

Original Article

**Effect of the Content Standard for Changing the Level of Knowledge of
Secondary School Students**

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Abstract:

The aim of the study was to extend the knowledge about the impact of selected components of module "Healthy lifestyle", during the Physical education and sports (P.E. & Sports) lessons on changes in the level of knowledge about health, in the group of secondary school students. Experimental selections consisted of students attending 2nd year of secondary school in the city Nováky (n = 71, age = 16.34, height = 171.8 cm, weight = 62.1 kg), who were chosen intentionally. To obtain the research data we applied didactic testing. Through the application of the experimental agent in the form of a specific educational program, based on selected components of content standard, we found a significant difference between the ES and CS1 (Chi = 29.29, p<0.01) and between ES and CS2 (Chi = 18.81, p<0.01) in the area "Importance of health oriented exercise". Significant change in this area were recorded in the ES (Chi = 9.75, p<0.01) as well. We have also seen significant changes in "Health disorders" in the ES (Chi = 14.21, p<0.01). In the health risks we observed a significant difference between the ES and CS2 in "Regular physical activity" (t = 3.226, p<0.01).

Key words: knowledge, physical education and sports, pupil, health.

Introduction

Health is a multifunctional concept of the nature, meaning and essence which are deeply hidden in person's being. That is also reflected in the ancient documents, raising the unity of body and soul, in terms of its irreplaceability and uniqueness. Understanding the philosophy of health, which currently requires a lot of effort with regard to the possibilities and pitfalls that are offered by the 21st century consumer life of today's modern society. Hypokinesia as a social phenomenon and, in some cases, even inactivity weakens health; it reduces functional ability, adaptability and mental well-being of the human body. From the mentioned above the creation of man's relationship and personal responsibility for own health can be influenced together by family and the physical and sports education in the lives of children and young people (Rozim, 2005; Štulajter, 2007; Ihász & Rikk, 2010; Chovanová, 2011, 2013; Cardon et al., 2012; Labudová 2012; Dobay, 2015; Novotná & Slovákova, 2015; Bendíková, 2016; Ghyppo, Tkachov & Orlenko, 2016). Physical and Sports Education has undergone in the last decade in Slovakia the process of innovation and transformation (2008), whose objectives were to improve the quality of teaching and influence the education and training of students of all school levels, not only physically, but also through the acquisition of theoretical knowledge as the basis for successful selection of sports with application in individual exercise regimen at present and in the future as well. Currently, the educational area "Health and Movement" of that school subject allowed schools and their students actively and systematically support the primary care of their health and seek means of education for lifelong physical activity (Antala & Labudová, 2008; Nemček, 2008; Labudová & Nemček, 2009; Bendíková, 2011; Labudová, 2012; Labudová, Nemček & Antala, 2012; Oršulová, 2014; Fyodorov & Erlikh, 2016; Gontarev & Kalac, 2016). It is shown that the objective of physical and sports education significantly departed from performance-based teaching towards developing skills of students and formation the values, interests and attitudes towards physical activity. The goal of the research was to broaden the knowledge of the impact of applying the selected components from the content standard module "Healthy Lifestyle" within the teaching the Physical Education and Sports to changes in the level of secondary school students' knowledge.

Method

Subject characteristics

Experimental selection consisted of students attending 2nd year of secondary school in the city Nováky (n = 71, age = 16.34, height = 171.8 cm, weight = 62.1 kg), who were chosen intentionally (Table 1). Distribution of students in the experimental and control files was based on their study program. The experimental selection (ES; n = 23) consisted of students attending an eight-year grammar school (class Sexta), control group 1 (CS1) consisted of students attending 2nd year of general study program (CS1; n = 26) and control group 2 (CS2; n = 22) consisted of students attending 2nd year in study programs Nutrition and Sport, Biotechnology and Pharmacology.

Table 1 Subject characteristics (n = 71)

Sample/ Gender	Boys (n)	Girls (n)	Σ	Age	Height/cm	Weight/kg	BMI
ES	17	6	23	17.2	173.8	62.2	20.5
CS1	5	21	26	17.5	170.4	57.6	19.7
CS2	11	11	22	17.4	171.3	66.5	22.5
x				17.1	171.8	62.1	20.9

x- arithmetic mean, n – amount, Σ – SUM, BMI – Body mass index

Measurement organisation

Main research method was pedagogical experiment, which lasted from 28/04/2014 to 20/06/2014. Experimental program was realised during the P.E. & Sports lessons and through the information boards, available as a visual stimulus in ES classroom. Theoretical training (t = 5min) was conducted in the introductory part on 16 lessons, together in the range of 80 minutes, which represented 11% of the total minute's subsidy of P.E. & Sports lessons, in the second half of the school year. 10 lessons were combined with theoretical teaching about effects of health-oriented exercises and practical teaching of technique; the other six lessons were part of actual thematic units. Experimental selection passed following thematic areas: gymnastics, track and field, and diagnostics of general physical performance and in the context of theoretical education Olympism. Control selections (CS1, CS2) passed ongoing thematic units, within a total of 16 lessons. P.E. & Sports lessons in ES had following structure:

