

# Preparing future teachers for work in an inclusive educational environment

<sup>1</sup>Svitlana H. Dubovyk, <sup>2</sup>Tanita I. Lyurina, <sup>3</sup>Valentyn V. Molodychenko, <sup>4</sup>Nataliia A. Molodychenko, <sup>5</sup>Alla M. Moskalenko

## **Abstract**

*A modern understanding of the essence of integrated learning is that its formation is correlated primarily with an understanding of subjectivity. If to consider the aspect of creating an educational environment that is able to form a stable level of education for children not only with mild abnormalities, but also people with severe antisocial forms of diseases, then the use of integrated education contributes to the formation of a full citizenship and adaptation of minimally professional skills. The novelty of the study is determined by the fact that the formation of pedagogical techniques and methods is based primarily on the necessity to achieve such parameters as the general educational environment and methods for its development. The authors of the article show aspects of the formation of personal levels in integrated education, determine the methods and forms of support for this technology, and summarise the data on sufficient levels for adaptation by both students and educational institutions. The authors show that the use of inclusive education should become a standard teaching pattern in school. The practical significance of the study is determined by the fact that the developed models for the implementation of the general educational space in school will contribute to the overall integration of children in social conditions.*

**Keywords:** *personal inclusive competency profile, inclusive educational space, cognitive strategies, the problem of teacher training, criteria for motivational-emotional readiness of teachers.*

## **I. Introduction**

The worldwide experience of introducing inclusive practice shows that when organising inclusive education, the requirements for the activities of teachers increase and their functional responsibilities expand (García-Huidobro & Corvalán, 2009). In addition, professionally significant and personal characteristics are changing (Johnstone *et al.*, 2019). In the new conditions, a teacher cannot be limited to knowing the specifics of general education programs and traditional teaching methods (McIlvaine, 2020). Reliance on existing pedagogical skills alone is clearly inadequate (Solar, 1995). The active development of inclusive practice requires new didactic models and another organisation of training for future teachers (Acedo, 2008). In modern conditions of the development of education, the features of the

---

<sup>1</sup> Department of Elementary Education, Borys Grinchenko Kyiv University, 04053, 18/2 Boulevard-Kudryavskaya Str., Ukraine, Kyiv

<sup>2</sup> Department of Elementary Education, Bogdan Khmelnytsky Melitopol State Pedagogical University, 72300, 20 Getmanskaya Str., Melitopol, Ukraine

<sup>3</sup> Department of Elementary Education, Bogdan Khmelnytsky Melitopol State Pedagogical University, 72300, 20 Getmanskaya Str., Melitopol, Ukraine

<sup>4</sup> Department of Foreign Languages, Bogdan Khmelnytsky Melitopol State Pedagogical University, 72300, 20 Getmanskaya Str., Melitopol, Ukraine

<sup>5</sup> Department of Pedagogy, Taras Shevchenko National University of Kyiv, 01033, 60 Volodymyrska Str., Kyiv, Ukraine

formation of professional abilities, skills and competencies of teachers for working in an inclusive educational space are changing (Daniela & Lytras, 2019):

- the structure of information transfer is changing;
- knowledge is updated and more research is being conducted in the field of pedagogy, psychology and corrective pedagogy;
- there are new technologies, techniques and methods of working with children with impaired psychophysical development that change the very approach to learning;
- there is a necessity to find the optimal combination of traditional and innovative teaching methods;
- the role of professional skills — cognitive, socio-emotional, practical, technological — is growing.

The main tasks of the modern training of future teachers for work in an inclusive educational space of defect staff are the following (Acedo, 2008):

- building a profile of professional abilities, skills and competencies of a student;
- development, testing and implementation of copyright methods by teachers and their placement in a distance learning system for use by other specialists;
- development, creation and use of control tasks in a game form (quests, didactic games, interactive forms), interactive teaching technologies, innovative forms of training;
- providing future teachers with all the necessary tools (interactive projectors, documents, software);
- organising and conducting of group lessons, conducting online courses, webinars, remote consultations on the use of interactive forms and methods of training, innovative technologies for highly qualified professionals;
- the construction of personal learning paths, the creation of their own pedagogical style, the collection of case studies.

The formation of professional abilities, skills and competencies of future teachers will be facilitated by the construction of personal training paths based on a personal inclusive competency profile and compliance with modern requirements and a personal vector of professional development.

