

## CHAPTER 1

# RESULTS OF THE FORMATIVE STAGE OF THE PEDAGOGICAL EXPERIMENT WITH CADETS - FUTURE SPECIALISTS IN PHYSICAL CULTURE AND SPORT

## CHAPTER 1

### ABSTRACT

The study is devoted to highlighting the statistically elaborated results of the formative stage of the pedagogical experiment on the formation of organizational competence among future specialists in physical culture and sports of the Armed Forces of Ukraine (hereinafter referred to as the respondents). The aim of the study is the dynamics of the formation of organizational competence after the formative stage of the pedagogical experiment, testing the significance of the results obtained and the reliability of the hypothesis put forward. An algorithm for determining the levels of formation of their organizational competence (low, medium, high) is presented according to a number of criteria – value-motivational, cognitive, organizational-active, managerial, individual-psychic and subjective. Their application makes it possible to find out the formation of the relevant components of the phenomenon under study – value-motivational, knowledge, managerial, managerial, control-corrective and reflective-evaluative components of the respondents' organizational competence. Their application made it possible to obtain such experimental results that made it possible to compare the levels of formation of the organizational competence of the respondents at the summative and formative stages of the pedagogical experimental study.

The experiment covered cadets of the Educational and Scientific Institute of Physical Culture and Sports and Recreation Technologies of the National Defense University of Ukraine named after Ivan Chernyakhovsky. The results of the formation experiment made it possible, on the one hand, to establish the statistical significance of the experimental results obtained, which are the result of the introduction of the pedagogical conditions for the formation of the organizational competence of the respondents, justified by us (maintaining and developing the motivation for its formation in them; pedagogical modeling of its formation in the future specialists of physical culture and sports of the Armed Forces (hereinafter referred to as the Armed Forces) of Ukraine in higher military educational institutions (hereinafter referred to as universities) as its organizers, ensuring interdisciplinary connections in the process of formation their organizational competence, purposeful formation of a system of organizational knowledge, skills and abilities as future organizers of physical training and sports using contextual teaching methods (special course "Organizational competence of future specialists in physical culture and sports of the Armed Forces of Ukraine"),

which positively influenced its formation, and on the other hand, to focus on based on the need to introduce additional pedagogical conditions for its formation in the course of their professional training in universities as future organizers of physical culture and sports in military units.

Diagnosis was made using the diagnostic tools developed by us. These are testing, questioning, quasi-management theoretical and practical tasks (situations). An analysis of the experimental results of its formation shows a positive trend, namely: the number of respondents with an average level of formation increased from 23.06 % (6 respondents) to 30.76 % (8 respondents), high – from 15.37 % (4 respondents) to 46.15 % (12 respondents), and at the same time, the number with a low level decreased significantly – from 61.54 % (16 respondents) to 23.09 % (6 respondents). The corresponding correlation coefficients between all components were established, which in the most general form made it possible to understand the direct relationship between them and to find out the correlations between the main components of the respondents' organizational competence.

#### KEYWORDS

Maturity, organizational competence, pedagogical experiment, methods, criterion, indicator, levels, correlation, statistics, specialists in physical culture and sports.

In recent years, there has been a growing interest in competencies in psychological and pedagogical research. One of the reasons for the popularity of its research is the functional perspective of competence and the desire for its further development [1], in our case, the formation of it in future officers – specialists in physical culture and sports of the Armed Forces of Ukraine, and competence in physical education, according to scientists, a person's ability to lead a physically active lifestyle [2]. As part of our study of the problem of formation the organizational competence of respondents, it is advisable to consider the methodology for conducting and evaluating the effectiveness of our proposed pedagogical activities to achieve the research goal. The research goal of the formative stage of the pedagogical experiment is a significant increase in the levels of formation of organizational competence among the respondents. Thus, an interesting opinion of scientists (Yahupov, V., Zastelo, O., Svystun, V., Korchynska, N., Chorna, O., Krykun, V.) makes it possible to understand that achieving a high level of students' competence significantly depends on how academic disciplines are taught in the course of their professional studies [3]. Accordingly, after the summative stage of the pedagogical experiment, the next stage is the formation one, at which the pedagogical conditions justified by us for the formation of the organizational competence of respondents in the process of acquiring professional education were introduced into the pedagogical process of universities. After that, there is a need for objective experimental confirmation or refutation of their effectiveness, in particular, the determination of the levels of formation of

the organizational competence of the respondents, namely, the clarification of the qualitative and quantitative characteristics of the state of its formation after the formative stage of the pedagogical experiment in comparison with the results of the summative experiment.

## 1.1 CONCEPTUAL APPROACHES TO THE DEVELOPMENT AND FORMATION OF ORGANIZATIONAL COMPETENCE OF FUTURE SPECIALISTS IN PHYSICAL CULTURE AND SPORTS OF THE ARMED FORCES OF UKRAINE: THEORETICAL FOUNDATIONS, MODERN TRENDS, REGULARITIES, PRINCIPLES

Analysis and synthesis of various scientific sources, developments, research papers and the results of dissertation research on the formation and development of organizational competence of different specialists made it possible to realize that scientific research is carried out in the following areas: organizational competence of managers of enterprises and organizations in the field of healthcare [4], pharmacists [5], local government [6], service sector [7], social sphere [8], technology teachers [9], etc. The main conclusion based on the results of their generalization is that there are no practical scientific developments on the organizational activities of managers and the formation of their organizational competence in general and the category of respondents we are studying – future officers as specialists in physical culture and sports in the Armed Forces of Ukraine, in particular.

On the subject of our study, the following scientific developments are important: the formation of organizational competence of future physical education teachers in the process of professional training (Pilova, S.) [10]; formation of students' readiness for organizational activities (Savchenko, L.) [11]; components of organizational competence of specialists in project management and support (Stevenson, K.) [12]. So, Stevenson, K. points out that "Also central to this development of competence is the organization's ability to assess its performance both internally and in relation to its competitors. As with individuals, endorsed organizational competency standards would provide a foundation for the development of an organization's project strategy aligned to corporate strategic goals, objectives and plans; the professional development, selection and employment of project staff; and the design, development and implementation of project management-related methods, standards and systems – all of which, in turn, would influence the evolving and maturing process, or the attainment of competence, for the organization" [12].

As for military personnel, there are only separate scientific developments regarding the formation and development of certain of their physical qualities. They reveal certain aspects of their physical education. For example, military scientists in their article The efficiency of the experimental academic program of the discipline of Physical Education, Special Physical Training, aimed at the formation of psychophysical readiness of cadets of technical higher military educational institutions for future professional activity was examined. The criteria of the efficiency of the experimental program are determined to be the indicators of general and special physical fitness of cadets and the

level of professionally important psychological qualities. It was discovered that conducting classes according to experimental program contributed to the improvement of the level of development of the cadets' special physical qualities, mastering military-applied skills, the formation of professionally important psychological qualities that generally ensured the formation of psychophysical readiness of future specialists for professional activity [13].