10 lessons (t = 45 min) with the experimental theoretical program under the guidance of P.E. & Sports teacher, based on the prepared materials for theoretical training (t = 5 min, in the introductory part of the lesson) and the acquisition of basic knowledge, technique and effects of health oriented physical activities (stretching exercises, breathing exercises and yoga, Pilates Exercise System, Nordic walking and aquafitness):

1. specific training program composed of selected components of the content standard in module "Healthy Lifestyle" with the concentration on:
 - theoretical and practical incentives about healthy lifestyle, risks of a healthy lifestyle and exercise regimen management,
 - theoretical incentives about health, effects of physical activity on health, somatic characteristics of health,
 - nutrition and drinking regimen,
2. general warm up led by the P.E. & Sports teacher (t = 10 min),
3. information about selected health-oriented physical activity (under our guidance) (t = 5 min).
4. practical training of selected health-oriented physical activity (under our leadership with the active participation of students) (t = 25 min).

6 lessons (t = 45) with the experimental theoretical program under the guidance of P.E. & Sports teacher based on our prepared materials (t = 5 min, in the introductory part of the lesson):

1. Specific training program was based on selected components of a content standard in the module "Healthy Lifestyle" with the concentration on:
 - theoretical and practical incentives about healthy lifestyle, risks of a healthy lifestyle and exercise regimen management,
 - theoretical incentives about health, effects of physical activity on health, somatic characteristics of health,
 - nutrition and drinking regimen,
2. general warm up led by the P.E. & Sports teacher (t = 10 min),
3. P.E. & Sports lesson within the current thematic unit (under the guidance of P.E. & Sports teacher (t = 25 min).

Measurement taking

To obtain the research data and results we applied didactic testing based on basic knowledge, technique and health effects of health-oriented physical activity. Didactic testing included dichotomous – n. 1, 3, 6, 8; open – n. 5, 7, 9, 10 and visual – n. 2, 4; questions.

Data Analyses

The obtained qualitative and quantitative data were processed by mathematical statistics, using the percentage frequency analysis, arithmetic mean, Chi - square test and t - test of two relative values ($p < 0.01$, $p < 0.05$), using inductive and deductive methods, as well as analysis and synthesis.

Results and discussions

Based on the aim of the study we present a part of the results that are subject to further exact monitoring and processing. The presented results can't be generalized, but it is necessary to understand them in the overall context and background as a guide for creating the content of P.E. and Sports lessons, in relation to students' health.

Importance of health oriented exercise. In the input testing 52.9% of students ES; 57.7% of students in CS1 and 81.8% students of CS2 identified correctly the meaning respectively, the effect of relaxation exercises. A significant difference was observed between ES and CS1 ($\chi^2 = 29.29$, $p < 0.01$) and compared with CS2 ($\chi^2 = 18.81$, $p < 0.01$) in favor of better knowledge in control selections. Output testing (Tab. 2) showed positive changes only in the ES specifically in the case of compensatory exercises, aerobic exercises, health-oriented physical activity and relaxation exercises. In compensatory and aerobic exercises was the difference significant ($\chi^2 = 9.75$, $p < 0.01$) (Tab. 3). It follows that the ES acquired the higher level of knowledge about health-oriented exercises compared to CS1 and CS2.

Table 2 Level of students' knowledge (ES, CS1, CS2; $n = 71$) about health oriented exercises in V_1 a V_2

Sample	ES		CS1		CS2	
Factors	V_1 %	V_2 %	V_1 %	V_2 %	V_1 %	V_2 %
Compensatory Exercises	5.9	47.1	57.7	57.7	18.2	18.2
Breathing Exercises	17.6	17.6	57.7	57.7	9.1	9.1
Aerobic Exercises	5.9	41.2	46.2	46.2	72.7	72.7
Health-oriented Physical Activity	0.0	52.9	50.0	50.0	27.3	27.3
Relaxation Exercises	52.9	70.6	57.7	57.7	81.8	81.8
Chi - test	V_1 ES/CS1/CS2 $\chi^2 = 29.29$ $p < 0.01$		V_2 ES/CS1/CS2 $\chi^2 = 18.81$ $p < 0.01$			

ES- experimental sample CS1 – control sample 1, CS2 – control sample 2, V_1 – input, V_2 - output, Chi - test

