



THE EFFICIENCY OF INTEGRATED AND SEGREGATED PHYSICAL EDUCATION CLASSES FOR SECONDARY SCHOOL STUDENTS WITH PHYSICAL AND MENTAL DISABILITIES AND POOR FITNESS

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ABSTRACT

Purpose. The aim of our investigation was to establish the efficiency of the integrated physical education classes for schoolchildren with minor deviations in health. **Methods.** Sociological (questionnaire), biomedical, pedagogical (testing), psycho-diagnostic, and mathematical statistics. Pupils ($N = 1417$) of secondary school (both sexes, 5th–9th forms, i.e. aged 10–15) were examined. **Results.** The characteristics of physical and mental development in the process of integrated physical education proved to be significantly better for different sex and age groups. Analysis of physical fitness characteristics shows that integrated physical education classes turned out to be more effective for schoolchildren with minor health deviations than for apparently healthy students. Integrated physical education classes are more effective for students' dexterity than for their power endurance. Integrated physical education classes are more effective for female students than for male ones; for schoolchildren with minor health deviations in older age groups (7th–9th forms) than for younger schoolchildren. Those schoolchildren who attended integrated physical education classes expressed significantly better attitudes to physical education than their peers who studied in a segregated environment. **Conclusions.** Integrated physical education classes are a more progressive and effective form of physical education in terms of their beneficial effect upon the physical and mental development of secondary school children with minor health distortions.

Key words: inclusive physical culture, pupils, health groups

Introduction

The concept of integrated education has lofty aims and noble tasks though often counteracted by a whole range of negative tendencies causing an inevitable decrease in education level and developing in healthy students the feeling of being “neglected”, the so called “integration fatigue” (anxiety and aggression of some children against their disabled peers), and the like [1–4]. Major problems occur during physical training lessons (PT), when discrepancy in physical capabilities of schoolchildren manifests itself to its utmost. Integrated education has been gradually introduced in the Ukrainian educational institutions since 2001. Nevertheless physical training teachers often fail to show interest in introducing new educational modes [5–8]. Introduction of common integrated physical training lessons for students whose physical and mental characteristics do not deviate considerably might create an effect of preconditioning for innovations in those educational institutions that strive for integration.

Since scientists express conflicting views on practical verification of the inclusive physical education model, it seems necessary to check the effect of integrated physical education upon schoolchildren with minor psycho-physical abnormalities and rather poor physical fitness. Thus the aim of our investigation was to determine the efficiency of the integrated physical education classes for schoolchildren with minor deviations in health.

Material and methods

The experimental group (EG) included secondary school students following the integrated program. Physical education classes in such schools were conducted for children with different levels of psycho-physical abilities simultaneously (with individualization of tasks based on the needs and abilities of each child). The control group (CG) was comprised of students of those secondary schools in which physical education classes were conducted separately for healthy students and for those with minor psycho-physical deviations and rather poor physical fitness (differences between groups are presented in the form of table [5]). Nine secondary educational establishments were involved in the investigation. Secondary school students from 5th to 9th forms (aged 10–15 years), $N = 1417$, took part in the research. The number of EG students amounted to 694 (320 girls and 374 boys). CG numbered 720 students (332 girls and 388 boys). Each age-sex subgroup numbered at least 20 people.

Socio-psychological characteristics of schoolchildren were established by means of a questionnaire developed by Bodnar, Andres and Tymkovich [6]. The survey was conducted to find out the children's favorite types of locomotor activities during PE classes and out of school, the most enjoyable organizational forms of physical education, their most common harmful habits, their attitudes towards physical education and standardized characteristics of physical fitness. In order to determine the amount of physical activity performed by students, the Framingham method was used. The timekeeping measurements were taken by schoolchildren themselves

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within one day in the course of one week (on Tuesday, Wednesday or Thursday) from December to February. Individual characteristics of physical activity volume (measured in points) and students' energy expenditures have been computed. Physical developmental quotients were measured according to accepted standards; integrated parameters, like age-and-weight Quételet index, were calculated. Physical fitness was determined by means of exercise test pack. Mental development characteristics were studied with the help of traditional psychodiagnostic methods (Spielberg-Khanin's method of HAM: health, activity, mood; tapping test, Seashore's Group Cohesiveness Index and V.A. Rozanova's method of group motivation for success) [7]. Parametric and non-parametric methods of mathematical statistics have been applied. To determine the extent of differences among group characteristics, the proportion comparison method was applied ("Statistics" routine).

Results

According to the research, the range of locomotor activity of domestic nature, like helping parents with housework, was significantly higher ($p < 0.01$) in EG schoolchildren in comparison with those of CG. The higher range of EG locomotor activity in EG students confirms higher efficiency of integrated physical education (PE).