This article [14] investigated the influence of kettlebell lifting exercises on indicators of physical development of cadets in higher military educational institution during the study period. Physical development was investigated on the basis of height, body weight, body mass index and the ratio of the number of cadets in each group that were overweight. The body weights of cadets in their senior academic years who trained via kettlebell lifting were significantly lower than those of cadets who were engaged in the current system of physical education by 4.2–6.7 %. The influence of the kettlebell lifting training on the level of endurance development and functional abilities of the cadets' cardiovascular system in the course of study is examined in the article. The study of the level of endurance development was conducted during the following tests: 3 km race, 5 km accelerated march, and the obstacle course (400 m). The cardiovascular system functioning was examined concerning these indicators: heart rate, arterial blood pressure, Robinson's index, and heart rate recovery from a standard load. The improved indicators of the endurance and cardiovascular system of cadets have been reliably determined ( $p < 0.05$ – $0.001$ ) which proves the efficiency of the kettlebell lifting training concerning the future officers' formation of physical readiness for professional activity [15].

The article deals with the results of experimental study of the development of psychophysical endurance in future professionals of military administration (PMA) at the stage of operational-tactical training. Let's present the statistical results of the statement and formative experiments for each component – value and motivation, cognitive, emotion-and-will, profession-and-activity and subjective components, received in the result of diagnosing their psychophysical endurance development. There is given the hypothesis of the research, aimed to revealing the statistically important differences in the results of experimental research. It is shown the experimental data concerning the levels (low, average, sufficient, high) of their psychophysical endurance development. There are characterized assessment criteria and factors of psychophysical endurance development in future PMA and the block of methods for incoming and outgoing diagnosing of its development. IBM SPSS Statistics 22 software was used for statistical processing of data. The experimental study covered 38 students of operational and tactical level of training, which were divided into experimental ( $n_1 = 19$ ) and control ( $n_2 = 19$ ) groups. Arithmetic mean value of all scales was calculated for each component of psychophysical endurance, and their generalization confirms the positive tendency towards psychophysical endurance development in EG: the high level had increased from 5.26 % to 26.32 %, the sufficient – from 21.05 % to 47.37 %, the average – decreased from 47.37 % to 15.78 % and the low – from 6.32 % to 10.53 %, respectively. In the result of statistical processing of the received experimental data, the statistical hypothesis of the research (H1) was confirmed. Thus, the proposed model and methodology for

the development of psychophysical endurance of future PVU led to statistically significant changes in the development of psychophysical endurance of future PVU, which, first, can be extended to the whole population; secondly, they depend on the effectiveness of experimental pedagogical measures. The conducted statistical analysis of the results of summative and shaping experiments and their comparison shows the positive dynamics of the development of psychophysical endurance of future military management professionals in EG and confirms the statistical hypothesis of the study (H1). Thus, our proposed pedagogical conditions – the model and method of developing their psychophysical endurance – have led to statistically significant results that can be extended to the whole population [16].

According to (Kryshtanovych, S., Bilostotska, O., Ulianova, V., Tkachova, N., Tkachov, A.), the competence of managers in physical education and sports is determined by professional knowledge, the level of success in using cognitive psychology methods, readiness to fulfill the future works [17].

At the same time, according to the results of our generalization of scientific sources, the problem of the formation of organizational competence of future officers – specialists in physical culture and sports in the Armed Forces of Ukraine, remained without attention of scientists, in particular, the clarification of the current state of its formation and development, as well as experimental substantiation of the necessity and expediency of its purposeful formation in the process of obtaining military-professional education in military universities.

## **1.2 ORGANIZATION OF SCIENTIFIC RESEARCH AND RESULTS OF EXPERIMENTAL WORK**

The pedagogical experiment involved 26 cadets of the Educational and Scientific Institute of Physical Culture and Sports and Recreation Technologies of the National Defense University of Ukraine named after Ivan Chernyakhovsky (hereinafter referred to as cadets, respondents), who at the same time make up the general population in Ukraine. To obtain more reliable experimental results, the experiment covered two senior courses – 3 and 4. And if the sample is relatively small – at least 5 people and not more than 50, then it is subject to full coverage and continuous diagnosis. "A sample is a set of subjects selected at random from the general population, that is, it corresponds to the general population in all characteristics. The theoretical basis of the sampling method is the theory of probability and the law of large numbers" [18]. Taking into account this feature of our sample, a consistent pedagogical experiment was conducted, which "... is characterized by the fact that the same group of subjects is analyzed, which is both a control group (its primary state at the summative stage) and an experimental one: its state after the formation experiment. Let's agree with the opinion of scientists that a sequential experiment is organized in one study group, in which the state of formation / development of the studied pedagogical phenomenon is recorded according to the traditional system and the effectiveness of new pedagogical innovations is compared after their introduction as an experimental factor in the same group [19]. Consequently, even before the start of the experiment, all the control, factorial and neutral properties of the

subject of study and its main properties are correctly recorded, which will then be diagnosed. After that, the factorial (experimental) characteristics of the group and the conditions for its functioning are changed, and after the formation experiment, the state of the subject of research is measured again according to its control characteristics – components and their content.

Thus, there is no control group in the serial experiment. The same group acts in it as a control for the introduction of experimental conditions and as an experimental group after these conditions are experimentally implemented. The proof of the hypothesis in this case is based on a comparison of two states of the subject of research – at different times: at the summative and formative stages. It is characterized by the fact that the same group is subject to analysis, which is the control (its initial state) and experimental (its state after the formation experiment), that is, before the start of the experiment, the control, factorial and neutral characteristics of the subject of study are clearly fixed – components and their content, for example, managerial thinking of different categories of officers" [18].

After the implementation of the pedagogical conditions that we justified for the formation of the organizational competence of the respondents (maintaining and developing the motivation for its formation in them; pedagogical modeling of its formation among future specialists of physical culture and sports of the Armed Forces of Ukraine in universities as its organizers; ensuring interdisciplinary connections in the process of formation their organizational competence; purposeful formation systems of organizational knowledge, skills and abilities as future organizers of physical training and sports using contextual teaching methods (special course "Organizational competence of future specialists in physical culture and sports of the Armed Forces of Ukraine"), the dynamics of the formation of each of its components was established, and the corresponding correlations between them were established, that is, we carried out the formative stage of the pedagogical experiment, diagnosing its results was carried out using the diagnostic tools developed by us (**Table 1.1**) [20].

**Table 1.1** reflects the methods of diagnosing each component of organizational competence of future specialists in physical culture and sports of the Armed Forces of Ukraine. We have chosen and substantiated each method of diagnosing, carried out expert evaluation activities on the author's methods of diagnosing them with fundamental experts in this field of knowledge.

After the formative stage of the experiment, the respondents were asked to perform research procedures that were at the summative stage. In particular, these are:

- pass a questionnaire and test to identify their professional motives and values, to find out the levels of formation of their general knowledge of the future military specialty, organizational knowledge as managers in the field of physical training and sports, pedagogical knowledge – teachers-organizers of physical training and sports in a military unit, knowledge of the basic principles of managing the process of physical education of military personnel in the Armed Forces of Ukraine;
- pass a test to identify future officers as organizers of physical training and sports in military units;
- fill in and answer the questions of a number of questionnaires aimed at identifying professionally important organizational qualities of respondents as future organizers of physical training and sports in a military unit.

