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Rationale for the Invariant Content of Physical Education in the Context of Inclusive Education

Abstract: In recent years, there has been a dynamic increase in the number of students with special educational needs (SEN) in educational institutions. However, as evidenced by the analysis of scientific and methodological literature, anomalies in the physical development of such children remain largely unexplored. This significantly complicates the development of physical education curricula, hinders the effective adaptation and modification of existing educational programs, and prevents the creation of effective individualized development programs for students with SEN. Therefore, to address this issue, there is a need to study empirical data on the physical development of children with SEN and to justify the invariant content of educational programs for this population. During the 2024–2025 academic year, 103 children with special educational needs were examined. The study assessed the level of development of motor coordination, balance, fine and gross motor skills, as well as abnormalities in gait patterns, posture, and the structure of the lower limbs. In addition, medical records and comprehensive assessment reports from the Kremenets Inclusive Resource Center were analyzed. The collected data were summarized in tables, statistically processed using the IBM SPSS software, and visualized through diagrams. The vast majority of students with SEN exhibited deviations in the development of both fine and gross motor skills, as well as impairments in motor coordination and balance. Furthermore, there was a high prevalence of postural disorders, structural defects of the feet, and improperly formed gait patterns. An additional issue is the difficulty in perceiving educational content, particularly instructions and explanations for motor tasks. Based on the data obtained during the study regarding physical development anomalies in learners with special educational needs (including deviations in fine and gross motor skills development, impaired coordination and balance, postural disorders, anomalies in foot structure, and gait abnormalities), a conceptual framework has been proposed for the content of an invariant module within adapted and modified individual educational programs for learners with SEN. This framework encompasses instruction and application of exercises aimed not only at facilitating children’s social integration within the community, but also at enhancing motor activity and addressing the identified physical development deviations across all categories of educational difficulties.

Keywords: inclusive education, physical culture, physical education, special educational needs.

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Обґрунтування інваріантного змісту фізичного виховання у контексті інклюзивної освіти

Анотація: Останні декілька років характеризуються динамічним зростанням у закладах освіти України кількості здобувачів, що мають особливі освітні потреби (ООП). Проте, як засвідчують результати аналізу науково-методичної літератури, аномалії фізичного розвитку серед таких дітей майже не вивчені. Це затрудняє розробку змісту освітніх програм з фізичної культури, стає на заваді ефективній адаптації та модифікації чинних освітніх програм, складанню дієвих індивідуальних програм розвитку здобувачів з ООП. Відтак, для вирішення вказаної проблематики існує необхідність вивчення фактичних даних щодо фізичного розвитку дітей з ООП та обґрунтування інваріантного змісту освітніх програм для таких здобувачів. Впродовж 2024-2025 навчального року було обстежено 103 дітини з особливими освітніми потребами, а саме: рівень розвитку координації рухів, рівноваги, дрібної, загальної моторики, аномалії акту ходи, постави та будови нижніх кінцівок. Крім того, вивчалися медичні документи, висновки Кременецького ІРЦ щодо комплексної оцінки осіб з ООП. Одержані дані узагальнювалися у вигляді таблиць, статистично оброблялися за допомогою комп'ютерної програми IBM SPSS та візуалізувалися у вигляді діаграм. Серед переважної більшості здобувачів з ООП спостерігаються відхилення у розвитку дрібної та загальної моторики, порушення координації рухів та рівноваги. Крім того, виявлено високу поширеність порушень постави, дефектів будови стоп та неправильно сформованого акту ходи. Окрему проблему становить ускладнене сприйняття навчального матеріалу, зокрема пояснень та інструкцій до виконання рухових завдань. На підставі отриманих під час дослідження даних щодо аномалій фізичного розвитку здобувачів з особливими освітніми потребами (відхилення у розвитку дрібної та загальної моторики, порушення координації рухів та рівноваги, порушення постави, аномалії будови стоп та акту ходи) запропоновано концепцію змісту інваріантного модулю до адаптованих та модифікованих індивідуальних освітніх програм для здобувачів з ООП, зміст якого включас навчання та використання вправ не лише для соціалізації дітей в суспільному середовищі, але й для підвищення рухової активності та подолання виявлених відхилень фізичного розвитку для всіх груп освітніх труднощів.