## II. Literature review

In the new realities, in the context of educational reform, new didactic theories appear, the content of which is the focus on the development of a personality of a child. Innovative technologies are being developed that are based on personality-oriented learning (Marope, 2017). Technology in the production process means a system of means, methods and algorithms proposed by science, the use of which provides predetermined results of activity, guarantees the receipt of products of a given quantity and quality. Technology is based on science. All modern facilities are technology-based (Ainscow, 2005).

The term “technology” was introduced into pedagogy by A. Makarenko. In his opinion, the true development of pedagogical science is associated with its ability to “design a personality”, that is, clearly provide for its qualities and properties that should be formed in the child. Definiteness of goals makes it possible to move to a clear technology for training or education (Tkachyk, 2013). In the 1920s, the term “pedagogical technology” was widely used in pedagogy (Operti *et al.*, 2009). In the context of this study, it is important to determine the content of educational technologies and learning technologies (Shaeffer, 2019). Education technology is the targeted use, in combination or separately, of objects, techniques, tools, events or relationships to enhance the effectiveness of the educational process (Raksiek *et al.*,

2019). Learning technology includes a holistic goal-setting process, constantly updating curricula and programs, testing alternative strategies and teaching materials, evaluating pedagogical systems in general, and setting goals anew as soon as new information about the effectiveness of a system arrives (Ainscow & Miles, 2008).

Learning technology at a higher educational institution involves the management of the didactic process, which includes two main components: organisation of students' activities and control of these activities (Smith & Tyler, 2011). These processes are interrelated, interdependent, control each other and affect further improvement and efficiency: the results of the control affect the content of management actions, which, in turn, provides for the further organisation of activities in order to achieve goals defined on the basis of educational standards (Acedo, 2011).

The basis of modern technologies is a personality-oriented approach, which is determined by the priority of a child's personality, its harmonious development in the existing educational system and involves the transformation of education into the sphere of personal self-affirmation (Singal, 2006). One of the priority tasks of the school is the implementation in practice of a personality-oriented approach in education (Tkachyk, 2013). Its essence is the perception of a child in the education system not as a means, but as a goal, that is, it should become the subject of training, education and development (Rambla *et al.*, 2008).

In a personality-oriented educational process, the main acting unit is dialogic integrity: personality of a student –personality of a teacher. The centre of the educational process is the personality of a child. The personality-oriented educational process is built not just on the basis of taking into account the individual characteristics of the pupils, but in a consistent attitude towards them as individuals who are responsible and conscious subjects of activity. All markers (criteria) of personality-oriented learning are present in the technology of the developing method in the educational process.

### III. Materials and methods

Any technology is based on methodological foundations, certain conceptual provisions. The basis of the technology of developmental education is the principle of general and social psychology “internal through external”. This means that internal development is determined by the external environment (Pelatti *et al.*, 2016). Such an external environment is the educational space of an educational institution. Neuropsychic processes turn into complex ones, which arise as a result of the cultural influence of a number of conditions, primarily, active communication with the environment (Opertti & Belalcázar, 2008). The development of the child's intellect can accelerate or slow down depending on the educational environment (space). The activity of the influence of the educational environment depends on a method. The goal of developmental education is to support the child's natural desire for perfection, harmony and beauty, to evoke a positive psycho-emotional state and relevant emotions (Yadav *et al.*, 2015).

The essence of developmental education is to ensure the positive development of thoughts and speech of a child in relation to objects of cognition and their behaviour. There are several stages.

#### 1. The primary formation of thought-speech:

- the emergence of relevant emotions, experiences under the influence of an external speech of a teacher;
- experiences contribute to the appearance of inner speech, primary thoughts, which so far have common ideas about a subject of knowledge or behaviour;
- consolidation of primary thought in external speech using words, facial expressions, gestures. At this moment, inner speech finds its way into outer speech.

2. Creation of a situation of cognitive dissonance. To do this, it is necessary to organise a meeting on the structure and content of external statements (broadcasters) of children. Under the influence of internal discomfort, spontaneous restructuring of internal speech to a higher level occurs.

3. Adaption to a higher broadcasting structure and achieving a child's enjoyment of optimal for him success (positive emotions, experiences that reinforce success, instil confidence in oneself, increase self-esteem, and the like).

The technology of developing education ensures the flow of all mental processes in each child in all forms of the educational process. In order to build the competence of future teachers, it is important to focus students on the deep conceptual provisions of teaching technologies, the appropriate use of effective means of influence and the creation of favourable conditions for the education and upbringing of children with impaired psychophysical development in an inclusive educational environment.

