774). The selective value of the Fisher criterion $F = 133,196$ significantly exceeds the critical $F_{1-p}(f_1, f_2) = F_{1-0.05}(2, 17) = 4.098$, which gives us reason to reject the null statistical hypothesis and consider the discrepancies of group means not random. If we reject the null hypothesis ($H_0 + \alpha = \alpha_y$), then this means that the difference between the sample averages is significant and is explained by the fact that the averages α_x and α_y themselves are different. In our case, the values of α_x and α_y mean various qualitative factors (using interactive tools in teaching vocabulary of students of EG1 and performing similar exercises from the English-language manual, but without special use of interactive tools of teaching vocabulary, in EG2). Therefore, accepting an alternative or competing hypothesis ($H_0 + \alpha_x \neq \alpha_y$), with a probability of 0.93, we can state that the use of interactive tools when performing the developed set of exercises in training has significantly affected the quality level of the formation of linguistic culture among students of the EG1 group.

Table 6 presents similar results of the analysis of the level of formation of English-speaking linguistic culture based on a comparison of pre-experimental and post-experimental sections of students from group EG2.

Group average (66.076-78.58). The change in group means G2 compared to G1 is less noticeable. This is explained by the fact that students of this group studied without systematic use of interactive modes of working with vocabulary in the process of performing exercises and assignments from a study guide chosen for the experiment.

Table 6
EG2 univariate analysis of variance.

| Results | | | | | | |
|---------------------|----------|---------|------------|-------------|-------------|-------------|
| Groups | Score | Sum | Mean | Dispersion | | |
| Line 1 | 20 | 1321.92 | 66.096 | 27.01585132 | | |
| Line 2 | 20 | 1571.6 | 78.58 | 24.09963263 | | |
| Variance analysis | | | | | | |
| Source of variation | SS | df | MS | P | P- value | F critical |
| Between groups | 1558.503 | 1 | 1558.50256 | 20.8739 | 5.05502E-05 | 4.098171661 |
| Inside groups | 2837.184 | 38 | 74.6627389 | | | |
| Total | 4395.687 | 39 | | | | |

$$\begin{aligned} - \text{ Intergroup dispersion } \frac{SS}{df} &= \frac{1558,503}{1} = 1558,503 \end{aligned} \quad (5)$$

$$\begin{aligned} - \text{ Intragroup dispersion } \frac{SS}{df} &= \frac{2837,184}{38} = 74,66273895 \end{aligned} \quad (6)$$

Tables 7 and 8 present the results of analysis of variance based on a comparison of the data of pre-experimental and delayed sections for students of groups EG1 and EG2.

Table 7
Univariate analysis of variance EG1 (A)

| Results | | | | | | |
|--------------------------|--------------|------------|-------------|-------------------|------------|-------------|
| Groups | Score | Sum | Mean | Dispersion | | |
| Line 1 | 20 | 1295.25 | 64.7625 | 27.015851 | | |
| Line 2 | 20 | 1568.58 | 78.429 | 33.538462 | | |
| Variance analysis | | | | | | |
| Source of variation | SS | df | MS | P | P- value | F critical |
| Between groups | 1867.732 | 1 | 1867.732 | 61.687834 | 1.7727E-09 | 4.098171661 |
| Inside groups | 1150.532 | 38 | 30.27716 | | | |
| Total | 3018.264 | 39 | | | | |

Group average (64.7623-78.429). Three weeks after the end of the experiment, the difference in group averages is palpable, which indicates a fairly stable level of vocabulary knowledge and an adequate level of formation of English-speaking linguistic culture among EG1 students who worked during experimental training using interactive tools when performing exercises from the developed complex.

$$\begin{aligned} - \text{ Intergroup dispersion } \frac{SS}{df} &= \frac{1867,372}{1} = 1867,732 \end{aligned} \quad (7)$$

$$\begin{aligned} - \text{ Intragroup dispersion } \frac{SS}{df} &= \frac{1150,532}{38} = 30,27716 \end{aligned} \quad (8)$$

Table 8
Univariate dispersion analysis of EG2 (A)

| Results | | | | |
|--------------------------|--------------|------------|-------------|-------------------|
| Groups | Score | Sum | Mean | Dispersion |
| Line 1 | 20 | 1321.92 | 66.096 | 106.5614358 |
| Line 2 | 20 | 1469.81 | 73.4905 | 62.37475237 |
| Variance analysis | | | | |

| Source of variation | SS | df | MS | P | P- value | F critical |
|---------------------|----------|----|----------|-------------|-------------|-------------|
| Between groups | 546.7863 | 1 | 546.7863 | 6.473288032 | 0.015137437 | 4.098171661 |
| Inside groups | 3209.788 | 38 | 84.46809 | | | |
| Total | 3756.574 | 39 | | | | |