● **Table 1.1** Methods of assessment of training the organizational competence components during the summative and formative stages of the experiment

No.	Test	Methods of assessment of training the nature of organizational competence components
1	Value and motivation	"Diagnostics of the Real Structure of Value Orientations of a Personality" by Bubnov, S.; "Motivation of Professional Activity" by Zamfir, K. (methodology modified by Rean, A.)
2	Cognitive	proprietary questionnaire tests/inventories
3	Organizational and operational	solving quasi-administration practical organizational tasks (situations) that are proprietary
4	Management	proprietary methodology of assessing future military officers as managers of physical training and sports activities at military units
5	Individual and mental	"Method of Diagnosing Communicative and Organizational Abilities" (according to Synyavskiy, V. and Fedoryshyn, B.); "Aptitude for leadership" test; proprietary test to determine the levels of physical fitness of respondents according to the requirements and standards as provided for by Order of the Minister of Defense of Ukraine No. 225 dd. 05 August 2021
6	Subject	"Evaluation of Reflexivity" method by Karpov, A.; "Evaluation of Development Levels of Personality Subjectivity" method by Shchukina, M.

Let's move on to the analysis and generalization of the dynamics of the formation of organizational competence among the respondents in all its components before and after the formative stage of the pedagogical experiment. First, we clarified the dynamics of the formation of its value-motivational component at the main stages of the pedagogical experiment – summative and formation (**Table 1.2, Fig. 1.1**). The importance of this component is related to the meaning of values in education, which "... consists primarily in the fact that they form a system of values, principles, norms, canons and ideals that determine the value of education in society, regulate the interaction of subjects in the educational sphere and form a value component in the structure of the educational activities of those who acquire a certain education, the pedagogical activities of teachers. This is due to the fact that values, firstly, form the most important thing for each person and specialist – their attitude towards the world, things, activities, other people and oneself; secondly, they determine the behavior and meaning of the activities of its subjects in education, the attitude, on the one hand, of teachers to pedagogical activity, to its meaning and results, on the other hand, of students (students, listeners) to the acquisition of education, educational activities and its meaning, and the main result In this regard, in pedagogical research, one of their main goals should be to clarify the value sphere of the subjects of education – teachers and those receiving a certain education – pupils (students, listeners)" [21].

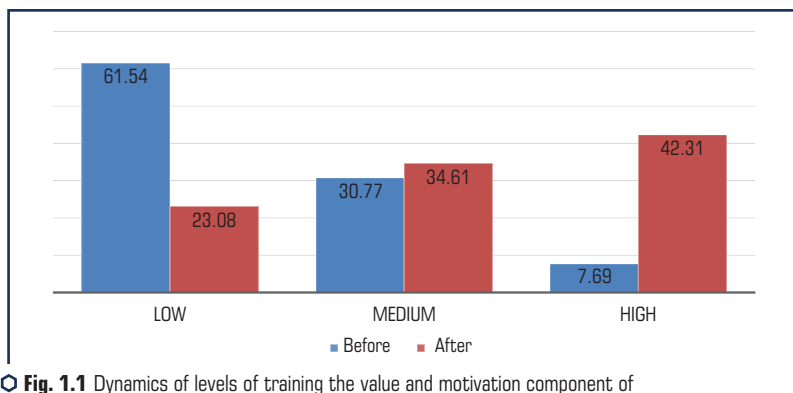
Analysis of the content of **Table 1.2** shows that after the formative experiment, compared with the summative experiment, there was a significant increase in the number of respondents with a high (from 7.69 to 42.31 %) level of formation of their value-motivational component of organizational

competence. In addition, we observe a positive trend in a significant decrease in the low level of its formation (from 61.54 % to 23.08 %). This fact is essential in our study, since the value-motivational aspect has a direct positive impact on the formation of all other components of the respondents' organizational competence. The results of our correlation analysis, contained in **Table 1.1**, confirm this thesis and demonstrate such a stable pattern between almost all components.

● **Table 1.2** Dynamics of training the value and motivation component of organizational competence in students during the experiment

Component nature	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
Professional values	Low	17	65.42	7	26.92	−10 (−38.46 %)
	Medium	6	23.07	11	42.31	+5 (+19.23 %)
	High	3	11.51	8	30.78	+5 (+19.23 %)
Professional motives	Low	14	53.84	5	19.23	−9 (−34.61 %)
	Medium	11	42.30	7	26.92	−4 (−15.38 %)
	High	1	3.84	14	53.85	+13 (+50 %)
Total	Low	16	61.54	6	23.08	−10 (−38.46 %)
	Medium	8	30.77	9	34.61	+1 (+3.84 %)
	High	2	7.69	11	42.31	+9 (+34.61 %)
N = 26						

N = 26



○ **Fig. 1.1** Dynamics of levels of training the value and motivation component of organizational competence before and after the formative experiment

The dynamics of the formation of knowledge of the organizational competence component of the respondents is highlighted in **Table 1.3** and **Fig. 1.2**.

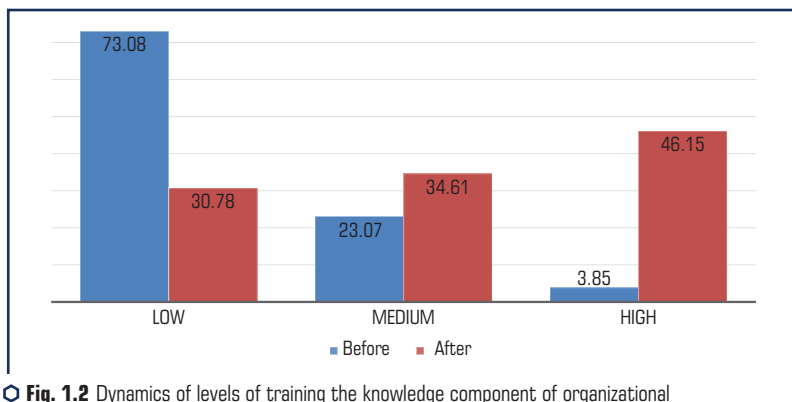


# 1 RESULTS OF THE FORMATIVE STAGE OF THE PEDAGOGICAL EXPERIMENT WITH CADETS - FUTURE SPECIALISTS IN PHYSICAL CULTURE AND SPORT

● **Table 1.3** Dynamics of training the knowledge component of organizational competence in students during the experiment

Component nature	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
Operational knowledge in the capacity of a military officer	Low	19	73.08	6	23.08	−13 (−50 %)
	Medium	6	23.07	9	34.61	+3 (+11.54 %)
	High	1	3.85	11	42.31	+10 (+38.46 %)
Management knowledge in the capacity of an organizer of physical training and sports activities	Low	20	76.92	8	30.78	−12 (−46.15 %)
	Medium	4	15.38	8	30.78	+4 (+15.38 %)
	High	2	7.69	10	38.44	+8 (+30.77 %)
Pedagogical knowledge in the capacity of a teacher-organizer at a military unit	Low	18	69.23	9	34.61	−9 (−34.61 %)
	Medium	8	30.77	2	7.69	−6 (−23.07 %)
	High	0	0	15	57.70	+15 (+57.69 %)
Total	Low	19	73.08	8	30.78	−11 (−42.30 %)
	Medium	6	23.07	6	23.07	0
	High	1	3.85	12	46.15	+11 (+42.30 %)