In an inclusive educational space, it is advisable to use the technology of cognitive strategies. The term "cognitive strategies" is understood to mean plans, actions, steps and processes aimed at implementing any educational task or solving a problem. For children with special educational needs, the use of this technology is to learn how to learn and regulate their own learning activities. Teachers of inclusive classes take into account numerous strategies to support cognitive processes such as organising, understanding, and remembering information. For group work with complex academic material, Bellanca and Fogarty recommend using the following sequence of basic steps:

- 1) teacher questions to stimulate thinking;
- 2) a detailed explanation of thinking skills and their development in practice;
- 3) familiarisation with the graphic organisers, which clearly show the thought process;
- 4) teaching students to ask questions of the highest level.

Thinking strategies are techniques that "teach to think," and the main goal is to build the ability of children with mental and physical disabilities to expand the scope of these techniques in order to learn how to think. The theory of cooperative learning is largely based on the teachings of Leo Vygotsky, one of the founders of developmental psychology. In particular, this is illustrated by his position that human learning has a specific social nature, and through this process children are integrated into the intellectual life of others.

Other technologies for organising the training and support of inclusive education teachers are offered by researchers from Sweden who are studying the role of mentors in teacher training. Formation of a pedagogical team focused on inclusive education with the help of mentoring or a supervisor teacher is an effective event that allows solving pedagogical problems. A school with a mentoring system is more flexible in transitioning to inclusion than other institutions.

#### **IV. Results and discussion**

At the final stage, the effectiveness of the methodology of didactic and practical training of future teachers for work in an inclusive educational environment was checked and control cross-sections for the formation of didactic and practical skills of future teachers were carried out. According to the results of the experiment, positive changes were identified in the control and experimental groups that affected the state of readiness of future teachers to work in inclusive educational institutions in the conditions of an inclusive educational space of an educational institution.

Consider the results of the formation of the criterion of motivational-emotional readiness of future teachers for work in an inclusive educational space after the introduction of an experimental methodology of didactic-practical training of future teachers for work in an inclusive educational space. The results of introducing a comprehensive

experimental methodology for preparing future teachers for work in an inclusive educational institution showed an increase in the number of students with a high level of formation of skills in the motivational and emotional sphere. Quantitative indicators of motivational-emotional readiness are presented in Table 1.

**Table 1.** Levels of formation of the criterion of motivational-emotional readiness of future teachers for work in an inclusive educational space

Group	Levels					
	High		Medium		Low	
	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment
Perseverance and purposefulness						
EG	8.2	37.8	38.3	56.6	53.5	5.6
CG	10.5	11.6	42.1	50.5	47.4	37.9
Emotional stability						
EG	12.6	53.6	36.3	33.7	51.1	12.7
CG	10.5	12.1	47.4	52.1	42.1	35.8
Motivation for the success in the practical implementation of didactic tasks						
EG	14.3	45.9	35.2	45.9	50.5	8.2
CG	10.5	13.1	39.5	51.1	50.0	35.8
Final results on indicators of motivational-emotional preparedness						
EG	11.7	45.8	36.6	45.4	51.7	8.8
CG	10.5	12.3	43.0	51.2	46.5	36.5

After the introduction of the experimental model at a high level in the EG, the indicator of the criterion of motivational-emotional readiness was determined in 45.8% (before – 11.7%) of students, in the CG the indicators did not change significantly – 2.3% (before – 10.5%). The average level of readiness in the EG was shown by 45.4% of students (before – 36.6%), in the CG – 51.2% (before – 43.0%). At a low level in the EG, there were 8.8% (before – 51.7%). In the CG, 36.5% of students (compared to 46.5%). Thus, indicators on the motivational-emotional criterion of the readiness of future teachers to work in an inclusive educational environment of the control group have not changed significantly. In the experimental group, the number of respondents whom the authors attribute to a high level has

significantly increased, the number of middle-level students has increased, and the data at the low level of formation of the motivational and emotional readiness of future teachers have significantly changed.

The results of the formation of the criterion of didactic-technological readiness of future teachers for work in an inclusive educational space indicate positive changes in the levels of formation of didactic knowledge and technological skills of future teachers due to the introduction of a comprehensive experimental model of preparing future teachers for work in an inclusive educational space. Quantitative indicators of didactic-technological readiness are presented in Table. 2.