Ключові слова: інклюзивна освіта, фізична культура, фізичне виховання, особливі освітні потреби.

Abbreviations:

IRC is the inclusive-resource centre,

SEN is special educational needs.

Introduction

The issue of teaching and educating children with special educational needs (SEN) is not new to pedagogical science. For a long period, the educational process for this category of learners was carried out in isolation from the mainstream educational environment—mainly in specialised schools or boarding institutions. The prevailing model of such education was primarily aimed at the formation of basic life and elementary learning skills, often without considering the need for socialisation, integration, and the comprehensive development of the child (*Poroshenko, 2019*). At the same time, practice has demonstrated the low effectiveness of this model in the context of the constant increase in the number of children with SEN.

The global educational community responded to the necessity of creating conditions to ensure equal access to quality education for all participants in the educational process (*Hryshchenko, 2024*): in 1994 the Salamanca Statement was adopted (*Yefimenko & Moba, 2022*). In the context of Ukrainian educational policy, inclusive education began to be systematically implemented with the adoption of the revised Law of Ukraine “On Education” (*2017*) and the Law of Ukraine “On Complete General Secondary Education” (*2020*), which established the main legal framework for inclusive learning. At the same time, the Resolution of the Cabinet of Ministers of Ukraine “On Approval of the Regulation on the Inclusive Resource Centre” (*2017*) was passed, defining the mechanisms for specialists’ work on comprehensive assessment and identification of individual educational needs of learners with SEN. This was followed by the Resolutions of the Cabinet of Ministers of Ukraine “On Approval of the Procedure for the Organisation of Inclusive Education in General Secondary Education Institutions” (*2021*) and “On Approval of the Procedure for the Organisation of Inclusive Education in Pre-School Education Institutions” (*2019*).

Such steps by the state represent a logical response to the dynamic growth in the number of learners with special educational needs (*Inclusion..., n.d.; Development..., 2024*). In particular, according to official statistics, in 2019 the number of such children in pre-school and general secondary education institutions amounted to 29,733, while by 2024 it had reached 51,639, indicating an increase of 73.7% (*Statistical data..., n.d.*). This means that as of 2024, for every thousand learners there are approximately 13 children with SEN (1.3%), and this trend is showing steady positive growth. At the same time, the issue of inclusive education from the perspective of psychology, speech therapy, and corrective pedagogy has been widely covered in academic publications. However, the substantiation and rethinking of the content of physical education curricula for learners with SEN, as well as the adaptation or modification of learning material, remain insufficiently explored.

At present, educational institutions, guided by the conclusions of inclusive resource centres, independently carry out the adaptation or modification of standard physical education curricula. Yet, in most cases, such changes are fragmentary, lack a scientifically grounded approach, and often amount to a formal fulfilment of requirements. Moreover, there are no unified invariant (compulsory) components in the content of physical education for learners with SEN, which makes it impossible to ensure systematic and high-quality learning (*Bondar & Melnyk, 2025*).

An analysis of current academic and methodological literature confirms the underdevelopment of this issue. For example, O. Forostian (*2018a*) notes the near absence in

Ukraine of academic research devoted to the organisation and delivery of physical education lessons in inclusive classes (*Forostian, 2018a*). In our previous studies, we also emphasised the difficulties of implementing physical education in inclusive environments within general secondary schools (*Bondar et al., 2024*).

Researchers such as L. Borysenko (*2018*), O. Shukatka, and O. Korzhan (*2022*) draw attention to the prevailing scepticism among specialists regarding the effectiveness of inclusive education specifically in physical education, which is due to the significant variability of motor impairments in children with SEN (*Borysenko, 2018; Shukatka & Korzhan, 2022*). A. Solovey, M. Yaroshyk, and M. Danylevych (*2025*) in their work also emphasise the ongoing debate on the content of inclusive physical education and propose a justification for the content of physical education in general secondary schools for children with autism spectrum disorders (*Solovey et al., 2025*).

