



Tecnología pedagógica en la enseñanza de niños con necesidades educativas especiales en el contexto de la educación inclusiva

Pedagogical technology in teaching children with special educational needs in the context of inclusive education

Alla A. Kolupayeva^{1a}, Oksana M. Taranchenko², Lidmyla V. Koval-Bardash³,
Oksana I. Chekan⁴, Larysa M. Nakonechna⁵

National Academy of Educational Sciences of Ukraine, Kyiv, Ukraine¹²³⁵
Mukachevo State University, Mukachevo, Ukraine⁴

 ORCID ID: <https://orcid.org/0000-0002-4610-5081>¹
 ORCID ID: <https://orcid.org/0000-0002-5908-3475>²
 ORCID ID: <https://orcid.org/0000-0002-3342-8922>³
 ORCID ID: <https://orcid.org/0000-0002-3480-6366>⁴
 ORCID ID: <https://orcid.org/0000-0003-3876-6813>⁵

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Resumen

El objetivo de este artículo fue probar la efectividad del modelo horizontal de implementación de tecnologías pedagógicas para la enseñanza de alumnos de primer grado con trastornos del espectro autista en el proceso de educación inclusiva. El estudio fue una forma de experimento que duró un año con la participación de clases de control y experimentales con alumnos con trastornos del espectro autista. El estudio involucró métodos tales como evaluación experta de programas de aprendizaje diferenciados, llevar un diario de la observación de las actividades de aprendizaje de los niños, presencia de un psicólogo tutor y un maestro de escuela primaria. Se aplicó el método de observación por un psicólogo práctico de la institución utilizando los criterios de manifestaciones emocionales, motivacionales y sociales de la conducta. Además, se recopilaron las características psicológicas de los alumnos de las clases de control y experimentales al inicio y al final del estudio. En el curso del experimento se utilizaron métodos de aprendizaje diferenciado como iconos, telarañas semánticas, “guiones gráficos” del texto en componentes de la trama. Con base en los resultados del estudio se encontró que la introducción de tecnología pedagógica horizontal dentro de la institución educativa tiene un efecto positivo en la motivación y adaptación social de los alumnos con necesidades educativas especiales en comparación con los resultados

^aCorrespondencia al autor
E-mail: alla1.education12@gmail.com

obtenidos en la clase control. En consecuencia, se puede concluir que la práctica del aprendizaje diferenciado necesita un mayor desarrollo y adaptación.

Palabras clave: Adaptación, autismo, aprendizaje diferenciado, inclusión, motivación, tecnologías pedagógicas.

Abstract

The aim of this article was to test the effectiveness of the horizontal model of implementation of pedagogical technologies for teaching first-graders with autism spectrum disorders in the process of inclusive education. The study was a form of experiment that lasted one year with the involvement of control and experimental classes with the same number of pupils with autism spectrum disorders. The study involved methods such as expert evaluation of differentiated learning programs, keeping a diary of the observation of the children's learning activities, the tutor psychologist and the primary school teacher. The method of observation by a practical psychologist of the institution using the criteria of emotional, motivational, and social manifestations of behaviour was applied. Besides, the psychological characteristics of pupils in both the control and experimental classes at the beginning and at the end of the study were compiled. Differentiated learning methods such as icons, semantic webs, "storyboards" of the text into plot components were used in the course of the experiment. Based on the results of the study, it was found that the introduction of horizontal pedagogical technology within the educational institution has a positive effect on the motivation and social adaptation of students with special educational needs compared to the results obtained in the control class. Consequently, it can be concluded that the practice of differentiated learning needs further development and adaptation.

Keywords: Adaptation, autism, differentiated learning, inclusion, motivation, pedagogical technologies.

Introduction

The problem of access of children with special educational needs to the general education system is becoming increasingly important in Ukraine. Given the recent processes of reform in education, experts are actively developing opportunities for educational and personal fulfilment of children with special educational needs (SENs). The organization of quality education for children with SENs is possible only with the effective use of a set of technologies that considers the specifics of children's special educational needs, as well as social determinants that ensure productive interaction of all actors in the educational process (Johora, Fleer & Hammer, 2021). Pedagogical technology is understood as scientific forecasting and reproduction of pedagogical actions that help achieve the planned results (Skrypyk, 2015).

Arrangement of the world and domestic experience of technologization in education allows distinguishing the following five groups of technologies: educational management, management technologies, cooperation technologies, service support technologies, assistance/tutoring support technologies; teaching technologies. They can be conditionally divided into vertical and horizontal: while vertical (management, cooperation, and service support) require more detailed set-up time, tutoring and teaching technologies can be implemented and researched within a single institution. This article focuses on evaluating the effectiveness of cooperative learning by tutors, teachers, and psychologists, together with the use of differentiated learning as a pedagogical technology of inclusive education for first graders with autism spectrum disorders.