N = 26



○ **Fig. 1.2** Dynamics of levels of training the knowledge component of organizational competence in students at the summative and formative stages of the experiment

The formation of the managerial component of the organizational competence of the respondents is presented in **Table 1.4** and **Fig. 1.3**. A significant increase in the average (from 15.38 % to 26.92 %) and especially high (from 3.85 % to 50 %) levels of its formation. In addition, we have a significant positive trend in reducing its low level (80.75 % to 23.08 %). We consider this result

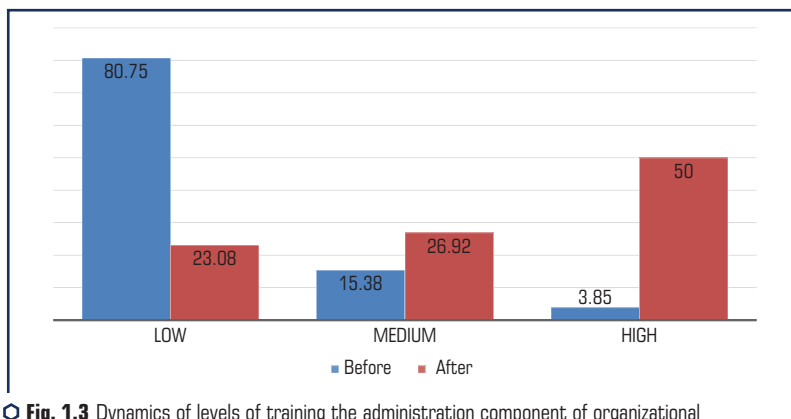
to be a natural result of the presence of a strong or significant correlation with the value-motivational, cognitive and reflexive-evaluative components of their organizational competence (**Table 1.1**).

In our opinion, based on the definition "physical training of military personnel is a purposeful controlled process of their physical improvement". It is the management component that is one of the fundamental components of the content and structure of organizational competence of future specialists in physical culture and sports of the Armed Forces of Ukraine. Management and organization of the physical training process, for example, in a military unit, is an extremely important task for a future specialist.

◆ **Table 1.4** Dynamics of training the administration component of organizational competence in students during the experiment

Component nature	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
Quasi-administration situations	Low	21	80.76	6	23.08	−15 (−57.69 %)
	Medium	4	15.38	7	26.92	+3 (+11.54 %)
	High	1	3.85	13	50	+12 (+46.15 %)
Total	Low	21	80.75	6	23.08	−15 (−57.69 %)
	Medium	4	15.38	7	26.92	+3 (+11.54 %)
	High	1	3.85	13	50	+12 (+46.15 %)

N = 26



◆ **Fig. 1.3** Dynamics of levels of training the administration component of organizational competence in students at the summative and formative stages of the experiment

Based on their analysis, it can be found that there has been a significant increase in respondents with an average (from 3.85 % to 30.77 %) and especially high (from 0 % to 50 %) levels of

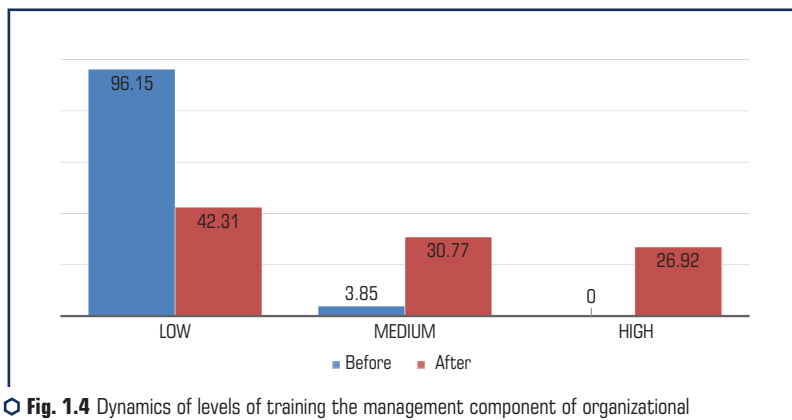
its formation. There is also a positive trend in the reduction of its low level (96.15 % to 42.31 %). Such results (**Table 1.5** and **Fig. 1.4**.) indicate the need for targeted managerial training of respondents, since there remains a significant reserve – 42.31 % (low level of maturity) – to improve this component.

● **Table 1.5** Dynamics of training the management component of organizational competence in students during the experiment

Component nature	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
Proprietary test of assessing physical training managers	Low	25	96.15	11	42.31	-14 (-53.84 %)
	Medium	1	3.85	8	30.77	+7 (+26.92 %)
	High	0	0	7	26.92	+7 (+26.92 %)
Total	Low	25	96.15	11	42.31	-14 (-53.84 %)
	Medium	1	3.85	8	30.77	+7 (+26.92 %)
	High	0	0	7	26.92	+7 (+26.92 %)

N = 26

N = 26



○ **Fig. 1.4** Dynamics of levels of training the management component of organizational competence in students at the summative and formative stages of the experiment

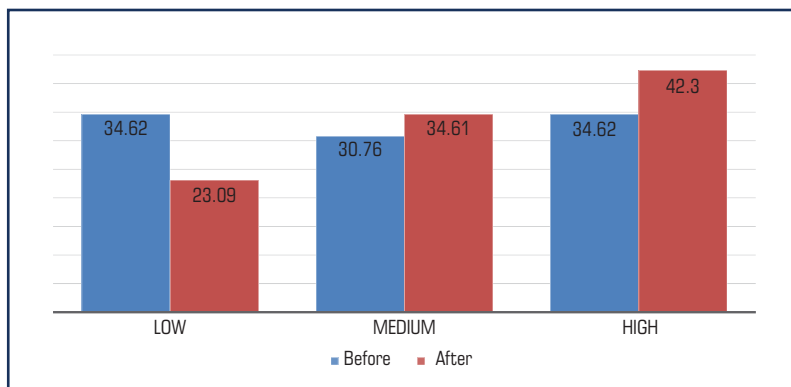
Therefore, the formation of these components and the positive dynamics of the results of the formative stage in comparison with the summative stage of the experiment convincingly indicate that there are reserves for improving the practical organizational preparedness of the respondents in the process of their military professional training, and especially organizational readiness at the university, since they are direct organizers of training and sports of military personnel in military units.

The formation of the control and corrective component of the organizational competence of the respondents is reflected in **Table 1.6** and **Fig. 1.5**.

● **Table 1.6** Dynamics of training the control and correction component of organizational competence in students during the experiment

Component nature	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
Dominance (leadership)	Low	13	50	7	26.92	-6 (-23.09 %)
	Medium	8	30.77	11	42.31	+3 (+11.53 %)
	High	5	19.23	8	30.77	+3 (+11.53 %)
Aptitude for communication and organization	Low	11	42.30	9	34.61	-2 (-7.69 %)
	Medium	9	34.61	9	34.61	0
	High	6	23.09	8	30.77	+2 (+7.69 %)
Professional endurance	Low	2	7.69	2	7.69	0
	Medium	7	26.92	6	23.09	-1 (-3.85 %)
	High	17	65.38	18	69.23	+1 (+3.85 %)
Total	Low	9	34.62	6	23.09	-3 (-11.53 %)
	Medium	8	30.76	9	34.61	+1 (+3.85 %)
	High	9	34.62	11	42.30	+2 (+7.69 %)

N = 26



○ **Fig. 1.5** Dynamics of levels of training the control and correction component of organizational competence in students at the summative and formative stages of the experiment

Summarizing their content makes it possible to emphasize that the positive dynamics here are not as significant as in the previous components. In particular, there was a certain increase in the average (from 30.76 % to 34.61 %) and high (34.62 % to 42.30 %) levels of its formation. In addition, there is a positive trend in the decrease in the low level of its formation – 34.62 % to 23.09 %.