**Table 2.** Quantitative indicators of didactic-technological readiness of future teachers for work in an inclusive educational environment

roup	Levels					
	High		Medium		Low	
	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment
Sense of didactic-technological knowledge						
G	12.2	36.2	44.4	58.7	43.4	5.1
G	21.1	21.6	36.8	43.2	42.1	35.2
Creativity of practice-oriented knowledge						
G	12.2	51.0	40.9	38.8	46.9	10.2
G	13.2	14.2	44.7	46.9	42.1	38.9
Practical modelling of the development environment						
G	7.7	53.6	41.3	33.7	51.0	12.7
G	7.9	10.5	39.5	43.7	52.6	45.8
Final results on didactic-technological preparedness criteria						
G	10.7	46.9	42.2	43.7	47.1	9.4
G	14.1	15.4	40.3	44.6	45.6	40.0

After the introduction of the experimental model, a high level in the EG according to the criteria of didactic-technological readiness was determined in 46.9% (before – 10.7%) of students, in the CG the indicators did not change significantly – 15.4% (before – 14.1%). The average level of readiness in the EG was shown by 43.7% of students (before – 42.2%), in the CG – 47.1% (before – 43.7%). At a low level in the EG, there were 9.4% (before – 47.1%). In

the CG, 40.0% of students are at low (compared to 45.6%). The introduction of a comprehensive experimental model of preparing future teachers for work in an inclusive educational space has helped to increase the level of formation of deontological knowledge, verbal skills in future teachers to work in an inclusive educational space. Quantitative indicators of deontological-verbal readiness are presented in Table. 3.

**Table 3.** Quantitative indicators by the criterion of deontological-verbal readiness of future teachers

Group	Levels					
	High		Medium		Low	
	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment
Tolerance of future teacher						
EG	9.2	40.3	43.9	51.5	46.9	8.2
CG	13.2	11.1	47.4	48.4	39.4	40.5
Formation of deontological competence						
EG	8.7	45.4	45.4	42.9	45.9	11.7
CG	10.6	10.0	44.7	47.9	44.7	42.1
Speech culture of future teacher						
EG	15.3	37.3	33.2	51.5	51.5	11.2
CG	5.3	17.4	43.6	37.9	51.1	44.7
Final results on the indicators of the criterion of deontological-verbal preparedness						
EG	11.1	41.0	40.8	48.7	48.1	10.3
CG	9.7	12.8	45.2	44.7	45.1	42.5

After the introduction of the experimental model, a high level in the EG in terms of the criterion of deontological-verbal preparedness was determined in 41.0% (before – 11.1%) of students; in the CG, the indicators did not significantly change 9.7% (before – 12.8%). The average level of preparedness in the EG was shown by 48.7% of students (before – 40.8%), in the CG – 44.7% (before – 45.2%). At a low level in the EG, there were 10.3% (before – 48.1%). In the CG, 42.5% of students are at low (compared to 45.1%). The results of introducing a comprehensive experimental model of preparing future teachers for work in an inclusive educational institution showed an increase in the number of students of high and medium levels of formation of skills in the reflexive-practical sphere. Quantitative indicators of reflexive-practical preparedness are presented in Table 4.

**Table 4.** Quantitative indicators of reflexive-practical preparedness of future teachers for work in an inclusive educational environment

Group	Levels					
	High		Medium		Low	
	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment
Reflexion of teacher's own behaviour						
EG	7.1	42.3	39.3	49.0	53.6	8.7
CG	5.3	7.4	50.0	43.2	44.7	49.4
Practical preparedness to conduct special education						
EG	7.7	45.9	39.8	44.4	52.5	9.7
CG	4.2	9.5	45.8	47.9	50.0	42.6
Mutual assessment and mutual analysis of the activities of future teachers						
EG	6.1	41.3	40.8	45.9	53.1	12.8
CG	2.6	8.4	39.5	44.8	57.9	46.8
Final results on indicators of the criterion of reflexive-practical preparedness						
EG	6.9	43.2	40.0	46.4	53.1	10.4
CG	4.0	8.4	45.1	45.3	50.9	46.3

After the introduction of the experimental model, a high level in the EG according to the indicators of the criterion of reflexive-practical preparedness was determined in 43.2% (before – 6.9%) of students, in the CG the indicators did not change significantly – 8.4% (before – 4.0%). The average level of preparedness in the EG was shown by 46.4% of students (before –40.0%), in the CG – 45.3% (before –45.1%). At a low level in the EG, there were 10.4% (before –53.1%). In the CG, 46.3% of students are at the low (compared to 50.9%). Comparative quantitative data on the levels of formation of didactic and practical abilities and skills at the ascertaining and final stages are presented in Table 5.