The practice of tutoring and differentiated teaching is widely used abroad, where inclusive education has long been used successfully. The experience of Canadian teachers deserves special attention, which is actively picked up by Ukrainian specialists in the field of special pedagogy and psychology (Loreman & Deppeler, 2001). Among Western research concepts, Loreman's (2007) technological direction "seven pillars of inclusion" deserves special attention (Loreman, Deppeler & Harvey, 2005; 2010). In Western pedagogical practice, inclusive education is recommended for children who have even minor deviations from the norm (Sianciolo & Prokhorenko, 2021).

Compared to domestic research on inclusive education, such studies have already had a history in the West (Anastasiou & Hajisoteriou, 2020; Sundqvist, Björk-Åman & Ström, 2021). Today there is an active practice of finding and transforming existing inclusive models that would integrate the experience of all participants in the inclusive learning process in the joint exchange of their own observations and conclusions (Heng, Quinlivan & Plessis, 2019; Ricci, Scheier-Dolberg & Perkins, 2020).

Despite the active development of inclusive education, the West as well as Ukraine still experience a lack of practical experience of teachers to ensure inclusive education of children with special needs, given their differences and inability to follow certain clearly defined approaches (Roberts & Webster, 2020). In the United States, much attention is paid to research not only on the cognitive adaptation of such children, but also on work with learning activities such as fear of public speaking, which further contributes to anxiety (Nyborg et al., 2020). The inclusion is being actively introduced in Singapore due to the need to adapt a sufficiently dense school load for children with special needs (Heng & Song, 2021). Kolupayeva and Taranchenko (2019) are the leading researchers of the development of inclusive education in Ukraine, who have developed a

whole complex of pedagogical technologies for children with various forms of intellectual disabilities. Much attention is paid to curricula for teachers engaged in inclusive education and inclusive teaching strategies (Danilovichute & Lytovchenko, 2012; Dyatlenko et al., 2015).

At present, in Ukraine we can note the significant development of research in the field of implementation of pedagogical technologies, which are based on the analysis of foreign practice and theoretical background. There is a lack of empirical and experimental data that would clearly demonstrate the effectiveness of certain forms of inclusive education. Therefore, the object of the research were first graders with special educational needs. The subject of the research were the educational activities of pupils with special educational needs. The hypothesis of the research was the assumption that joint learning and differentiated teaching technology will help improve the social adaptation and learning abilities of first graders with autism spectrum disorders.

Materials and Methods

The main objective of the research was to study the effectiveness of the differentiated learning technology for children with autism spectrum disorders (ASD). The methodological background included several components - assessment of the model of differentiated learning and diagnostic assessment of the child's level of development, which included primary and final diagnostics of the child's social, cognitive sensory and emotional spheres (compilation of psychological characteristics of the child). using the diary of observation of children with special educational needs (educational portal Vseosvita). The next methodological objective was to monitor the child's academic achievement and school adaptation using a diary of observation of children with special educational needs (educational portal Vseosvita).

The study we proposed was mainly of a qualitative nature and involved the use of an extensive set of interventions of considerable duration. Accordingly, we selected two first forms of Podilskyi and Dniprovskyi districts of Kyiv, where 28 and 30 children aged 6-7 studied. There were two pupils who were characterized by autism spectrum disorders in each form: Taras — 6 years old, Oleksandr — 6 years old, Arsen — 7 years old, and Hennadii — 6 years old^b. The ASD was diagnosed by the commission of the Inclusive Resource Centre. One class acted as experimental (Class A), another one — as the control (Class B). Parents of pupils in the

^bTo preserve the confidentiality of the children who participated in the study, the names were replaced by fictitious ones.

experimental class agreed to introduce inclusion for their children. The parents of pupils in the control class (Class B) did not recognize such a need, besides, a request was made to prohibit any form of psychological support for the child other than lessons with a speech therapist (Campbell, 1980). Taras and Oleksandr studied in class A, Arsen and Hennadii — in class B.

As instruments a diary of the observation, psychological profile of the child, icons were used. The diary was completed by the tutor together with the teacher during the school year. Each criterion was evaluated on a ten-point scale with the derivation of average values at the end of the academic semester, which were subjected to comparative analysis to determine probable changes. One more selected method was observation of the child's behaviour according to such criteria as social adaptation, motivation for cognitive activity, emotional and sensory reactions (manifestations of aggression), which was carried out by a practical school psychologist. A practical psychologist with the participation of a tutor teacher made a psychological portrait of the child, recorded the manifestations of behaviour according to selected criteria, and re-compiled psychological characteristics of pupils, indicating the changes that have occurred. The plan for the implementation of differential learning technology included the following stages:

1. Assessment of the general level of development taking into account the specialists' opinion.
2. Assessment of school and classroom environment in order to identify barriers to the implementation of the educational process.
3. Compiling a list of expected learning outcomes.
4. Adaptation of school material.
5. List and characteristics of psychocorrection aids given the existing problems.
6. Evaluation of current and final results of inclusive education.