Table 3 Level of students' knowledge (ES $n=23$) about health oriented exercises in V_1 a V_2

Sample	ES		p
Factors	V_1 %	V_2 %	
Compensatory Exercises	5.9	47.1	$p < 0.01$
Breathing Exercises	17.6	17.6	
Aerobic Exercises	5.9	41.2	$p < 0.01$
Health-oriented Physical Activity	0.0	52.9	
Relaxation Exercises	52.9	70.6	
Chi - test			$\chi^2 = 9.751$ $p < 0.01$

ES- experimental sample, V_1 – input, V_2 - output, Chi - test

Health disorders. In the characteristics of health disorders, most students stated correctly: ES - scoliosis (70.6%), CS1 – diabetes mellitus (84.6%), CS2 - diabetes mellitus (63.6%). Significant differences during input testing were observed between ES and CS1 ($\chi^2 = 20.13$, $p < 0.01$) when CS1 students recorded proper knowledge in 4 of 6 indicators. The output testing of knowledge (Tab. 4) showed significant difference between ES and CS1 in favor of ES, which has improved in all six indicators ($\chi^2 = 14.47$, $p < 0.01$). Comparison of ES and CS2 were not significantly ($p < 0.05$), which was the result of a higher input level of knowledge, based on the medically oriented study programmes.

Table 4 Level of students' knowledge (ES a CS1; $n = 49$) about health disorders in V_1 a V_2

Sample	ES		CS1		ES	CS1
Factors	V_1 %		V_1 %	V_2 %		V_2 %
Scoliosis	70.6		38.5	82.4		38.5
Hypertension	41.2	$\chi^2 = 20.13$	50.0	76.5	$\chi^2 = 14.47$	50.0
Pes planus	52.9	$p < 0.01$	65.4	94.1	$p < 0.05$	65.4
Muscle imbalance	11.8		46.2	88.2		46.2
Diabetes mellitus	47.1		84.6	88.2		84.6
Asthma bronchiale	23.5		19.2	88.2		19.2

ES- experimental sample CS1 – control sample 1, V_1 – input, V_2 - output, Chi – test

There was a significant difference between the input and output levels of knowledge about the health disorders (Tab.5) in ES ($\chi^2 = 14.21$, $p < 0.01$) specifically in hypertension ($\chi^2 = 4.602$, $p < 0.01$), pes planus ($\chi^2 = 4.806$, $p < 0.01$), muscle imbalances ($\chi^2 = 10.81$, $p < 0.01$), diabetes mellitus ($\chi^2 = 4.997$, $p < 0.01$) and asthma bronchiale ($\chi^2 = 8.658$, $p < 0.01$). It follows that the experimental training program helped to clarify

characteristics of some health disorders. Important is the fact, that the most significant number of ES students understood the nature of muscle imbalances, also influenced by the theoretical knowledge about stretching. At the same time we add that in both phases of testing, all students identified correctly the meaning of heart rate and its increase during the physical activity.

Table 5 Level of students' knowledge (ES; n = 23) about health disorders in V₁ a V₂

Sample	ES (experimental sample)			
Factors	V ₁ %		V ₂ %	t-test
Scoliosis	70.6		82.4	
Hypertension	41.2	Chi = 14.21	76.5	t = 4.602, p<0.01
Pes planus	52.9	p<0.05	94.1	t = 4.806, p<0.01
Muscle imbalance	11.8		88.2	t = 10.81, p<0.01
Diabetes mellitus	47.1		88.2	t = 4.997, p<0.01
Asthma Bronchiale	23.5		88.2	t = 8.658, p<0.01

ES- experimental sample, V₁ – input, V₂- output, t – test, Chi - test

Health risks. Healthy lifestyle is also associated with the knowledge about risk factors, which can negatively influence morbidity. Therefore, we were interested about students' perception of unhealthy lifestyle and its risks. ES students (Tab. 6) identified as most commonly determinants of healthy lifestyle (input 30.8%, output 30.6%), regular physical activity (input 19.2%, output 20.4%) and genetic factors (input 15.4%, output 16.3%). Significant difference was recorded in output testing between ES and CS2 in regular physical activity (t = 3.226, p <0.01).