**Table 5.** Distribution of future teachers according to the level of formation of didactic and practical knowledge, abilities and skills to work in an inclusive educational space (in %)



Group	Number of future teachers completed tasks (%)					
	Levels					
	High		Medium		Low	
	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment	The start of the experiment	The end of the experiment
EG	7.2	56.5	42.4	32.6	50.4	10.9
CG	8	25.0	33	25.0	59	45.0

56.5% (before – 7.2%) of students were identified at a high level of EG; indicators in the CG did not change significantly – 25.0% (before – 8.0%). The average level of preparedness in the EG was shown by 32.6% of students (before – 42.4%), in the CG – 25.0% (before – 33.0%). At a low level in the EG, there were 10.4% (before – 50.4%). In the CG, 45.0% of students became low (compared to 59.0%). Statistical verification of the obtained results was conducted at the critical point of Student's distribution (Student's r-criterion). Based on a statistical analysis of the results, it can be concluded that some students with a high level of didactic knowledge, practical skills in the EG exceed the corresponding value in the CG.

The results of the forming stage of the experiment showed that in the conditions of specially organised work according to the methodology, future teachers increase their level of readiness for work in an inclusive educational institution, which means the expediency of its further implementation. To test the hypothesis of significant or non-significant differences in the experimental and control groups, the authors used Student's criterion (t-test). This criterion allows to compare the average knowledge that is recognised, obtained in the experimental and control group, and establish the significance of these values (Table 6).

**Table 6.** Indicator “Motivational-emotional preparedness”

Levels	The start of the forming experiment	
	EG (196 students)	CG (190 students)
High	23	20
Medium	72	82
Low	101	88

As numerical assessments of the level, the authors choose the following: high – 3 points, medium – 2 points, low – point – 1 point. The following statistical distribution is obtained (Table 7).

**Table 7.** The distribution

Levels	The start of the forming experiment	
	EG (196 students)	CG (190 students)
3	23	20

2	72	82
1	101	88

Here  $n_1=196$ ,  $n_2=190$ .

Samples of  $x$  and  $y$  in the experimental and control groups are found,

$$x = \frac{3 \cdot 23 + 7 \cdot 72 + 1 \cdot 101}{n_1} = \frac{314}{196} \approx 1,602 \quad (1)$$

$$y = \frac{3 \cdot 20 + 2 \cdot 82 + 1 \cdot 88}{n_1} = \frac{312}{190} \approx 1,642 \quad (2)$$

Samples of the variances  $D_x$  and  $D_y$  in the experimental and control groups are found

$$D_x = \frac{\sum (x_i - x)^2 k_i}{n_1 - 1} = \frac{92,959}{195} \approx 0,477 \quad (3)$$

$$D_y = \frac{\sum (y_i - y)^2 p_i}{n_2 - 1} = \frac{83,662}{189} \approx 0,443 \quad (4)$$

The empirical value of the criterion is calculated:

$$t_{emp} = \frac{|1,602 - 1,642|}{\sqrt{196 \cdot 0,477 + 190 \cdot 0,443}} \sqrt{\frac{196 \cdot 190}{196 + 190}} (196 + 190 - 2) \approx 0,5774 \quad (5)$$

The results of didactic-practical training of future teachers for work in an inclusive educational environment are presented in Table 8.

**Table 8.** The results of didactic-practical training of future teachers for work in an inclusive educational environment

Levels	EG (196 students)	Share of the indicator %	CG (190 students)	Share of the indicator %
High	23	11.7 %	20	10.5 %
Medium	72	36.7 %	82	43.2 %
Low	101	51.6 %	88	46.3 %

The hypothesis ( $H_0$ ) is tested: the means of two samples belong to the same population (the difference in means is due to random factors).

- The average in the EG – 1.602
- The average in KG – 1,642
- Selective dispersion in the EG – 0.477
- Selective dispersion in the KG – 0.443
- Significance level – 0.05
- The empirical value of the criterion – 0.577
- The table value of the criterion – 1.9695

Since the value of the criterion obtained in the experiment exceeds the tabular one, that is, there is reason to accept the alternative hypothesis ( $H_1$ ) that the difference in the mean values is not random (Table 9).

**Table 9.** The indicator “Didactic-technological preparedness”

Levels	The start of the forming experiment	
	EG (196 students)	CG (190 students)
High	21	27
Medium	83	77
Low	92	86

As numerical assessments of the level, the authors choose the following: high – 3 points, medium – 2 points, low – point – 1 point. The following statistical distribution is obtained (Table 10).

**Table 10.** The statistical distribution

Levels	The end of the forming experiment	
	EG (196 students)	CG (190 students)
3	21	27
2	83	77
1	92	86

Here  $n_1=196$ ,  $n_2=190$ .