In order to test the effectiveness of the differentiated learning programme, the method of expert evaluation of ten specialists from different schools of Kyiv, who had the practice of implementing differentiated teaching, was used.

Statistical analysis

At the beginning of the experimental study, a team of school specialists consisting of a psychologist, tutor and primary school teacher compiled psychological characteristics to all four pupils with special educational needs according to the criteria of intellectual, social and motivational-cognitive abilities. Throughout the experiment in class A, regular psychodiagnostic

measurements were performed, the differentiated learning technology was implemented with the help of a tutor, as well as the necessary psycho-corrective measures. In class B, there was a normal process of learning on the basis of comprehensive school programme with the recording of pupil performance and observation of a psychologist without any outside interference.

At the end of the experiment, a comparative analysis of the average values of the observation diary was performed, and repeated psychological characteristics of pupils were compiled. Due to the short duration of lessons, it was impossible to introduce such teaching methods as group work, which provided for the differentiation of pupils according to their learning abilities, as well as the peer-to-peer method. In order to compensate for the gaps in the proposed inclusive model, a school psychologist was additionally involved, who worked with the establishment of social contacts and manifestations of aggression and anxiety of pupils with special educational needs. All participants of the experiment were acquainted with the procedure of its course and gave written consent to participate in it. Information about the participants was confidential.

Results

The results of the study include a comparative analysis of the initial and final characteristics of the participants in the experiment, a description of the research procedure, a description of some fragments of the differentiated learning programme and a comparative analysis of its results. The fragmentary nature of the programme description is related to its volume and is presented in the context of the analysis of the results. Expert assessment of differential learning technology was 8.9 points.

Taras, a pupil of the experimental class, refused to eat in the school cafeteria, avoided active group activities — physical education classes, was characterized by manifestations of spontaneous aggression and was also characterized by excessive and obsessive pedantry, unstable level of motivation. Oleksandr was characterized by a sense of hyper self-importance and a reduced understanding of the purpose of being in the team and the role of classmates for him. Hennadii, a pupil of the control class, showed mediocre ability to read and write and a high level of mathematical abilities, walked on tiptoe. Arsen was noted for extremely high intellectual abilities, love of mathematics and chess, low communication skills, sharp emotional reactions to the laughter of classmates and noise in the classroom. All the pupils were children from complete

families and were the eldest child in the family except Arsen, who was the only child. Hennadii had a younger brother and sister, about whom he repeatedly gave positive reviews. Oleksandr and Taras had three years younger brothers, the relationship with whom they described quite dryly. The highest level of social interaction was observed in Hennadii, who was noted for establishing social contacts with peers mainly on the ground of playing computer games.

The expected learning outcomes included mastery of writing and reading, logical and arithmetic operations, spatial imagination, development of mnemonic processes, causation, the ability to display images and objects while maintaining their conceptual integrity (in the case of human images, there must be all the parts of the body). A selective cognitive activity was observed in pupils with special needs in the course of group work with the involvement of a psychologist.

The diary of observations was filled in by the tutor in the experimental class, while in the control class the teacher was allowed to get a general picture of changes on the criteria of Independence, Attentiveness, Number of Completed Assignments, Distractions, Clarifying Questions, Material Adaptation in quantitative indicators. These criteria were assessed on a ten-point scale during the first half and second half of the school year. The obtained average values were compared to identify statistically significant differences. The results recorded in the diary of observations during the year on the subject Writing are shown in Table 1.

Table 1

The results of the diary of observations for Writing

Subject	Independence			Attentiveness			Number of Completed Assignments			Distractions			Clarifying Questions			Material Adaptation			
	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	
Writing																			
Taras	6.5	7.8	p≤0.001	7.2	7.4		5.8	6.9	p≤0.001	4.3	3.2	p≤0.001	2.1	2.3		3.2	2.1	p≤0.001	
Oleksandr	5.4	6.2		6.1	7.8	p≤0.001	4.5	6.9	p≤0.001	6.7	4.2	p≤0.001	3.4	3.3		6.7	4.8	p≤0.001	
Hennadii	5.8	6.4		5.6	6.3		5.2	5.4		6.9	6.5		4.1	4.0		-	-		

Arsen	7.1	7.4	6.2	6.4	6.7	6.9	3.8	3.6	2.1	1.9	-	-
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From the table we see statistically significant changes ($p \leq 0.001$) in Taras and Oleksandr ($p \leq 0.05$) on the Independence criterion in the experimental class and the absence of such changes in Hennadii and Arsen in the control class. Despite the fact that in the experimental class the learning process was accompanied by a tutor, the diary shows that such participation contributes to the development of independence, not vice versa. Statistically significant changes are observed in the development of Attention in Oleksandr ($p \leq 0.001$), who showed a much lower level and was characterized by significant distractions at the beginning of his studies. At the same time, the level of Oleksandr's distraction also decreased at a statistically significant level ($p \leq 0.001$). Taras also had a reduced number of distractions at a statistically significant level ($p \leq 0.001$). According to these criteria, no statistically significant changes in the pupils of the control class were recorded. Besides, there are statistically significant changes ($p \leq 0.001$) on the criteria of adaptation — there was a decrease in the need for adaptation of educational material by the end of the school year.