Analysis of the students' social-and-psychological characteristics allowed us to claim that EG children were more active computer users ($p < 0.01$). Whereas CG schoolchildren (healthy students by 7.8%, $p = 0.05$ and secondary school students with minor health problems by 31.8%, $p = 0.07$) more often spent their free time reading educational literature and fiction as well as visiting museums and exhibitions ($p < 0.05$). EG students often seem to use the Internet resources while doing their homework. The use of modern means and sources of information by EG students is clear evidence of their higher mobility, quick readjustment skills, ability to use time more efficiently, progressive thinking qualities and rapid development in terms of integration. EG students eventually show a comparatively stronger need for communication aroused due to mutual task solution during PE classes, whereas their peers from CG behave in a more humble manner, executing teacher's commands and instructions. It is highly probable that as a result of prevailing need for cooperation EG students express their preference to outdoor games more often ($p < 0.001$) than CG children. EG schoolchildren have chosen more fashionable recreational games among youngsters compared to CG students. Secondary school students with minor health deviations (by 45.5%, $p < 0.05$) prefer playing billiards and bowling, whereas healthy children enjoy rope skipping (by 5.6%, $p = 0.01$), thus confirming the fact that young students who have studied in segregated physical education classes possess more progressive views.

Analysis of socio-psychological characteristics has shown that schoolchildren with different health status in terms of their attitude to physical education classes demonstrate significant differences. The number of EG schoolchildren who fully enjoy all the components of physical education classes was higher (among those with minor deviations by 14.8%, in convalescent by 31.3%, $p < 0.001$, and in healthy students by 18.0%, $p = 0.001$). In the case of EG students with minor health problems these values compared to their CG counterparts were close to significant ($p = 0.06$). EG students exhibited relatively stronger tendency towards a desirable quantity of physical education classes per week (3.75 classes on average) than CG students (3.28 classes). This tendency was proved statistically significant ($p < 0.05$). Such attitude might well be explained by the fact that the students who attended segregated physical education classes expressed less interest, joy and enthusiasm than their peers who practiced physical education on an integrated basis. Healthy students who attended integrated physical education classes accepted the idea of taking physical fitness tests with approval ($p < 0.05$), whereas the attitude of schoolchildren with minor health deviations who attended either integrated or segregated PE classes did not differ. Significant differences in socio-psychological characteristics of schoolchildren from both groups allowed us to claim that those students who attended integrated PE classes showed probably a better attitude to physical training than those attending segregated classes. Moreover, CG students missed PE classes by far more often (by 9.2%, $p < 0.05$) compared to their EG peers, thus demonstrating less enthusiastic attitude to physical education.

Comparison of schoolchildren health complaints in view of their level of health indicated that differences in emotional state were observed in healthy students from both EG and CG groups. CG students were complaining of groundless mood changes, anxiety and irritation more often than EG students (by 17.3%, $p < 0.01$). The very fact of breakup with friends studying in segregated conditions might cause negative changes in neuropsychiatric state of those students. Another reason for negative mood changes might be unfavorable ambience of segregated lessons for healthy students, which might lead to frustration.

Our study found that according to physical development characteristics the integrative model of conducting PE classes proved to be more effective ($p < 0.05$), since the number of significantly higher characteristics in each sex and age EG subgroup was larger than in respective CG subgroups (Table 1).

Our study has shown that in view of physical development the integrative physical education contributes to more positive changes in healthy schoolchildren (43.6%) and in convalescents (50.9%) than in schoolchildren who have minor health problems (21.6%). Hence the apprehensions of experts concerning low efficiency of PE classes

Table 1. The percentage of significantly higher physical fitness characteristics displayed by the experimental (EG) and control group students (CG)

Groups	Apparently healthy students		Convalescents		Students with minor health problems		Total
	girls	boys	girls	boys	girls	boys	
EG	23.6	20.0	23.6	27.3	18.0	3.6	19.4*
CG	16.3	7.3	18.2	18.2	9.1	12.7	13.6

* differences between EG and CG are significant at $p < 0.05$

Table 2. The percentage of significantly higher results of physical fitness of the experimental (EG) and control group students (CG)

Groups	Apparently healthy students		Convalescents		Students with minor health problems		Total
	girls	boys	girls	boys	girls	boys	
EG	2.9	1.0	5.7	10.5	8.6	3.8	36.2*
CG	4.8	8.6	4.8	7.6	4.8	5.7	32.4

* differences in EG and CG are significant at $p < 0.05$

for physical development of students with sound health proved to be wrong.