The conclusions on this component are as follows: firstly, the formation of this component is important, since it ensures that the respondents correct their organizational activities in a timely manner based on the results of control measures for the physical fitness and readiness of military personnel and military units (units); secondly, the obtained experimental results indicate the need for additional psychological and pedagogical research for the formation of the individual mental component of organizational competence; thirdly, in order to obtain a significant dynamics of the formation of this component, additional purposeful educational education with respondents is needed; fourthly, the content of this component contains communication links that are important in any organization, whether it be internal communication between various organizational structures of the institution or communication with other institutions or with the media in general [22]; fifthly, it is possible to significantly improve the formation of this component due to the reflective-evaluative component, which has a direct impact, as the experience of pedagogical activity shows, on all other components.

The formation of the reflective-evaluative component among the respondents is shown in **Table 1.7** and **Fig. 1.6**. Their analysis and generalization of the content show that there has been a significant increase in the number with a high (from 38.46 % to 57.69 %) level of its formation. In addition, there is a noticeable positive trend in reducing the low level of its formation (from 23.08 % to 3.85 %). Such dynamics is evidence that the introduced organizational and pedagogical conditions generally have a positive effect on the formation of future officers as subjects of the organization of physical culture and sports in military units [16]. The presence of positive subjective shifts gives us the opportunity to emphasize the possibility of achieving significant results in the training of future officers as subjects of physical training and sports. This is probably the most difficult task compared to other tasks in the formation of the main components of their organizational competence.

● **Table 1.7** Dynamics of training the reflection and evaluation component of organizational competence in students during the experiment

Component nature	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
1	2	3	4	5	6	7
Professional subjectivity	Low	9	34.62	0	0	−9 (−34.61 %)
	Medium	4	15.38	11	42.30	+7 (+26.92 %)
	High	13	50	15	57.69	+2 (+7.69 %)

Continuation of Table 1.7

1	2	3	4	5	6	7
Reflexivity	Low	3	11.53	1	3.85	-2 (-7.69 %)
	Medium	16	61.53	8	30.77	-8 (-30.77 %)
	High	7	26.92	17	65.38	+10 (+38.46 %)
Total	Low	6	23.08	1	3.85	-5 (-19.23 %)
	Medium	10	38.46	10	38.46	0
	High	10	38.46	15	57.69	+5 (+19.23 %)
N = 26						

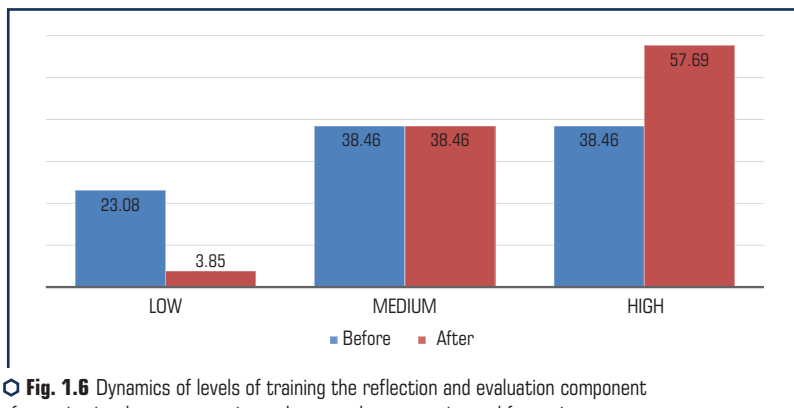


Fig. 1.6 Dynamics of levels of training the reflection and evaluation component of organizational competence in students at the summative and formative stages of the experiment

According to the results of the calculation of statistical data on the formation of the components of the organizational competence of the respondents, its generalized results by levels were obtained (Table 1.8, Fig. 1.7).

Table 1.8 Dynamics of training the components of organizational competence in students during the experiment

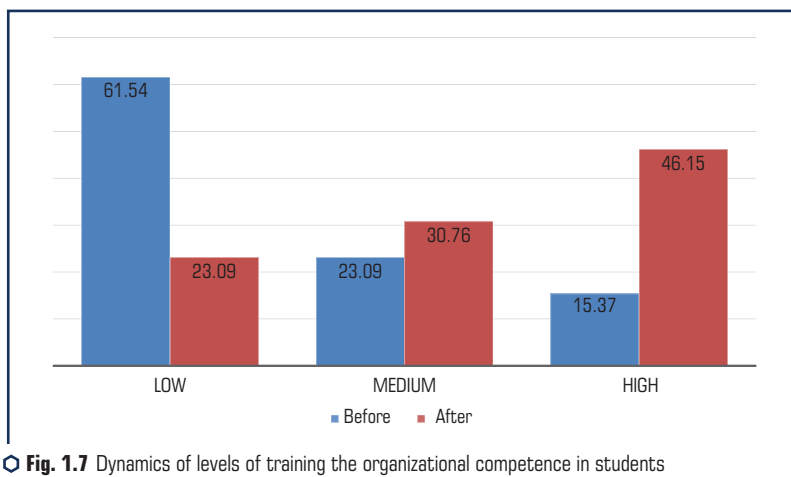
Components	Levels	Experiment stages				Difference
		Before		After		
		Quantity	%	Quantity	%	
1	2	3	4	5	6	7
Value and motivation	Low	16	61.54	6	23.08	−10 (−38.46 %)
	Medium	8	30.77	9	34.61	+1 (+3.84 %)
	High	2	7.69	11	42.31	+9 (+34.61 %)

# 1 RESULTS OF THE FORMATIVE STAGE OF THE PEDAGOGICAL EXPERIMENT WITH CADETS - FUTURE SPECIALISTS IN PHYSICAL CULTURE AND SPORT

◆ Continuation of Table 1.8

1	2	3	4	5	6	7
Knowledge	Low	19	73.08	8	30.78	-11 (-42.30 %)
	Medium	6	23.07	6	23.07	0
	High	1	3.85	12	46.15	+11 (+42.30 %)
Administration	Low	21	80.75	6	23.08	-15 (-57.69 %)
	Medium	4	15.38	7	26.92	+3 (+11.54 %)
	High	1	3.85	13	50	+12 (+46.15 %)
Management	Low	25	96.15	11	42.31	-14 (-53.84 %)
	Medium	1	3.85	8	30.77	+7 (+26.92 %)
	High	0	0	7	26.92	+7 (+26.92 %)
Control and correction	Low	9	34.62	6	23.09	-3 (-11.53 %)
	Medium	8	30.76	9	34.61	+1 (+3.85 %)
	High	9	34.62	11	42.30	+2 (+7.69 %)
Reflection and evaluation	Low	6	23.08	1	3.85	-5 (-19.23 %)
	Medium	10	38.46	10	38.46	0
	High	10	38.46	15	57.69	+5 (+19.23 %)
Total	Low	16	61.54	6	23.09	-10 (-38.46 %)
	Medium	6	23.09	8	30.76	+2 (+7.69 %)
	High	4	15.37	12	46.15	+8 (+30.76 %)

N = 26



◆ Fig. 1.7 Dynamics of levels of training the organizational competence in students before and after the formative stage of the experiment

General conclusions on the dynamics of the main levels of formation of the organizational competence of the respondents are as follows:

- firstly, there was a significant decrease in respondents with a low level – from 61.54 % to 23.09 %, which is a significant result of the entire pedagogical experiment;
- secondly, at the same time there was a significant increase in the number of respondents with a high level – from 15.37 % to 46.15 %;
- thirdly, we have a certain positive shift in the average level – from 23.09 % to 30.76 %.