At the beginning of his studies, Taras performed well in assignments that consisted of outlining dashed lines, repeating graphic drawings. Writing capital letters on his own was much more difficult. When completing independent assignments, he often alternated handwritten letters and block letters, such results were initially awarded in the absence of errors, but later Taras had to divide assignments into smaller ones completing them in handwritten letters; later the volume of such assignments increased. Oleksandr's main problem was that he often deviated from tasks and did "something of his own" in notebooks, the pupil also needed more time to do the exercises compared to other pupils, he constantly failed to finish the assignment. The main task of the tutor teacher was joint participation in the work, where fragments of assignments were completed in turn. As mentioned in Table 2, Mathematics was the subject that caused the least difficulty for all pupils.

Table 2
Results of the Math lesson observation diary

Subject	Independence			Attentiveness			Number of Completed Assignments			Distractions			Clarifying Questions			Material Adaptation		
	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig
Mathematics	7.4	7.8		7.5	7.6		7.8	7.9		4.7	3.2	$p \leq 0.05$	2.1	2.0		4.3	4.1	
Taras	4.8	6.2	$p \leq 0.001$	5.1	6.4	$p \leq 0.001$	5.5	6.9	$p \leq 0.001$	5.7	4.2	$p \leq 0.001$	4.4	3.3	$p \leq 0.05$	4.2	2.1	$p \leq 0.05$
Oleksandr	7.8	7.9		6.7	6.9		7.2	7.4		3.4	3.8		2.1	2.0		-	-	
Hennadii	8.8	8.9		7.8	8.2		8.9	9.2		2.4	2.6		1.1	1.2		-	-	
Arsen																		

Oleksandr had the largest number of statistically significant changes on most of these criteria. In particular, Oleksandr had a statistically significant increase in Independence ($p \leq 0.001$), the Number of Completed Assignments ($p \leq 0.001$), Distractions. There was a statistically significant decrease in the number of Clarifying Questions ($p \leq 0.05$) and the level of Material Adaptation ($p \leq 0.05$). Additional visualization through mathematical icons was the main adaptation techniques used for Oleksandr. Taras did not show much difficulty in learning Mathematics, so he did not need a special level of material adaptation, but he needed recurrent reassurance due to impulsive behaviour and spontaneous teasing classmates. The results of the diary of observations of a science lesson are shown in Table 3.

Table 3
Results of the Nature Study lesson observation diary

Subject	Independence			Attentiveness			Number of Completed Assignments			Distractions			Clarifying Questions			Material Adaptation		
	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig
Nature Study																		
Taras	6.4	6.8		4.5	5.6	p≤0.05	4.8	6.2	p≤0.001	5.7	4.2	p≤0.05	3.1	3.0		6.7	5.7	p≤0.05
Oleksandr	3.8	5.2	p≤0.001	5.1	6.5	p≤0.001	3.2	4.9	p≤0.001	6.2	3.2	p≤0.001	4.5	2.3	p≤0.001	6.8	5.1	p≤0.05
Hennadii	3.8	3.9		5.2	5.6		4.2	4.4		5.4	5.8		3.8	3.9		-	-	
Arsen	4.8	5.2		4.9	5.1		5.1	5.4		4.4	4.6		4.2	4.5		-	-	

It was noted above that Taras and Oleksandr lack interest in Nature Study, however, a number of statistically significant changes were recorded in each pupil from the experimental class and no such changes in the control class pupils by the end of the year. As we can see from the results of the table, Taras and Oleksandr improved Attentiveness, the Number of Completed Assignments and decreased the number of Clarifying Questions at a statistically significant level ($p \leq 0.001$). Additional visualization was used as an adaptation technique, as it was difficult for pupils to understand several component properties of objects and phenomena — the tutor teacher additionally used cobwebs for this purpose.