In the works of M. Yefymenko and M. Moha (*2022*), the forms and methods of physical development of pre-school children with SEN are systematised, particularly those with musculoskeletal disorders (cerebral palsy, spinal paresis, delayed psychomotor development, etc.). However, the authors do not consider the content of curriculum material that could be integrated into standard educational programmes (*Yefymenko & Moha, 2022; Yefymenko, M. M., 2013*).

N. Horopakha (*2014*) studied certain aspects of organising physical education in inclusive settings, in particular the issues of continuity of learning material and individual forms of teaching. At the same time, as the researcher notes, there is significant inconsistency between educational programmes and their substantive content with regard to the physical education of learners with SEN (*Yefymenko & Moha, 2022*).

Thus, the existence of objective difficulties in the organisation of physical education in inclusive settings, the necessity of incorporating into its content exercises aimed at correcting deviations in the physical development of learners with SEN, together with the insufficient scientific development of the content of educational programmes, determine the relevance of conducting this study. We assume that by identifying and substantiating the most relevant content of the subject Physical Education for learners with SEN, the state of their physical development will be improved.

Therefore, the aim of this study is to substantiate the invariant (compulsory) content of physical education in the context of inclusive learning, based on factual data on the physical development of learners with SEN.

Materials and Methods

During the 2024–2025 academic year, we examined 103 children with special educational needs. The sample represents 22.4% of the total number of learners in the service area (460 individuals) who are registered with the Municipal Institution “Inclusive Resource Centre of Kremenets City Council” (Kremenets IRC). Accordingly, the results are presented with a 95% confidence level and a 7% margin of error ($p=0.5$).

The study involved assessment using standardised tests: motor coordination (finger-to-nose test and straight-line walking), balance (one-leg stance “Crane” test), fine motor skills (the “Fingers Greeting” test), gross motor skills (box test – the child steps into the box and then out

of it again. The tasks are gradually made more complex by increasing the distance to the box and replacing it with a deeper one), gait (pedagogical observation), posture disorders (using a postural chart and child inspection), and lower limb deformities (footprint analysis, Navicular Drop Test). In addition, the child's medical records were examined. The data were recorded in the protocol for assessing the child's physical development. The conclusions of the Kremenets IRC concerning the comprehensive assessment of children with SEN were also studied.

The obtained data were summarised in tables, processed using the IBM SPSS software package, and visualised in the form of charts.

All official representatives signed consent forms for the processing of children's personal data in the state-prescribed format.

Results

As evidenced by the analysis of the specialised literature presented above, children with special educational needs (SEN) face five types of educational difficulties, namely: intellectual, physical, physiological, learning and socio-adaptive (sociocultural) difficulties. These, in turn, are categorised across five levels of educational support (from 1 to 5). However, in this study the distribution of the obtained results by support levels is not provided. The data are synthesised only by groups of educational difficulties, as contained in the official conclusions of the comprehensive assessment of persons with SEN carried out by the Inclusive Resource Centre (*Figure 1*).

The analysis of the results presented in the diagram (*Figure 1*) shows that the largest group of children with SEN are learners experiencing learning difficulties. The second group (around one quarter) of learners with SEN face socio-adaptive difficulties (*Figure 1*). The third group comprises intellectual difficulties, accounting for about one fifth of those assessed. The fourth group (about one sixth) are children with functional difficulties. The smallest, fifth group are children with purely physical difficulties.

In line with the aim of the research, namely to identify invariant (mandatory) physical exercises for the design of adapted or modified educational programmes for learners with SEN, the next step of the study was to determine the most characteristic anomalies in the physical condition of such children, with the purpose of defining the components of the educational programme aimed at correcting physical development and preventing certain impairments. The results of the assessment are provided in the appendix (*Table 1*).