Consequently, according to the results of the formative stage of the pedagogical experiment (**Fig. 1.7**), there is a positive dynamics in the formation of organizational competence among all respondents, since their percentage, in which its formation has reached an average and especially high level, has increased significantly.

Thus, based on the generalization of the above experimental material, it is possible to single out a positive dynamics in the results of the implemented pedagogical conditions for the formation of organizational competence among respondents. In particular, this is confirmed by the positive dynamics of the levels of its formation in the majority of respondents, who at the summative stage had significantly lower results.

In addition, according to the results of the formative experiment, the task arises to confirm or refute the statistical (scientific) hypothesis – to identify the reliability of the experimental data obtained, which must be done to exclude a random combination of circumstances. Accordingly, it is necessary to formulate hypotheses about the formation of organizational competence among the respondents.

In our study, a statistical hypothesis is any assumption regarding the type or parameters of an unknown distribution law. In a specific situation of formation of organizational competence of future specialists in physical culture and sports of the Armed Forces of Ukraine, we form a statistical hypothesis as an assumption at a certain level of statistical significance about the properties of the general population according to the sample estimates.

### ***Statistical hypothesis:***

1. General statistical hypothesis – there are differences between the studied electoral population before and after the formative stage of the pedagogical experiment.
2.  $H_0$  – no differences were found in the studied sample before and after the formative stage of pedagogical experience.
3.  $H_1$  – differences in the studied sample before and after the formative stage of pedagogical experience were revealed.

In our study, a scientific hypothesis is a certain statement containing a specific assumption about the decision that we face in terms of the formation of organizational competence among future specialists in physical culture and sports of the Armed Forces of Ukraine. In essence, a scientific hypothesis is the main idea of a possible solution.

### ***Scientific hypothesis:***

1. *The general scientific hypothesis* is that the formation of organizational competence among respondents will be effective if additional pedagogical conditions for its formation are introduced



into the process of their military professional training in universities, namely, the confirmation of the statistical hypothesis  $H_1$  of the experimental study.

2.  $H_0$  – the formation of organizational competence among the respondents is not effective in confirming the statistical hypothesis  $H_0$ .

3.  $H_1$  – the formation of organizational competence among the respondents is effective, subject to the confirmation of the statistical hypothesis  $H_1$ .

Therefore, to calculate the obtained experimental data of the pedagogical experiment, the statistical criterion of G-signs was used [23, 24], used to compare the state of some properties (features) of members of two dependent samples based on their diagnosis. It is used to compare the state of some properties (features) of members of two dependent samples based on their diagnosis. It belongs to the non-parametric criteria of statistical data analysis and is used exclusively for related samples. The G-signs test allows to determine how much the values of the corresponding properties (features) change when the associated sample is rediagnosed. This criterion is easy to use and allows to fully find out and compare the state of features or properties. In this regard, it is used for statistical processing of experimental data obtained on small samples.

It should be emphasized that when calculating statistical data, the concept of "shift" is used – the magnitude of the difference between the values of the corresponding properties (features) of the same participant before and after the formative stage of the pedagogical experiment. It should be noted that the criterion of G-signs is intended to determine the changes in the values of properties (attributes) when re-diagnosing a related sample in the direction of increasing or decreasing. In view of the foregoing, let's introduce two necessary notations:

1. The largest sum of biases is called the typical bias and is denoted by the letter  $n$  used when working with the corresponding table for this criterion. This table presents the critical values ( $G_{cr}$ ) of 5 % and 1 % significance levels of this criterion.

2. The sum of shifts, which is the smallest, that is, has an atypical shift, denoted by  $G_{emp}$ . The  $G_{emp}$  value is placed on the significance axis.

An example of the result of calculating statistical data according to this criterion is shown in **Fig. 1.8**, where, according to the results of placing  $G_{emp}$  on the significance axis, it did not fall into the zone of significance.

Let's note that in the example above, the significance axis is shown upside down. The zero mark is represented by right, and the number row increases in the opposite direction. This type of location of the significance axis is reliable for some well-known statistical tests – the Wilcoxon T-test, the McNamara test and the Mann-Whitney U-test.

So, let's directly consider an example of calculating the statistical data of the formative stage of the pedagogical experiment, obtained as a result of the introduction of additional pedagogical conditions for the formation of organizational competence among respondents. It was conducted using licensed software IBM Statistical Package for the Social Sciences – a statistical package for the social sciences.

The results of the calculation are shown in **Fig. 1.9–1.11** and **Table 1.9**.

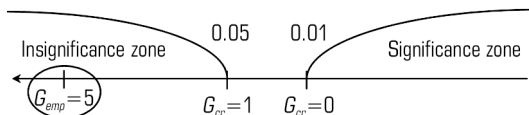


Fig. 1.8 Significance axis for G-signs test

### Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Before and After equals 0	Related-Samples Sign Test	0.000	Reject the null hypothesis

Asymptotic significances are displayed. The significance level is 0.050.

Fig. 1.9 Conclusion on the statistical hypothesis

Therefore, **Fig. 1.9** shows the result of calculating the experimental data before and after the formative stage of the pedagogical experiment using the licensed software IBM Statistical Package for the Social Sciences, which confirmed the preliminary calculations. So, the median of the difference between before and after the pedagogical experiment is not equal to zero, that is, the statistical hypothesis  $H_0$  is not confirmed.