Samples of  $x$  and  $y$  in the experimental and control groups are found,

$$x = \frac{3 \cdot 21 + 7 \cdot 83 + 1 \cdot 92}{n_1} = \frac{332}{196} \approx 1,638 \quad (6)$$

$$y = \frac{3 \cdot 27 + 2 \cdot 77 + 1 \cdot 86}{n_1} = \frac{321}{190} \approx 1,689 \quad (7)$$

The sample variances of  $D_x$  and  $D_y$  of the experimental and control groups are found:

$$D_x = \frac{\sum (x_i - x)^2 k_i}{n_1 - 1} = \frac{87,281}{195} \approx 0,448 \quad (8)$$

$$D_y = \frac{\sum (y_i - y)^2 p_i}{n_2 - 1} = \frac{94,679}{189} \approx 0,501 \quad (9)$$

The empirical value of the criterion is calculated:

$$t_{emp} = \frac{|1,638 - 1,689|}{\sqrt{196 \cdot 0,448 + 190 \cdot 0,501}} \sqrt{\frac{196 \cdot 190}{196 + 190} (196 + 190 - 2)} \approx 0,7699$$

(10)

The results of didactic-practical training of future teachers for work in an inclusive educational environment are shown in Table 11.

**Table 11.** The results of didactic-practical training of future teachers for work in an inclusive educational environment

Levels	The start of the forming experiment	
	EG (196 students)	EG (196 students)
High	21	10,7 %
Medium	83	42,4 %
Low	92	46,9 %

The hypothesis ( $H_0$ ) is tested: the means of two samples belong to the same population (the difference in means is due to random factors).

The average in the EG – 1,638

The average in KG – 1,689

Selective dispersion in the EG – 0.447

Selective dispersion in KG – 0.501

Significance level – 0.05

The empirical value of the criterion – 0.7699

The Table 12 value of the criterion – 1.9695

**Table 12.** The indicator “Deontological-verbal preparedness”

Levels	The start of the forming experiment	
	EG (196 students)	EG (196 students)
High	22	18
Medium	80	80
Low	94	94

As numerical assessments of the level, the authors choose the following: high – 3 points, medium – 2 points, low – point – 1 point. The following statistical distribution is obtained (Table 13).

**Table 13.** The statistical distribution

Levels	The end of the forming experiment	
	EG (196 students)	EG (196 students)
3	22	18
2	80	86
1	94	86

Note: here  $n_1=196$ ,  $n_2=190$ .

Samples of  $x$  and  $y$  in the experimental and control groups are found,

$$x = \frac{3 \cdot 22 + 2 \cdot 80 + 1 \cdot 94}{n_1} = \frac{320}{196} \approx 1,633$$

(11)

$$y = \frac{3 \cdot 18 + 2 \cdot 86 + 1 \cdot 86}{n_2} = \frac{312}{190} \approx 1,642$$

(12)

The sample variances of  $D_x$  and  $D_y$  of the experimental and control groups are found:

$$D_x = \frac{\sum (x_i - x)^2 k_i}{n_1 - 1} = \frac{89,661}{195} \approx 0,459$$

(13)

$$D_y = \frac{\sum (y_i - y)^2 p_i}{n_2 - 1} = \frac{79,663}{189} \approx 0,421$$

(14)

The empirical value of the criterion is calculated:

$$t_{emp} = \frac{|1,638 - 1,689|}{\sqrt{196 \cdot 0,459 + 190 \cdot 0,421}} \sqrt{\frac{196 \cdot 190}{196 + 190 - 2}} \approx 0,7699$$

(15)

The results of didactic-practical training of future teachers for work in an inclusive educational environment are shown in Table 14.

**Table 14.** The results of didactic-practical training of future teachers for work in an inclusive educational environment are shown

Levels	EG (196 students)	Share of the indicator %	CG (190 students)	Share of the indicator %
High	22	11,2 %	18	9,6 %
Medium	80	40,8 %	86	45,2 %
Low	94	48,0 %	86	45,2 %

The hypothesis ( $H_0$ ) is tested: the means of two samples belong to the same population (the difference in means is due to random factors).

The average in the EG – 1,633

The average in KG – 1,642

Selective dispersion in the EG – 0.459

Selective dispersion in the KG – 0.421

Significance level – 0.05

The empirical value of the criterion – 0.7699

The table 15 value of the criterion – 1.9695

**Table 15.** Criterion “Reflexive-practical preparedness”

Levels	The start of the forming experiment	
	EG (196 students)	CG (190 students)
High	14	7
Medium	78	86
Low	104	97

As numerical assessments of the level, the authors choose the following: high – 3 points, medium – 2 points, low – 1 point. The following statistical distribution is obtained (Table 16).