Summarizing physical fitness characteristics of schoolchildren from different health groups it was found that the total sum of significantly higher results of the students' physical fitness in the integrative and segregative conditions was virtually identical (32.4% in EG and 36.2% in CG). Nevertheless, the number of healthy students who displayed stronger results was larger in CG (13.4% vs. 3.9%, $p < 0.05$, see Table 2), besides significant advantages in the number of stronger results of physical development displayed by convalescent schoolchildren (16.2% vs. 12.4%) and against the students with minor health problems (12.4% vs. 10.5%) from EG. Thus the results of the study enable us to claim that judging by physical fitness characteristics integrated physical education is more effective for schoolchildren with minor health deviations, whereas physical education classes with separate subgroups are more preferable for healthy students. Hence integrated PE classes conducted jointly with children with minor differences in physical and mental development confirmed the predictions of experts who accentuated upon low potential of integrated physical education classes for physical fitness improvement of healthy schoolchildren. This issue does not conflict with the information [2] about ineffectiveness of integrated PE classes for healthy students in terms of their physical fitness improvement since the changes introduced by the author applied not only to PE classes but also to out-of-school activities. To ensure sufficient improvement of physical fitness in the integrated PE classes, healthy schoolchildren should attend extra fitness classes or sports groups practicing certain kinds of sport.

It was found that EG students, both males and females demonstrated significant ($p \leq 0.01$ – 0.001) ad-

vantages in the development of agility ("10 eights" exercise and Romberg's test). Agility is gaining in importance in the contemporary society, becoming especially significant for mastering modern occupations. It also determines the speed of cognitive operations, helps people to adjust to variable life circumstances. These factors enhance the social significance and advantages of the experimental management of PE classes.

But often significantly lower results ($p < 0.05$ – 0.001) (in comparison with the students of sex and age CG subgroups) have been observed in EG students in terms of power endurance performance (for legs, abdomen, arms and upper back). Power endurance is an essential physical quality which affects students' efficiency. Taking into account the exceptional health-improving importance of power endurance and in view of low characteristics of this quality in CG students observed during the research while conducting integrated PE classes for students of both groups, it would be worthwhile to recommend physical education teachers increasing the volume of physical endurance exercises for schoolchildren.

It was found that in performance of certain exercises students of different sexes reacted to the changed form of physical education classes in a different way (see Table 2). This means that integrated physical education led to more positive changes in female physical fitness, whereas in males slightly higher growth rate of physical fitness was observed during segregated physical education classes.

Another factor that determines the efficiency level of a physical education class model is the student's age. Thus among 5th–6th form CG students there were more groups of schoolchildren who came in with better results (21 vs. 13) than among EG students, whereas among 9th form students there were more EG children with significantly higher results than in CG (8 vs. 3). It was found

Table 3. The percentage of significantly higher mental state characteristics of experimental (EG) and control group students (CG)

Groups	Apparently healthy students		Convalescents		Students with minor health problems		Total
	girls	boys	girls	boys	girls	boys	
EG	6.7	13.3	10.0	26.7	16.7	16.7	15.0**
CG	0	2.0	10.0	10.0	3.3	0	5.0

** differences between EG and CG are significant at $p < 0.01$

that integrated physical education is more effective for 12–15-year-old schoolchildren with minor health disturbances, whereas segregated physical education is more beneficial for 11–13-year-old apparently healthy schoolchildren.

Summarizing the results of mental development analysis of schoolchildren it should be mentioned that the ambience during integrated physical education classes conduces to more favourable psychological conditions for students. The number of higher mental development characteristics was significantly higher ($p < 0.01$) in all sex, age and medical subgroups of EG (15.0% vs. 5.0%, see Table 3).

In those forms where physical educated classes for students with different health status were carried out jointly, the number of students with a high level of personal anxiety was lower ($p < 0.05$) compared with those forms where physical education classes were conducted separately. EG students had an average and high level of personal anxiety. The level of personal anxiety was higher in CG students thus testifying to the fact that CG students interpreted various situations as precarious for their self-esteem, honor, competence and authority. The widest discrepancies in personal anxiety characteristics were observed between CG and EG students with minor health problems. The schoolgirls of 5th and 9th forms ($p < 0.05$), the 9th-form schoolchildren ($p \leq 0.05$) with minor health disturbances as well as students-convalescents of 5th and 6th forms ($p < 0.05$ – 0.01) from EG showed significantly lower characteristics of personal anxiety compared with CG students. Obviously the functionally disabled schoolchildren during joint PE classes are not afraid that their relatively more physically efficient peers might undermine their prestige. Thereby integrated physical education, contrary to segregated one, can by no means jeopardize mental health of the students with minor health distortions and cannot cause any further psychoneurotic reactions.