Overall, of the 103 children assessed, half had coordination and balance impairments; over one third had deficiencies in fine motor skills; slightly less than half had deficiencies in gross motor skills; 63.1% had posture problems; more than half suffered from flat feet, valgus-varus deformity of the feet, and in some cases limb shortening, which, as a result, led to gait anomalies in one third of the children; nearly half experienced difficulties in perceiving instructions and motor tasks; and one sixth of those assessed had problems with immunity (*Table 1*). (Given the margin of error in the data, the results concerning immunity formation will not be considered further as insignificant).

Further analysis of the results by groups of educational difficulties revealed that children with intellectual and physical difficulties were the most vulnerable in terms of physical condition (*Table 1*).

Thus, two thirds of learners with physical difficulties had problems with coordination, balance, gross motor skills, spinal deformities, foot structure, and gait. Half of them had fine motor deficiencies, while only a quarter experienced problems with understanding commands and instructions (*Table 1*).

Among learners with intellectual difficulties, 76.2% and 71.4% had, respectively, spinal deformities and movement coordination problems. The majority of such children also faced balance difficulties, anomalies in the structure of the lower limbs, and problems with understanding instructions and commands. About half of the children had deficiencies in fine and gross motor skills. Gait disturbances were observed in two out of five learners (*Table 1*).

The overwhelming majority of learners belonging to the socio-adaptive difficulties group experienced challenges in perceiving tasks and instructions. More than half had gross motor deficiencies, posture disorders, low coordination, and foot abnormalities. Two out of five had balance problems and fine motor deficiencies. One third had gait disturbances (*Table 1*).

Children classified in the functional difficulties group also displayed high rates of posture disorders—about two thirds—as well as problems in perceiving and carrying out tasks and instructions, and in movement coordination. Half had foot structure problems, while two out of five had balance issues. Meanwhile, the proportion of learners with fine and gross motor deficiencies was somewhat lower than in the previous groups—one fifth and one third, respectively. Additionally, one third of those assessed had gait disturbances, a figure similar to that observed in the socio-adaptive group (*Table 1*).

The final group consisted of learners classified as having “learning difficulties”. Among them, high rates of spinal deformities and foot abnormalities were recorded, at 61.8% and 55.9%, respectively. By contrast, only slightly more than one third had coordination and balance impairments, significantly fewer than in the previous groups. However, the proportion of learners with fine and gross motor difficulties was somewhat higher than among the children in the preceding group. Gait disturbances were observed in only one sixth, while difficulties in perceiving and following instructions and tasks were noted in just one tenth of learners (*Table 1*).

At the next stage of the study, we conducted a variance analysis of the obtained data across groups of difficulties relating to physical development disorders in children with SEN (*Figure 2*).

The analysis of the diagram presented in Figure 2 demonstrates that the smallest deviations from the mean values are observed in indicators concerning posture disorders and abnormalities in the structure of the lower limbs (within 10–11%). This suggests that such defects are highly likely to occur in learners with SEN in the proportions presented in this study. Slightly less common (deviation within 12%) are impairments in fine motor skills. Less frequent still (15–17% deviation) is reduced development of movement coordination, balance, and gross motor skills. However, the variance analysis overall confirms the significant impact of the listed anomalies on the physical development of children with SEN as a complex problem.

Based on the data in appendix (*Figure 2*), gait abnormalities occur much less frequently (deviation from the mean of 21.2%). Even fewer children with SEN experience problems with the perception of learning material, tasks, and instructions (deviation of 25.01%).

At the final stage of the scientific substantiation for selecting invariant exercises for adapted or modified physical education programmes for learners with SEN, we carried out a correlation

analysis between the groups of data and compiled a correlation matrix (*Table 2*). The data presented in Table 2 indicate that there is a high correlation between all indicators of physical development disorders as well as indicators of difficulties in perceiving instructions and tasks, ranging from 0.92703 to 0.99969, meaning that all the identified dependencies tend towards 1.

Thus, based on the above, it can be stated with high probability that learners with SEN face a complex problem concerning the formation of their bodies, regardless of the group of educational difficulties. This demonstrates the necessity of developing a unified invariant content for the physical education of such children. In our view, this will contribute to a more effective learning process and the prevention of physical development anomalies.