Table 4
Results of the Reading lesson observation diary

Subject	Independence			Attentiveness			Number of Completed Assignments			Distractions			Clarifying Questions			Material Adaptation			
	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	I s.	II s.	Sig	
Reading																			
Taras	6.4	6.8		4.5	5.6	p≤0.05	4.8	6.2	p≤0.001	5.7	4.2	p≤0.05	3.1	3.0		4.2	6.8	p≤0.05	
Oleksandr	3.8	5.2	p≤0.001	5.1	6.5	p≤0.001	3.2	4.9	p≤0.001	6.2	3.2	p≤0.001	4.5	2.3	p≤0.001	6.8	5.1	p≤0.05	
Hennadii	3.8	3.9		5.2	5.6		4.2	4.4		5.4	5.8		3.8	3.9		-	-		
Arsen	4.8	5.2		4.9	5.1		5.1	5.4		4.4	4.6		4.2	4.5		-	-		

Observation of Reading lessons (Table 4) showed the statistically significant changes in the criteria of Independence, Attentiveness, Distractions, Clarifying Questions. Besides, there was a statistically significant increase in the level of the Material Adaptation, which was associated with increasing complexity of the curriculum. Despite the normal reading skills, both Taras and Oleksandr had problems with text rendering. So, the tutor teacher used such a method as “storyboarding” of the text, which allowed identifying its main components and clearly demonstrate the logical connections. Instead of rendering the text, both pupils were to fill in the cell diagrams. Written completion was also related to pupils’ reluctance to speak in public. The objective of Drawing is the accuracy of reproduction of objects, the development of imagination and fantasy (Table 5).

Table 5
Results of the Drawing lesson observation diary

Subject	Independence			Attentiveness			Number of Completed Assignments			Distractions			Clarifying Questions			Material Adaptation			
	I s	II s	Sig	I s	II s	Sig	I s	II s	Sig	I s	II s	Sig	I s	II s	Sig	I s	II s	Sig	
Drawing																			
Taras	3.2	4.1		4.5	5.6	p≤0.05	4.8	6.2	p≤0.001	5.7	4.2	p≤0.05	3.1	3.0		8.6	8.8	p≤0.05	
Oleksandr	3.1	3.8	p≤0.001	5.1	6.5	p≤0.001	3.2	4.9	p≤0.001	6.2	3.2	p≤0.001	4.5	2.3	p≤0.001	9.1	9.01	p≤0.05	
Hennadii	4.2	4.6		5.2	5.6		4.2	4.4		5.4	5.8		3.8	3.9		-	-		
Arsen	3.9	4.2		4.9	5.1		5.1	5.4		4.4	4.6		4.2	4.5		-	-		

Despite the common love of children for drawing, both Taras and Oleksandr felt discomfort and difficulty in Drawing lessons. Taras often depicted living beings schematically, often in the form of geometric figures. There were also problems with colour reproduction. The Drawing lesson remained the subject where all the statistically significant changes recorded were achieved through the adaptation, or even modification of the teaching material. For example, if the children had to draw a bird, Taras and Oleksandr had the assignment to draw a birdhouse, which has clearly defined geometric shapes.

The final stage of the evaluation of the introduced differentiated learning technology was the re-compilation of a psychological portrait by a practical psychologist in both the control and experimental class. In the experimental class, the psychologist noted the progress in the level of social adaptation in the second half of the year (Taras began to eat in the school cafeteria, showed

greater interest in psychological group work, Oleksandr began to feel more comfortable in class, move around the classroom, initiate dialogues). Manifestations of aggression, social adaptability and motivation of pupils in the experimental class during the year can be presented in the form of a chart. The practical psychologist noted the total number of days when aggression was manifested during the month, when motivation to study was manifested, as well as active social interactions.

Figure 1 shows that the maximum number of manifestations of aggression in Taras was recorded in September and October, followed by a reduction trend. Besides, there is an increase in the level of social adaptation. A moderate increase in motivation is observed in both Taras and Oleksandr. The latter has a more pronounced increase in the level of social adaptation (Figure 2). Despite the low level of aggression compared to Taras, Oleksandr also showed its decline by the end of the year.