Analysis of wellbeing, activity and mood characteristics confirmed the advantages of integrative physical education model because CG schoolchildren showed significantly lower characteristics than EG students. Students-convalescents from EG significantly more often showed higher characteristics of “wellbeing” and “mood” subscales, whereas the students with minor health distortions turned to be more “active”. Hence it became

possible to claim that students-convalescents who studied in integrated conditions together with children with other health statuses showed stronger subjective feelings of physiological or psychological comfort compared with those students who had physical education classes separately. Students-convalescents who attended integrated PE classes revealed more favourable emotional response to real situations, events, means and methods of physical education in terms of promising life programs, plans, interests and expectations. Those schoolchildren with minor health problems who attended integrated PE classes were more vigorous, initiative and active compared with those who exercised separately from their peers with better health status and physical fitness. This means that for schoolchildren with minor health distortions integrative physical education is more psychologically comfortable than segregative education. Integrative environment enhances the intensity and scope of human interaction with physical and social surroundings for schoolchildren with reduced mental and physical abilities.

Those schoolchildren who studied in integrated environment of physical education classes possessed higher level ($p < 0.001$) of cohesion. Contrary to CG students, none of EG students considered the level of group cohesion as middling. During joint physical education classes the schoolchildren with minor health disturbances felt part of a whole group of mates, which explains why those children from EG more often assessed the degree of cohesion as higher. It is necessary to mention that the group cohesion created within a form was rated lower by children-convalescents than by schoolchildren with minor health disturbances. Not a single subgroup of CG students considered their class solidarity above average. Thus we can conclude that in segregated settings of PE classes the students-convalescents suffer from a lack of the teacher’s attention and do not feel involved in educational process.

Discussion

Scientific studies often analyze social, emotional and behavioral advantages of integrative education for schoolchildren with health distortions [9, 10], benefits in academic achievements [11]. Other studies examine changes in motor characteristics of schoolchildren in integrated environment of education [12, 13]. Characteristics of

physical development have been less investigated. There is a lack of empirical data on integrated education effects upon physical fitness characteristics.

Another study showed that those schoolgirls who attend single-sex classes exhibit higher level of belligerency compared to those girls who study in a co-educational environment [14].

The majority of scientific studies proved the efficiency of integrated education for schoolchildren with high morbidity level [14–18]. The influence of integrated education upon the students with minor health problems still needs further investigation.

Our study has demonstrated advantages of integrated education for physical fitness of the apparently healthy students and students-convalescents (38% and 44% respectively against 19% for the students with minor health distortions). Hence the apprehensions concerning little effectiveness of integrated physical education classes for apparently healthy schoolchildren proved to be wrong.

The results of our study make it possible to assert that integrated education exerts more positive effect upon physical fitness characteristics of the students with minor health disturbances, whereas segregated physical education classes for apparently healthy students are more preferable. Thus integrated PE classes conducted jointly with children who had minor differences in physical and mental development confirmed the predictions of experts who accentuated upon low potential of integrated physical education classes for physical fitness improvement of healthy schoolchildren. This issue does not conflict with the information [2] about ineffectiveness of integrated PE classes for healthy students in terms of their physical fitness improvement since the changes introduced by the authors applied not only to PE classes but also to out-of-school activities. To ensure sufficient improvement of physical fitness in the integrated PE classes healthy schoolchildren should attend extra fitness classes or sports groups practicing certain kinds of sport.

It should be pointed out that the major discrepancies have been observed between the results of personal anxiety of EG and CG students who had minor health discrepancies. The 5th and 9th form girls ($p < 0.05$) and the 9th form schoolchildren with minor health problems ($p \leq 0.05$) as well as the 5th and 6th form students-convalescents ($p < 0.05-0.01$) from EG showed much lower characteristics of personal anxiety compared with CG students.

Characteristics of personal anxiety in CG students were significantly higher than in EG students. The higher level of anxiety in the students with minor health problems has been also observed by other scientists.

Conclusions

The characteristics of physical and mental development in the process of integrated physical education proved to be significantly better ($p < 0.05-0.01$) for dif-

ferent sex and age groups. Analysis of physical fitness characteristics permits us to admit that integrated physical education classes turned out to be more effective for schoolchildren with minor health deviations than for apparently healthy students. Integrated physical education classes are more effective for students dexterity than for their power endurance. Integrated physical education classes are more effective for female students than for male ones; and for schoolchildren with minor health deviations in older age groups (7th–9th forms) than for younger schoolchildren.

Those schoolchildren who attended integrated physical education classes have significantly better attitude to physical education than their peers who studied in a segregated environment. Integrated physical education enhances the development of such essential personal qualities as: responsibility, ability to cooperate, sensitiveness, communication, mobility of thinking processes etc. It has special psychological comfort for the students with minor health problems.

Segregated physical education classes caused anxiety and increased excitability, irritability, nervousness and bellicosity. Hence segregative physical education might bear latent threat to students' mental health.

Therefore integrated physical education classes are a more progressive and effective form of physical education in terms of their positive effect upon physical and mental development of secondary school children with minor health distortions.

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