Discussion

Considering the research findings, it can be stated that the division of children with SEN into groups according to educational difficulties is rather conditional. The obtained data indicate that a learner is assigned to one group of educational difficulties most significant for the individual in accordance with the Regulations on the Inclusive Resource Centre (Resolution of the Cabinet of Ministers of Ukraine of 12 July 2017, No. 545). However, a child may simultaneously exhibit other educational difficulties of varying degrees. For example, a child with intellectual difficulties may also present with physical and other impairments.

Among children with SEN, a significant number of learners have deviations in physical development (deficiencies in fine and gross motor skills, disturbances in coordination and balance). In addition, many children experience postural disorders, foot structure anomalies, and gait abnormalities. This confirms the data in the scientific literature described by M. Yefimenko, A. Solovey, O. Forostian, etc. (*Yefimenko & Moba, 2022; Yefimenko, 2013; Solovey et al., 2025; Forostian et al., 2018b*). Some children also have difficulties in perceiving learning material through explanations and instructions for motor tasks.

Therefore, when designing adapted and modified educational programmes for learners with SEN, it is necessary to introduce an invariant component. Its content should include training in physical exercises that not only increase children's level of physical activity but are also aimed at correcting the above-mentioned anomalies of physical development. The only exception is instruction in proper gait, which should be selected individually for a child if such a developmental defect is present. The same applies to the choice of teaching methods for learners who have difficulties in perceiving and assimilating learning material. For instance, if a child has a hearing impairment—demonstration and sign language are used; weak spatial orientation—assistance of a teaching assistant and various markings on the playground and signs; visual impairment—a system of signals; difficulties in comprehension—a slow demonstration of the exercise with explanation, and so forth.

Conceptually, the invariant content is presented below:

1. Gross motor difficulties

Educational needs of the child—development of gross motor skills, acquisition of motor experience, mastery of basic human movements. Main physical exercises: walking (in a straight line, on heels, on toes, sideways, stepping over obstacles such as a rope or blocks, with a beanbag on the head); running on the spot; jumping (on two feet, on one foot,

forwards, sideways, backwards, from standing); rhythmic exercises; symbolic and active games.

2. Fine motor difficulties

Educational needs of the child—development of fine motor skills, mastery of precise hand movements. Main physical exercises: trays with small balls, Montessori lacing boards, games with buttons and beads (timed and untimed), rolling wooden and rubber balls with the palm on a flat surface, finger gymnastics, finger games.

3. Coordination difficulties

Educational needs of the child—development of movement coordination, formation of movement accuracy. Main physical exercises: standing on one leg with arms outstretched, exercises with closed eyes (standing on tiptoes, bends, head turns), stepping over obstacles (ropes, cushions, small objects), throwing and catching a ball in different ways (with both hands, one hand, over the head), ball dribbling (on the spot, between obstacles), jumping with a ball, arm rotations (bent at elbows, straight), trunk rotations, circular head movements, catching falling objects, throwing objects at a target, drawing exercises.

4. Balance difficulties

Educational needs of the child—development of balance, formation of spatial orientation. Main physical exercises: head rotations with support against the wall, side bends while standing on one leg, “Swallow” pose, balancing on a curved board, exercises on fitballs, crawling through tunnels, passing a ball between players standing on one leg, ball passing from a squatting position, dance exercises.

5. Postural difficulties

Educational needs of the child—correction of posture, strengthening of spinal muscles. Main physical exercises: pelvic lifts in a supine position, “Cat” exercise, “Plank” exercise, wall bar exercises, forward bends from sitting and standing positions, breathing exercises.

6. Foot structure difficulties

Educational needs of the child—prevention of flat feet, strengthening of lower limb muscles. Main physical exercises: foot rotations, walking on the spot—on different parts of the foot, rising on tiptoes, walking on the inner and outer edge of the foot, picking up pencils with toes, self-massage of the feet, walking on a massage mat.