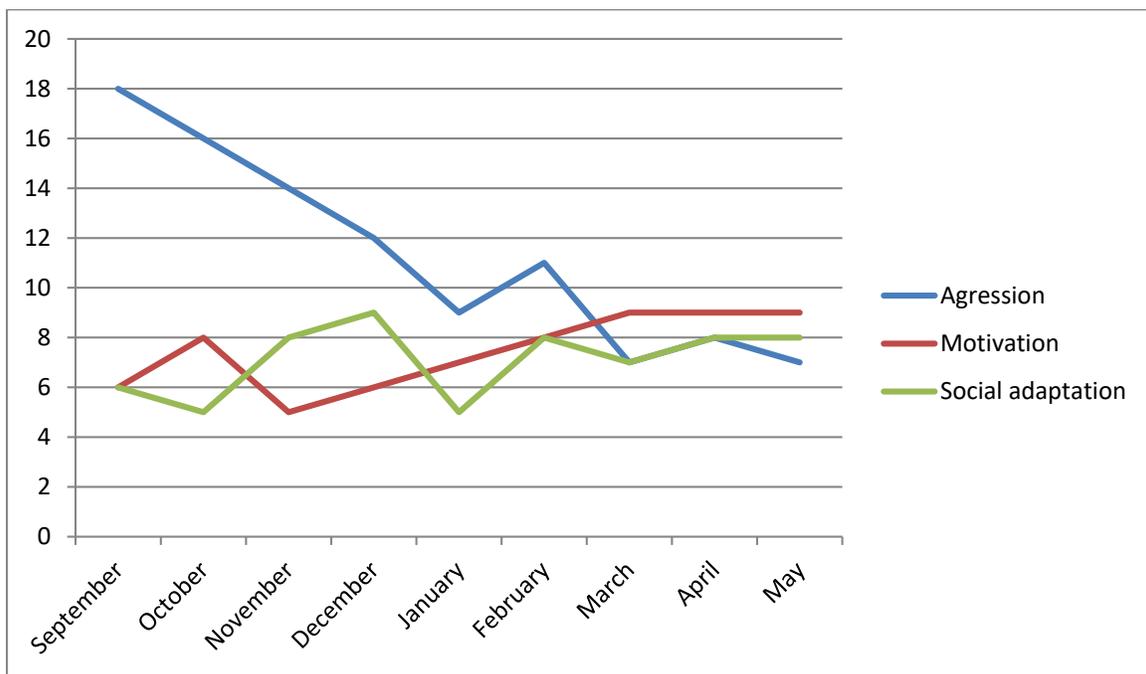


Figure 1. The number of manifestations of aggression, motivation and social adaptation during the year for Taras

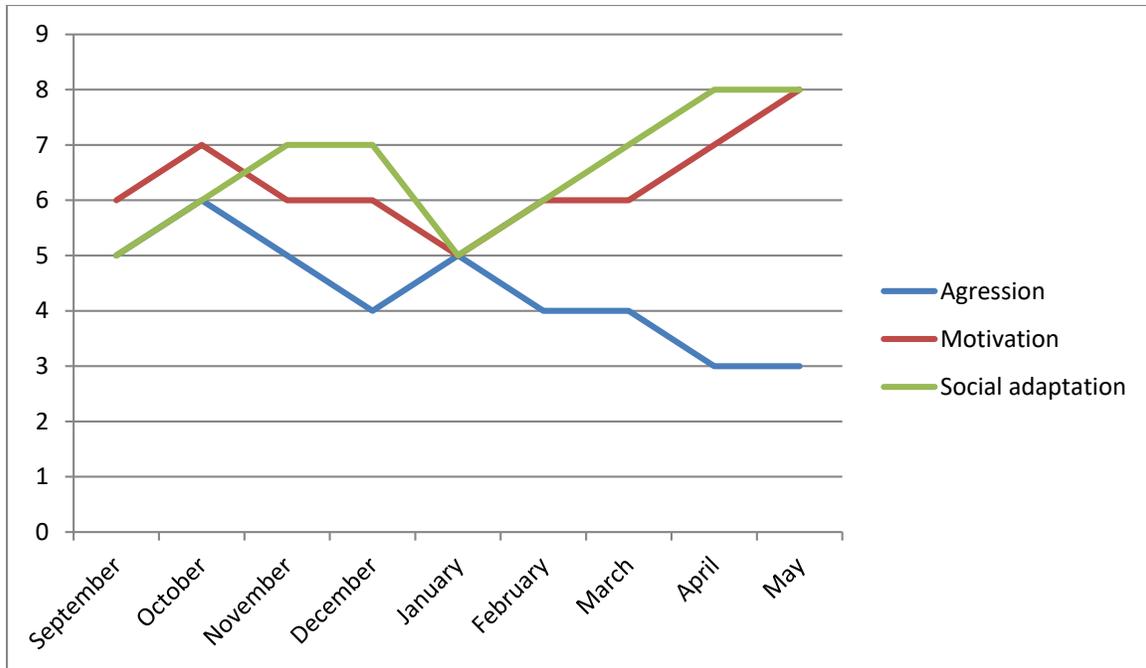


Figure 2. The number of manifestations of aggression, motivation and social adaptation during the year for Oleksandr

In the control class, the psychologist also made detailed measurements of the pupils' behaviour using the method of observation shown in Figure 3 and Figure 4.