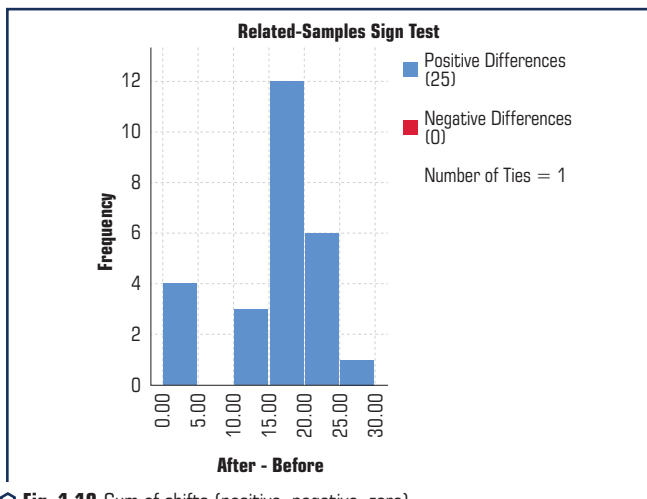
Table 1.9 G-sign convergence for related samples

Related-Samples Sign Test Summary	
Total N	26
Test Statistic	25.000
Standard Error	2.500
Standardized Test Statistic	4.800
Asymptotic Sig. (2-sided test)	0.000

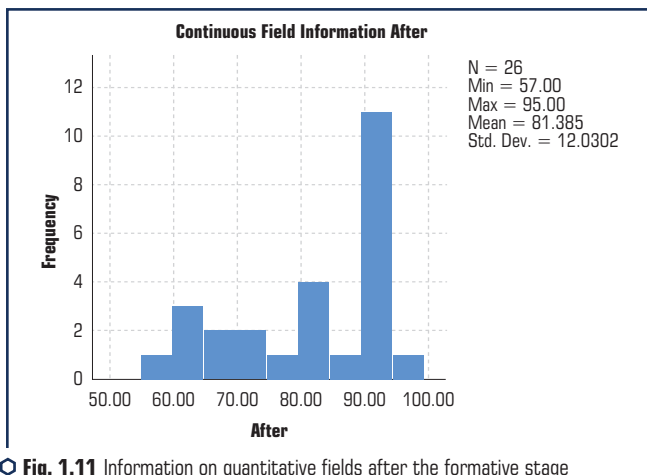
In addition, the analysis of **Table 1.9** gives us the opportunity to emphasize that the asymptotic significance (2-sided criterion) "tends" to zero, that is, the reduction of the statistical criterion of G-signs confirms the significance of the experimental data of the pedagogical experiment after the introduction of the appropriate pedagogical conditions justified by us. These conclusions of the pedagogical experiment can be extended to the entire general population – future officers – specialists in physical culture and sports in the Armed Forces of Ukraine. **Fig. 1.10** shows the sum of shifts of the results of the pedagogical experiment, including positive ones – 25, negative ones – 0 and zero (shift) – 1.

In the process of carrying out the formative stage of pedagogical diagnosis, according to the diagnostic tools justified by them, a point system for assessing respondents (from 0 to 100 points)

was chosen. Accordingly, **Fig. 1.11** reflects information on the number of respondents (26 cadets) who took part in the formative stage of the pedagogical experiment and the corresponding following statistical information – the minimum value obtained for the pedagogical experiment is 57 points, the maximum is 95 points, and the average is 81.38 points and a numerical characteristic characterizing the magnitude of the spread of quantitative characteristics relative to our average value (standard deviation) – 12.03 points.



**Fig. 1.10** Sum of shifts (positive, negative, zero)



**Fig. 1.11** Information on quantitative fields after the formative stage of the pedagogical experiment

For a deeper and more generalized analysis of the obtained experimental results, the method of statistical analysis of the Spearman correlation coefficient was used (using the licensed software IBM Statistical Package for the Social Sciences). The results of the correlation are presented in **Table 1.10**.

● **Table 1.10** Results of the analysis of correlations between the components of organizational competence trained in students

<b>Correlations</b>		<b>VM</b>	<b>Kn.</b>	<b>Adm.</b>	<b>Man.</b>	<b>CC</b>	<b>RE</b>
<b>Spearman's Rho</b>							
Value and motivation (VM)	Correlation Coefficient	1.000	0.705**	0.758**	0.597**	0.328	0.477*
	Sig. (2-tailed)	–	0.000	0.000	0.001	0.102	0.014
	N	26	26	26	26	26	26
Knowledge (Kn.)	Correlation Coefficient	0.705**	1.000	0.701**	0.605**	0.602**	0.586**
	Sig. (2-tailed)	0.000	–	0.000	0.001	0.001	0.002
	N	26	26	26	26	26	26
Administration (Adm.)	Correlation Coefficient	0.758**	0.701**	1.000	0.717**	0.541**	0.765**
	Sig. (2-tailed)	0.000	0.000	–	0.000	0.004	0.000
	N	26	26	26	26	26	26
Manager (Man.)	Correlation Coefficient	0.597**	0.605**	0.717**	1.000	0.590**	0.669**
	Sig. (2-tailed)	0.001	0.001	0.000	–	0.002	0.000
	N	26	26	26	26	26	26
Control and correction (CC)	Correlation Coefficient	0.328	0.602**	0.541**	0.590**	1.000	0.507**
	Sig. (2-tailed)	0.102	0.001	0.004	0.002	–	0.008
	N	26	26	26	26	26	26
Reflection and evaluation (RE)	Correlation Coefficient	0.477*	0.586**	0.765**	0.669**	0.507**	1.000
	Sig. (2-tailed)	0.014	0.002	0.000	0.000	0.008	–
	N	26	26	26	26	26	26

**Note:** *VM* – Value and motivation; *Kn.* – Knowledge; *Adm.* – Administration; *Man.* – Management; *CC* – Control and correction; *RE* – Reflection and evaluation

To facilitate the task of choosing the correlation coefficient in which the variables of our study are presented, it is advisable to use the table for interpreting the size of the effect size of the correlation dependence (according to Cohen, J. (**Table 1.11**)) [3].

● **Table 1.11** Interpretation of correlation dependence effect size values (according to Cohen, J.)

Effect level	The value of the correlation coefficient
Insignificant	$0.00 \leq  r  < 0.10$
Small	$0.10 \leq  r  < 0.30$
Average	$0.30 \leq  r  < 0.50$
Big	$0.50 \leq  r  < 1.00$

Consequently, **Table 1.10** reflects the results of calculations of the relationship between the components of organizational competence among respondents and their influence on mutual formation:

1. First of all, let's analyze the correlations of the value-motivational component with other components:

– high level of correlation was found with the administrative – 0.758, knowledge – 0.705 and managerial – 0.597 components, which indicates a direct relationship between them and the presence of a large effect from this relationship;

– average level of correlation was found out with the control-corrective – 0.328 and reflective-evaluative – 0.477 components, which indicates a tangible relationship between them and the presence of an average effect size from the relationship between them.

2. Let's analyze the correlations between the knowledge of a component and other components. A positive fact is that there is a high level of correlation with all components, in particular, with value-motivational – 0.705, administrative – 0.701, managerial – 0.605, control-corrective – 0.601 and reflective-evaluative – 0.586, which indicates a direct relationship between them and the presence of a significant influence of the organizational knowledge of the respondents on all other components of the organizational competence of the respondents. This indicates that it is necessary to introduce an organizational function and relevant academic disciplines into their state standard to form the organizational competence of graduates in the specialty 017 – physical culture and sports. This fact is confirmed by the very low results of the respondents at the summative stage of the experiment, when 73 % of the respondents demonstrated a low level of knowledge of components or organizational knowledge (**Table 1.3**). The positive impact of this knowledge is observed on the formation of the following components – managerial and managerial.

3. Let's characterize the correlations of the managerial component with other components. A significant positive result of the molding experiment is that there is a high level of correlation between the management component and all other components. In particular, with the reflexive-evaluative component, the correlation coefficient – 0.765, the value-motivational component – 0.758\*\*, the managerial component – 0.717, the knowledge component – 0.701\*\*, and the control-corrective component – 0.541, which indicates a high level of interconnection between them. These results confirm the effectiveness of the application of contextual and subject-active methods of organizational training of respondents.