**Table 16.** The statistical distribution

Levels	The end of the forming experiment	
	EG (196 students)	CG (190 students)
3	14	7
2	78	86
1	104	97

Note: Here  $n_1 = 196$ ,  $n_2 = 190$ .

Samples  $x$  and  $y$  of the experimental and control groups are found:

$$x = \frac{3 \cdot 14 + 2 \cdot 78 + 1 \cdot 104}{n_1} = \frac{302}{196} \approx 1,541$$

(16)

$$y = \frac{3 \cdot 7 + 2 \cdot 86 + 1 \cdot 97}{n_1} = \frac{290}{190} \approx 1,526$$

(17)

The sample variances of  $D_x$  and  $D_y$  of the experimental and control groups are found:

$$D_x = \frac{\sum (x_i - x)^2 k_i}{n_1 - 1} = \frac{76,674}{195} \approx 0,393$$

(18)

$$D_y = \frac{\sum (y_i - y)^2 p_i}{n_2 - 1} = \frac{61,369}{189} \approx 0,325$$

(19)

The empirical value of the criterion is calculated:

$$t_{emp} = \frac{|1,541 - 1,526|}{\sqrt{196 \cdot 0,393 + 190 \cdot 0,325}} \sqrt{\frac{196 \cdot 190}{196 + 190} (196 + 190 - 2)} \approx 0,0962$$

(20)

The results of didactic-practical training of future teachers for work in an inclusive educational environment are presented in Table 17.

**Table 17.** The results of didactic-practical training of future teachers for work in an inclusive educational environment

Levels	EG (196 students)	Share of the indicator %	CG (190 students)	Share of the indicator %
High	14	7,2 %	7	3,6 %
Medium	78	39,7 %	86	45,3 %
Low	104	53,1 %	97	51,1 %

The hypothesis ( $H_0$ ) is tested: the means of two samples belong to the same population (the difference in means is due to random factors).

The average in the EG – 1.541

The average in the KG – 1,526

Selective dispersion in the EG –0.393

Selective dispersion in the KG – 0.325

Significance level – 0.05

The empirical value of the criterion – 0.0962

The table value of the criterion – 1.9695

The experimental verification of the effectiveness of the proposed model proves the positive dynamics of the process of preparing future teachers for work in an inclusive educational environment, which is confirmed by quantitative indicators.

## V. Conclusion

In modern pedagogical science there is no single approach to the problem of teacher training. At the same time, most modern scientists agree that the training of teachers for work in in the conditions of an inclusive educational space of an educational institution should be considered as a personified and focused process and the result of the development of their professional competence. Preparation of teachers for activities in an inclusive educational space of an educational institution includes a number of stages, namely: motivational and emotional preparedness to fulfil their duties in an inclusive educational institution, willingness and ability to develop new training and development programs for children with special needs, the ability to communicate with different categories of children, their parents, teachers, psychologists and the like. Training of teachers for work in an in an inclusive educational environment, the institution should:

- have a syncretic character, manifested in the interconnectedness and interdependence of goals, content, organisation technology and the functioning of these components as a whole;
- include motivational-value, operational-activity and reflexive-evaluative components, since their presence in the training structure will ensure its syncretism and holistic character;
- be based on pedagogical values, which provide for the formation of personal attitudes among future teachers on inclusive education and the social significance of its organisation, which will become an indicator of personal and professional development and motivational and value readiness of future teachers to carry out activities new for them related to inclusive education;
- be characterised by flexibility and mobility in its implementation for the timely transformation by teachers of their own professional activities and successful adaptation to changing conditions when organising inclusive education;
- provide for the development of professional competence among teachers as the ability to solve professionally significant, socially determined and increasingly complex tasks that arise when organising inclusive practice.

Based on the analysis of theoretical approaches to the preparation of future teachers for activities in an inclusive educational environment, the authors understand the didactic and practical training of future teachers for work



in an inclusive educational environment as a goal-oriented and creative process of developing professional competence of future teachers aimed at achieving humanistic goals and the formation of pedagogical values, as a result of which future teachers form the ability to solve professional problems in the field of inclusive education that requires further theoretical and practical generalisations.