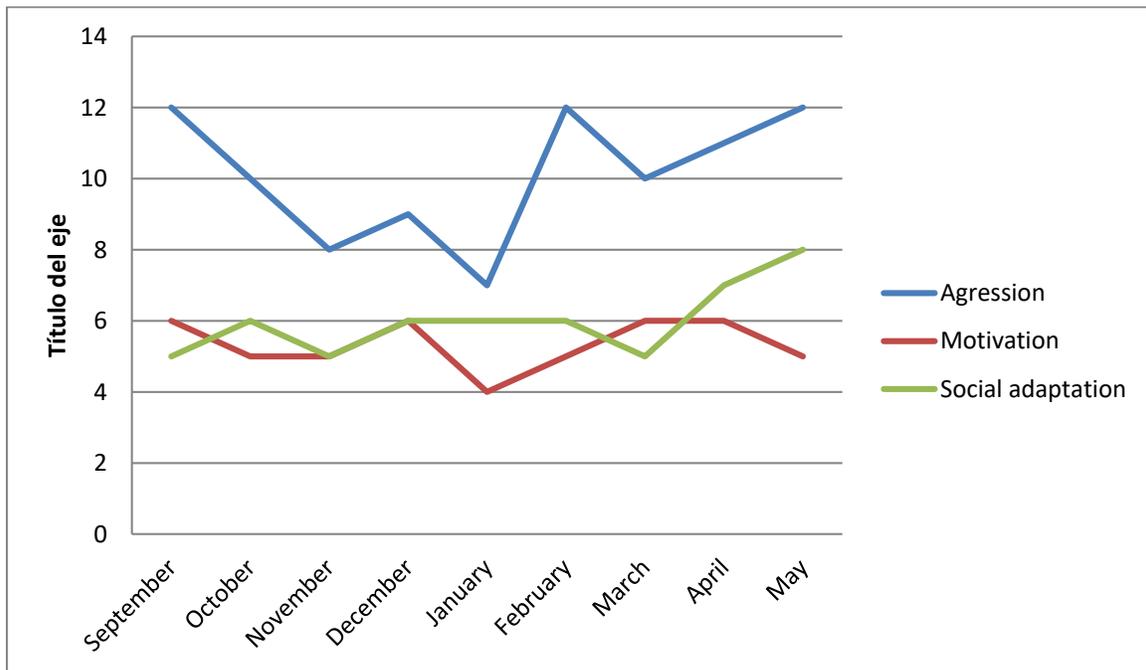


Figure 3. The number of manifestations of aggression, motivation and social adaptation during the year for Hennadii

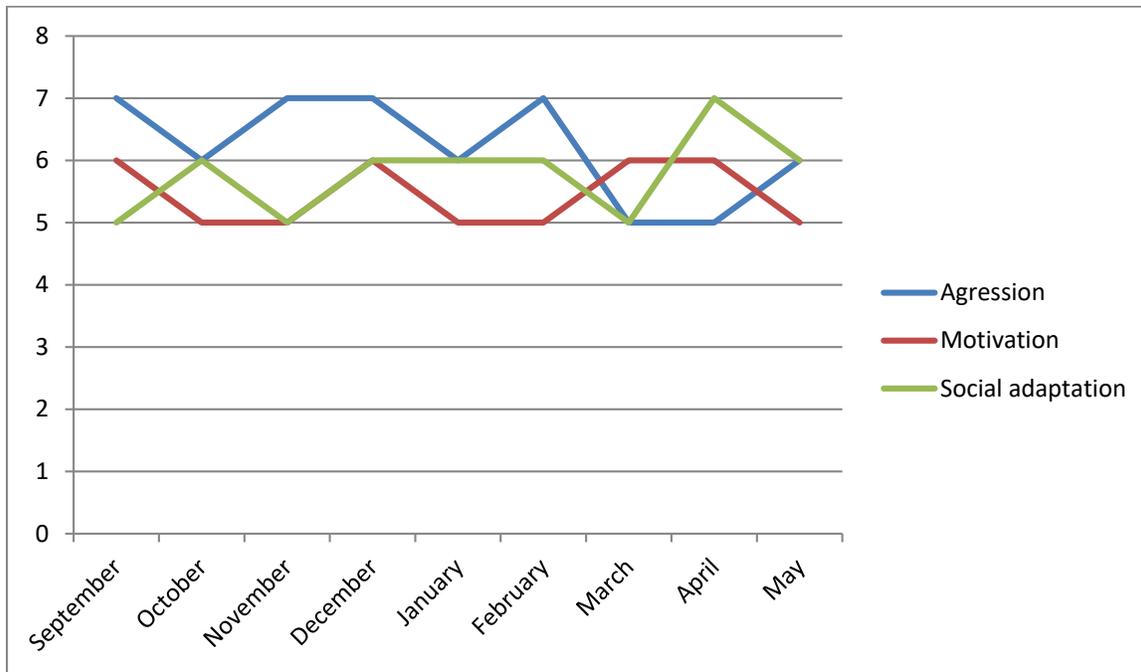


Figure 4. The number of manifestations of aggression, motivation and social adaptation during the year for Arsen

As we can see, Hennadii was recorded more frequent manifestations of aggression than Arsen, who had a slight decrease during the middle of the year and tended to increase at the end of the year. Hennadii also had some increase in the level of social adaptation. In general, the recorded changes were marked by instability and pupils' tendency to regress, which manifested itself in the return to isolated and sometimes aggressive forms of behaviour, uneven motivation to learn.

Discussion

Pedagogical technology of differentiated learning is a practice borrowed from the West, which is widespread in Asia and Eastern Europe, and Ukraine in particular. One of the form of differentiated learning is the corporate training. Ferguson-Patrik (2020) emphasizes the need for cooperative learning, describing the practice of inclusive education in Switzerland and England.