The obtained results are not final. To study the issue of developing physical education programmes for learners with SEN more thoroughly, a broader, similar study should be carried out in different regions of Ukraine. Moreover, based on the findings of this work, there is a need to develop and pilot an invariant module of the educational programme for learners with SEN, followed by the collection and processing of experimental data.

The data obtained will also be of practical use to physiotherapists in determining the content of therapeutic physical education for such children.

Conclusion

Thus, the study of the results of the assessment of learners with special educational needs (SEN) has enabled us to draw the following conclusions:

1. The findings of the study confirmed the presence of a considerable number of children with SEN who have impairments in physical development. The most common are delays in fine

and gross motor skills, disorders of movement coordination and balance, postural defects, abnormalities in the structure of the feet and gait disturbances. At the same time, these issues are not dependent on the group of learning difficulties. Accordingly, the problem of deviations in the physical development of such children should be regarded as complex, and the ways of addressing it should be approached through a unified, systemic strategy. A separate challenge lies in the difficulty of perceiving learning material, particularly explanations and instructions for performing motor tasks, which requires additional pedagogical support. The results obtained provide a more profound understanding of the content of physical education for learners with SEN and allow for a conceptual improvement of physical education curricula.

2. It has been proposed to include compulsory invariant content in the individual (in particular, adapted or modified) educational programmes for learners with SEN. This content should provide for the teaching and use of physical exercises aimed not only at facilitating the socialisation of such children in a community environment, but also at increasing their level of motor activity and promoting the correction of physical developmental impairments identified in conclusion 1. At the same time, it is important not only to adapt or modify the content of educational programmes, but also to carefully select teaching methods, taking into account the individual characteristics of instruction perception and the ability to perform motor tasks. The specified methodological approaches must be integrated into the individual development programme of each child with SEN.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Appendix

Table 1. Summary data of the assessment of children with special educational needs regarding physical development by educational difficulties ($p = 0.05$)

Difficulties / Physical characteristics	Impairments of movement coordination, %	Balance deficiencies, %	Difficulties in understanding tasks and instructions, %	Fine motor skill impairments, %	Gross motor skill impairments, %	Postural defects, %	Abnormalities in lower limb structure, %	Gait abnormalities, %	Weak immunity, %
Total children examined (n=103)	52,4	51,5	44,7	35,9	46,6	63,1	56,3	31,1	15,5
Of these:									
Intellectual difficulties (n=21)	71,4	66,7	66,7	47,6	57,1	76,2	66,7	38,1	9,5
Physical difficulties (n=4)	75	75	25	50	75	75	75	75	50
Functional difficulties (n=18)	50	44,4	55,6	22,2	33,3	61,1	50	33,3	16,7
Learning difficulties (n=34)	38,2	38,2	11,8	29,4	35,3	61,8	55,9	17,6	20,5
Socio-adaptive difficulties (n=26)	53,8	42,3	65,4	42,3	57,7	53,8	50	34,9	7,7

Table 2. Correlation Matrix of Physical Development Anomalies in Students with Special Educational Needs

	1	2	3	4	5	6	7
1 Movement coordination disorders							
2 Balance impairments	0,99910						
3 Difficulties in performing tasks and following instructions	0,96693	0,96727					
4 Fine motor skill impairments	0,99504	0,99771	0,95627				
5 Gross motor skill impairments	0,99523	0,99844	0,96458	0,99880			
6 Postural disorders	0,99144	0,99006	0,92866	0,98803	0,98522		
7 Lower limb structural abnormalities	0,99106	0,99058	0,92703	0,98992	0,98703	0,99969	
8 Gait disorders	0,99472	0,99452	0,97846	0,98675	0,99153	0,97774	0,97737