## References

- [1] Acedo, C. (2008). Inclusive education: pushing the boundaries. *Prospects*, 38(1), 5-13. DOI: 10.1007/s11125-008-9064-z.
- [2] Acedo, C. (2011). Preparing teachers for inclusive education. *Prospects*, 41(3), 301-302. DOI: 10.1007/s11125-011-9198-2.
- [3] Ainscow, M. (2005). Developing inclusive education systems: what are the levers for change? *Journal of Educational Change*, 6(2), 109-124. DOI: 10.1007/s10833-005-1298-4.
- [4] Ainscow, M., & Miles, S. (2008). Making education for all inclusive: where next? *Prospects*, 38(1), 15-34. DOI: 10.1007/s11125-008-9055-0.
- [5] Daniela, L., & Lytras, M.D. (2019). Educational robotics for inclusive education. *Technology, Knowledge and Learning*, 24(2), 219-225. DOI: 10.1007/s10758-018-9397-5.
- [6] García-Huidobro, J.E., & Corvalán, J. (2009). Barriers that prevent the achievement of inclusive democratic education. *Prospects*, 39(3), 239-250. DOI: 10.1007/s11125-009-9128-8.
- [7] Johnstone, C., Lazarus, S., Lazetic, P., & Nikolic, G. (2019). Resourcing inclusion: Introducing finance perspectives to inclusive education policy rhetoric. *Prospects*, 47(4), 339-359. DOI: 10.1007/s11125-018-9432-2.
- [8] Marope, P.T.M. (2017). Advancing inclusive and quality education through human rights education. *Prospects*, 47(1), 1-2. DOI: 10.1007/s11125-018-9430-4.
- [9] McIlvaine, J.A. (2020). Inclusive education for autistic children: helping children and young people to learn and flourish in the classroom. *Journal of Autism and Developmental Disorders*. DOI: 10.1007/s10803-019-04352-y. <https://link.springer.com/article/10.1007%2Fs10803-019-04352-y>
- [10] Opertti, R., & Belalcázar, C. (2008). Trends in inclusive education at regional and interregional levels: issues and challenges. *Prospects*, 38(1), 113-135. DOI: 10.1007/s11125-008-9062-1.
- [11] Opertti, R., Brady, J., & Duncombe, L. (2009). Moving forward: Inclusive education as the core of education for all. *Prospects*, 39(3), 205-214. DOI: 10.1007/s11125-009-9112-3.
- [12] Pelatti, C.Y., Dynia, J.M., Logan, J.A.R., Justice, L.M., & Kaderavek, J. (2016). Examining quality in two preschool settings: publicly funded early childhood education and inclusive early childhood education classrooms. *Child & Youth Care Forum*, 45(6), 829-849. DOI: 10.1007/s10566-016-9359-9.
- [13] Raksiek, M., Gröben, B., Rischke, A., & Heim, C. (2019). Teachers' attitude toward inclusive physical education and factors that influence it. *German Journal of Exercise and Sport Research*, 49(1), 27-36. DOI: 10.1007/s12662-018-0546-8.
- [14] Rambla, X., Ferrer, F., Tarabini, A., & Verger, A. (2008). Inclusive education and social inequality: an update of the question and some geographical considerations. *Prospects*, 38(1), 65-76. DOI: 10.1007/s11125-008-9052-3.

- [15] Shaeffer, S. (2019). Inclusive education: a prerequisite for equity and social justice. *Asia Pacific Education Review*, 20(2), 181-192. DOI: 10.1007/s12564-019-09598-w.
- [16] Singal, N. (2006). An ecosystemic approach for understanding inclusive education: An Indian case study. *European Journal of Psychology of Education*, 21(3), 239-252. DOI: 10.1007/BF03173413.
- [17] Smith, D.D., & Tyler, N.C. (2011). Effective inclusive education: Equipping education professionals with necessary skills and knowledge. *Prospects*, 41(3), 323-339. DOI: 10.1007/s11125-011-9207-5.
- [18] Solar, C. (1995). An inclusive pedagogy in mathematics education. *Educational Studies in Mathematics*, 28(3), 311-333. DOI: 10.1007/BF01274179.
- [19] Tkachyk, R.E. (2013). Questioning secondary inclusive education: are inclusive classrooms always best for students? *Interchange*, 44(1), 15-24. DOI: 10.1007/s10780-013-9193-z.
- [20] Yadav, M., Das, A., Sharma, S., & Tiwari, A. (2015). Understanding teachers' concerns about inclusive education. *Asia Pacific Education Review*, 16(4), 653-662. DOI: 10.1007/s12564-015-9405-6