4. Let's characterize the correlation links of the managerial component with other components, after the molding stage of the experiment, they mainly have a high level of correlation. In particular, the correlation coefficient is 0.669\*\* for the reflective-evaluative component is 0.605\*\* for the knowledge component is 0.717\*\* for the managerial component, and 0.590\*\* for the control and corrective component, which indicates a relatively high correlation of interaction and the relationship between them. Between the managerial and the evidence of a direct relationship between them and the large size of the effect of this relationship.

5. Let's analyze the correlations of the control-corrective component with other components. First of all, in comparison with other components, lower correlations are observed in comparison with other components. In particular, it has an average level of correlation with the value-motivational component – 0.328, which, in our opinion, requires additional psychological and pedagogical research to clarify in detail the content and specifics of their relationship and mutual influence in the process of forming the organizational competence of the subjects. Other results are higher, but somewhat low compared to other components. This may also be evidence of the fact that professionally important qualities of respondents are not subject to rapid formation, i.e., they require long-term targeted educational work on their formation in the process of organizational training in higher education institutions.

6. A significant positive result is the correlation of the reflexive-evaluative component with other components, since it is probably the most difficult to form, because in physical education, in addition to the pedagogical aspect, it directly contains both psychological and neuropsychological aspects [25]. It has an average level of correlation with the value-motivational component – 0.477\* and a high level of correlation with all other components.

The statistical criterion is a tool for determining the level of statistical significance, which ensures the acceptance of a true hypothesis and the rejection of a false one with a high probability, therefore, based on the correlation data (**Table 1.9**), it is possible to conclude that each relationship between the components has statistical significance (except for value-motivational and control-corrective – 0.102), that is, the probability that the experimental result obtained objectively represents the sample with which our experimental study was conducted.

General conclusions on the analysis and generalization of the results of the correlation analysis between the components of the organizational competence of the respondents (**Table 1.10**) are as follows:

- analysis and generalization of the correlations presented in **Table 1.9** shows that a predominantly high level of correlation was found between all components of the organizational competence of the respondents, which indicates, on the one hand, the sufficient effectiveness of the pilot study, and on the other hand, the need for targeted organizational training respondents to the upcoming organizational activities in the troops;
- a large correlation was found, a direct relationship between all components and a significant mutual effect on their formation between such components: managerial and reflexive-evaluative (0.765), value-motivational and administrative (0.758), administrative and managerial (0.717), value-motivational and knowledgeable (0.705), administrative and knowledgeable (0.701);

– the need for targeted work with respondents on their future professional activities in the troops was clarified, since their professionally important qualities are not subject to rapid formation. This indicates that, in our opinion, it is necessary, firstly, purposeful persistent educational work with respondents in their formation and self-formation as subjects of physical education and sports in military units; secondly, to form, in fact, as subjects of military professional activity and, accordingly, to form in them both military professional (as officers of the Armed Forces of Ukraine) and professional types of competence (as subjects of physical education and sports in military units) in universities [26].

Partial conclusions to **Table 1.10** are as follows:

– general correlation analysis and generalization of the results obtained showed that if the respondents have a positive factor in their organizational and administrative function in the troops, the higher the level of their values for the chosen specialty, motivation and ability to assimilate knowledge in the future specialty;

– a high correlation, a direct relationship between the components and a significant effect from the mutual influence on their formation between the managerial and reflexive-evaluative components (0.669) were established; the positive effect is due to the fact that the reflexive-evaluative component encourages introspection and evaluation of acquired managerial knowledge and their significance for future organizational activities;

– a large correlation, a direct relationship between the components and a significant effect of the mutual influence on their formation between knowledge and managerial components (0.605) was found out; the positive effect depends linearly on the acquired managerial knowledge in the field of physical training and sports in the troops;

– a large correlation, a direct relationship between the components and a significant effect of the mutual influence on their formation between knowledge and control and corrective components (0.601) was established; the positive effect is due to the desire to acquire knowledge in the chosen specialty, that is, the targeted assimilation of theoretical and practical knowledge in the future specialty, which also form the basis of the control and corrective component;

– a significant correlation, a direct relationship between the variables and a relatively significant effect of mutual formation between the value-motivational and managerial components (0.597) were established; the positive effect is due, in our opinion, to the high motivation and responsible attitude of respondents to future activities as managers in the field of physical education and sports with military personnel;

– a significant correlation, a direct relationship between the managerial and control-corrective components (0.590) and a relatively sufficient effect from mutual influence on their formation were found; the positive effect is due to the desire of respondents to acquire managerial knowledge in the field of physical training and sports in the Armed Forces of Ukraine, that is, an attempt to purposefully master theoretical and practical managerial knowledge and skills;

– a sufficient correlation was established – a high, direct relationship between the cognitive and reflexive-evaluative components (0.586) and a sufficient effect from mutual influence on their formation; the positive effect is due, in our opinion, to the fact that the reflexive-evaluative

component encourages self-analysis and self-assessment of the acquired theoretical and practical knowledge, skills and awareness of their significance and importance for future organizational activities in the troops;

- a significant correlation was established, a direct relationship between the administrative and control and corrective components (0.541) and a relatively sufficient effect from the mutual influence on their formation was found out; the positive effect is due, in our opinion, to the desire to put the acquired theoretical knowledge into practice;

- an average correlation, tactile relationship between the value-motivational and reflexive-evaluative components (0.477) were established and the average effect of mutual influence on their formation were established; this made it possible to understand that it is necessary to pay attention to the purposeful formation of professionally important qualities of respondents, that is, such qualities that directly positively affect the success of the respondents' organizational activities and contribute to their self-realization as future specialists in physical culture and sports in the Armed Forces of Ukraine; the obtained results indicate that the purposeful work of the scientific and pedagogical staff of universities is necessary to form the professionally important qualities of the respondents;

- an average correlation, a tactile relationship between the value-motivational and control-corrective components (0.328) were established and a relatively average effect of mutual influence on their formation was clarified; such a result gives grounds to assume that the stable individually mental qualities of the respondents need further special psychological and pedagogical scientific research.

## CONCLUSIONS

The analysis and statistical study of the obtained experimental results of the formative stage of the pedagogical experiment confirmed the positive changes in the quantitative values of the formation of the corresponding components of organizational competence among the respondents. The generalized results of the experimental data testify to the sufficient effectiveness of the implementation of the pedagogical conditions justified by us for the formation of organizational competence among the respondents.

Statistical processing of the experimental results obtained after the formative stage of the pedagogical experiment makes it possible to emphasize that the scientific hypothesis  $H_1$  is confirmed, and  $H_0$  is refuted.

The results of the correlation analysis confirm the direct correlation between all components of the organizational competence of the respondents and make it possible to find out the main directions for further scientific research.

The experimental results obtained confirm the need to focus the attention of the Ministry of Education and Science of Ukraine, heads of institutions of higher education and universities on improving the standard of higher education in the specialty 017 – physical culture and sports and



the implementation of organizational competence in the content of their professional competence, since the uniqueness of their future professional activity is in an organizational component in it, especially in the Armed Forces of Ukraine.

### CONFLICT OF INTEREST

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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