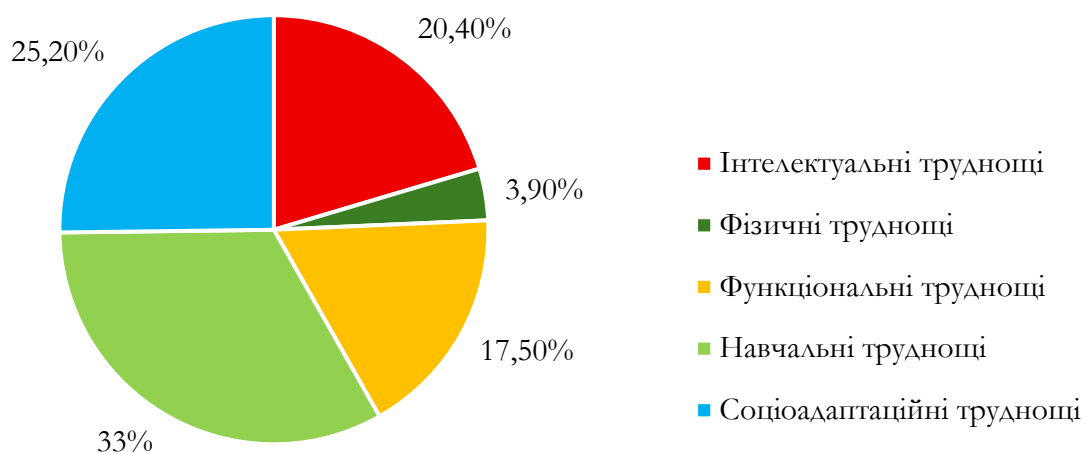


Figure 1. Number of children with special educational needs by groups of learning difficulties (In Ukr.)

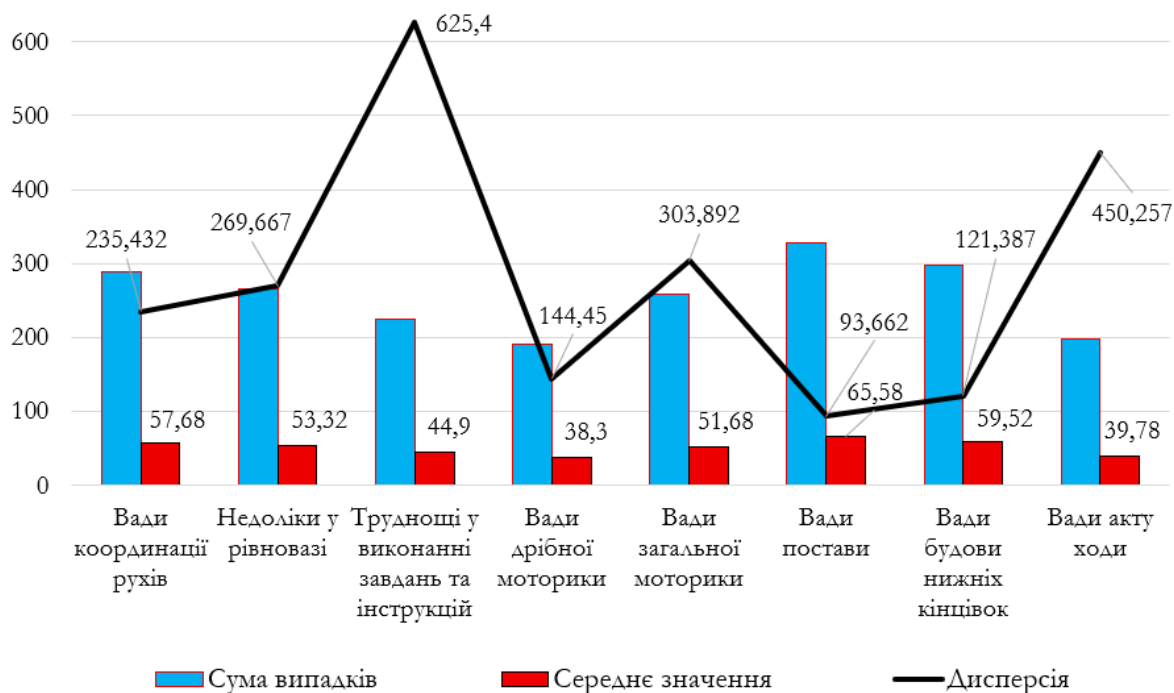


Figure 2. Data on the standard deviation from the mean values according to educational difficulties (In Ukr.)