Research on the specifics of teachers' practical experience for its effective application in the framework of inclusive education is actively conducted in the West (Gheysens et al., 2020). The study of foreign experience allows us to analyse the possibility of applying certain principles of differential education in Ukraine. An empirical study of the seven principles of inclusive education among American school teachers has shown that the most widely used methods are also visual graphics and visual aids, which have also become a methodological discovery for Ukrainian teachers.

The experience of implementing differential learning in Singapore finds many points of intersection with our proposed horizontal technology of cooperation between a tutor, practical psychologist and primary school teacher (Strogilos, Lim & Buhari, 2021). The technologies for the implementation of differentiated learning include the use of drawings, additional visualization. It is worth noting that in the process of implementing differential technologies in Singapore, this model of teaching has undergone a number of empirical adaptations, which is not always possible in Ukraine due to stereotypes and reluctance of parents to accept the child's diagnosis and accept an inclusive form of education (Heng & Song, 2021 Reducing the workload and working with children's fear of public speaking, which contributes to increasing anxiety, is also a priority in inclusive education (Nyborg et al., 2020).).

The use of observation diaries made it possible to visualize and compare the changes that took place with students. Analysing the results of the study based on its objectives and hypotheses, we can note the positive impact of differential learning on students with special needs. The joint participation of a tutor, primary school teacher and practical psychologist, as well as the use of differentiated teaching of the material allowed to increase the level of social adaptation and reduce the level of aggression in students of the experimental class compared to the control. Analysing the experience of the experimental study in the school of the Dniproviskyi district of Kyiv, it is fair to say that there was a certain difference in approaches to forms of educational adaptation (Strogilos, Lim & Buhari, 2021). For example, according to the primary school teacher, neat notebook management, sufficient intellectual level of pupils were criteria for assuming no need for inclusion, difficulties with social adaptation, aggression and obsessive behaviours were not considered the ones that require intervention.

The study proved the effectiveness of the introduction of such technologies of differentiated learning as the use of drawings, additional visualization, icons. In contrast to reducing the workload, the priority was to grind the training material while maintaining its total volume. Besides, the practice of children's reluctance to retell the text in front of the class was taken into account, which was replaced by filling the cells with the main components of the plot.

In contrast to foreign experience, in particular the Canadian one, there was a certain misunderstanding of the tutor teacher's role as a new figure in the Ukrainian pedagogical process (Lupart et al., 2006). It is fair to note that the results of such a model has proven its effectiveness by the middle of the school year. It is also important to emphasize the differences between the theoretical assumptions about differentiated learning and the practical implementation of this technology, which has also been proven by foreign studies (Smets, De Neve & Struyven, 2020). The main difficulties were adherence to a particular plan of action and the elements of spontaneity in the learning process. The process of implementing differentiated teaching in Ukraine is still focused on the needs of those who receive it, not taking into account the inclinations of teachers who can diversify the educational process. An empirical study of the seven principles of inclusive education among American schoolteachers has shown that the most widely used methods are also visual graphics and visual aids. A fairly common experience that Ukraine lacks is professional development trainings for teachers engaged in inclusive education (Reagan, 2012). An important factor that is actively implemented in Western inclusive practice, but not always possible in Ukraine is the technological support of inclusive education, namely the availability of resource rooms, sound insulation, general visualization —interactive whiteboards (Crosland & Dunlamb, 2012).

The study had some limitations. Among them are the use of mainly qualitative methods to assess the effectiveness of training of participants in the experiment, which could contain elements of the subjective attitude of the specialist to the participant of the experiment. Another limitation of the study is the lack of methods for assessing the school performance of people with special needs, which would include a wide range of intellectual, social and psychological criteria in order to reach a larger number of respondents. Limitations of the study also include the small sample size due to lack of methodological support. The purpose of the research on the evaluation of the model of differentiated learning by qualitative methods was to identify and describe diagnostic constructs, which will later form the basis of methodological scales for studying the process of inclusive education in Ukraine.

Conclusions

The results of experimental research proved the effectiveness of pedagogical technology of differential learning, which allows solving the problem of inclusive education for children with

special educational needs. The study demonstrated the possibility of effectively combining the efforts of teachers, tutors and the possibility of their productive cooperation. The use of differentiated learning and additional measures of psycho-correctional work allowed having a positive impact on the social adaptation of first-graders, their understanding of the reactions of the environment and their own role in it.

Also, the results of the study showed that the usual pedagogical process is insufficient for pupils with special needs. Expanding the practice of inclusion determines the need in conducting empirical experiments to test the effectiveness of various forms of adaptation of material and evaluation of psychological and behavioural reactions of students in order to further their implementation in wider pedagogical practice. It is also important to emphasize the need to clearly demonstrate the effectiveness of an inclusive learning model for parents of pupils with special needs who do not consider this form of learning acceptable for their children because of the high level of stereotyping.

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