Group average (66,096-73,4903). The change in group means shows a sufficient level of formation of linguistic culture among students of EG2 three weeks after the completion of experimental training, however, these indicators are lower in comparison with the EG1 group. It is quite obvious that the high results in the EG1 group are due to the positive potential of interactive tools that were used to teach English economic vocabulary while students developed the developed set of exercises.

$$- \text{ Intergroup dispersion } \frac{SS}{df} = \frac{546,7863}{1} = 546,7863 \quad (9)$$

$$- \text{ intragroup dispersion } \frac{SS}{df} = \frac{3209,788}{38} = 84,46809 \quad (10)$$

Analyze the resulting dispersion (Table 9). The difference between intergroup and intragroup dispersions in EG1 is significant, which indicates the positive impact of the interactive format of work with economic vocabulary on the level of formation of linguistic culture. In the EG2 group whose students were learning professional vocabulary without systematic use of interactive tools the indicators of intergroup dispersion are much lower. Intra-group dispersion in EG2 exceeds the corresponding figures in EG1, which indicates a noticeable influence of random factors on the quality of the formation of English-speaking linguistic culture among students of EG2.

Table 9
Dispersion indicators according to the results of the methodical experiment

| Groups | Cuts | Intergroup dispersion | Intragroup dispersion |
|--------|-----------------------|-----------------------|-----------------------|
| EG1 | Pre-Experimental cut | 3404.21 | 25.55774 |
| EG2 | | 1558.50256 | 74.66273875 |
| EG1 | Post-Experimental cut | 1867.732 | 30.27716 |
| EG2 | | 546.7863 | 84.46807 |

So, based on the results of data processing of the methodical experiment, we come to the following conclusion: in the process of experimental learning, the hypothesis was confirmed that the developed set of exercises for interactive learning of English economic vocabulary is quite effective and can be recommended for use in teaching economics students to form they have an English linguistic culture.

5. Conclusions

According to the results of the cuts during the experiment, the purpose of which was to test the developed set of exercises and clarify the chosen model of teaching English economic vocabulary, it was possible to achieve a sufficient level of linguistic culture formation among students, namely: EG1 – 81.42 points; EG2 – 83.39; EG3 – 79.33; EG4 – 81.23. The average indicator of the level of development of the English-speaking linguistic culture among students of all EGs who studied on the basis of a set of exercises amounted to 81.89 points.

The purpose of the experiment was to test the effectiveness of a set of exercises in the framework of the adjusted training model. For this, two EGs of twenty students each were formed. A pre-

experimental cut showed that the students of both EG had approximately equally low knowledge of English economic vocabulary and the ability to use it in written and oral speech: EG1 – 64.76 points; EG2 – 66.08 points, which made it necessary to conduct experimental training. EG1 studied on the basis of the developed set of exercises, and in EG2 – on the basis of exercises from a similar training manual, but without the special use of interactive teaching aids in professional vocabulary.

According to the results of experimental training, a post-experimental section was carried out, which revealed such a level of formation of a linguistic culture: EG1 – 83.21 points; EG2 – 78.58 points. Approximately the same dynamics was observed after the delayed slice: EG1 – 78.45 points; EG2 – 73.17. The increase in learning after experimental training in the EG1 group was 18.45 points, and in the EG2 group – 12.5. Thus, according to the results of the delayed cut, the increase in training was 13.66 points in the EG1 group and 7.11 points in the EG2 group. The results obtained allow us to conclude that students of EG1, who studied on the basis of the developed set of exercises, showed a high level of formation of linguistic culture, therefore, the established methodology can be considered effective and adequate for the purposes of teaching foreign language vocabulary in the specialty of student training. The results of experimental learning were verified and proved by the methods of mathematical statistics.

So, as a result of experimental learning, it was possible to confirm the effectiveness of the developed set of exercises and prove the hypothesis of the experiment. The practical significance of the obtained results lies in the fact that a set of exercises was developed and experimentally verified. We also formulated guidelines that can be used by teachers in the practice of interactive teaching students in professional vocabulary with the goals of developing a linguistic culture.

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Revista ESPACIOS. ISSN 0798 1015
Vol. 40 (Nº 41) Year 2019

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