Table 6 Evaluation of students' knowledge (ES, CS1 a CS2; n = 71) about health risks factors in V₁ a V₂

Sample	ES		CS1		CS2	
Factors	V ₁ %	V ₂ %	V ₁ %	V ₂ %	V ₁ %	V ₂ %
Genetic Factors	15.4	16.3	18.2	17.3	14.3	14.8
Age	7.7	8.2	9.1	9.3	7.9	8.2
Gender	1.9	2.0	0.0	0.0	3.2	3.3
Lifestyle	30.8	30.6	33.8	34.7	31.7	32.8
Mental Fitness	3.8	4.1	9.1	9.3	7.9	8.2
Regular Physical Activity	19.2	20.4*	14.3	13.3	7.9	8.2*
		*V2 ES/ CS2 t = 3.226, p<0.01				
Past Medical History & Present illness	7.7	8.2	7.8	8.0	14.3	14.8
Environment	1.9	2.0	1.3	1.3	3.2	1.6
Standard of living	7.7	0.0	2.6	2.7	3.2	3.3
Health Care	1.9	8.2	3.9	4.0	4.8	4.9
Hobbies	1.9	0.0	0.0	0.0	1.6	0.0
Σ	100.0	100.0	100.0	100.0	100.0	100.0

ES- experimental sample CS1 – control sample 1, CS2 – control sample 2, V₁ – input, V₂- output, t – test

As the most common risk factors of morbidity (Tab. 7) ES students marked abuses like smoking (V₁ 32% V₂ 34%), drug use (V₁ 32% V₂ 24%) and alcohol drinking (V₁ 18% V₂ 12%). In output testing ES students indicated as one of three most numerous factors hypomobility (18%), what confirms their knowledge about health risk factors.

Evaluation in CS1 & CS2 showed the same preferences as in the ES. CS1 indicated as the most common risk factors of morbidity smoking (28.6% V₁, V₂ 32.5%), drug use (27.3% V₁, V₂ 22.1%) and alcohol drinking (16.9% V₁, V₂ 18.2%). CS2 confirmed the same, presented by smoking (31.3% V₁, V₂ 33.3%), drug use (23.4% V₁, V₂ 24.2%) and alcohol (14.1% V₁, V₂ 16.7%).

Smoking as one of the most common health risk factors also recorded Oršulová (2014), which states that secondary school students considered as the most important health risk factor smoking (19.1%), poor nutrition (19.1%), lack of exercise (14.8%) and stress (13.9%).

Table 7 Evaluation of students' knowledge (ES, CS1 a CS2; n = 71) about health risks factors of morbidity in V_1 a V_2

Sample	ES		CS1		CS2	
Risk Factors	V_1 %	V_2 %	V_1 %	V_2 %	V_1 %	V_2 %
Smoking	32.0	34.0	28.6	32.5	31.3	33.3
Sleep Habits	2.0	0.0	0.0	1.3	3.1	1.5
Drug Use	32.0	24.0	27.3	22.1	23.4	24.2
Physical Inactivity	8.0	18.0	11.7	13.0	12.5	13.6
Recreational Sports	2.0	0.0	0.0	0.0	0.0	0.0
Alcohol	18.0	12.0	16.9	18.2	14.1	16.7
Stress	6.0	12.0	11.7	7.8	4.7	3.0
Medication Use	0.0	0.0	1.3	1.3	3.1	0.0
Hardening	0.0	0.0	0.0	0.0	0.0	0.0
Sedentary Lifestyle	0.0	0.0	2.6	3.9	7.8	7.6
Σ	100.0	100.0	100.0	100.0	100.0	100.0

ES- experimental sample CS1 – control sample 1, CS2 – control sample 2, V_1 – input, V_2 - output

Question "Which diseases arise as a result of an unhealthy lifestyle?" with possibility of multiple choice students (ES, CS1, CS2) indicated at the most obesity (25.5%), acute myocardial infarction (16.2%), and atherosclerosis (12.3%) (Tab. 8). When noticed significant change in output rating, when as most identified factor occurred hypertension, which in the input rating presented only 2.1% of answers but in output rating 24.7%, further followed by obesity (15.3%) and atherosclerosis (13.2%), which were among 3 most numerous diseases in input.

Table 8 Evaluation of students' knowledge (ES, CS1 a CS2; n = 71) about diseases caused by unhealthy lifestyle

Sample	ES		CS1		CS2	
Disease	V_1 %	V_2 %	V_1 %	V_2 %	V_1 %	V_2 %
Atherosclerosis	15.5	3.9	9.6	18.2	13.3	14.5
Acute myocar. infarction	12.1	13.7	23.4	9.1	10.8	8.1
Stroke	5.2	5.9	5.3	0.0	6.0	3.2
Hypertension	1.7	2.0	2.1	33.8	2.4	32.3
Obesity	29.3	33.3*	24.5	9.1*	24.1	8.1*
	* V_2 ES/CS1 $t = 5.256$, $p < 0.01$			* V_2 ES/CS2 $t = 5.539$, $p < 0.01$		
Cancer	8.6	9.8	3.2	14.3	6.0	6.5
Diabetes mellitus	10.3	11.8	9.6	7.8	9.6	14.5
Premature Birth & Miscariage	3.4	3.9	0.0	1.3	6.0	3.2
Depression	3.4	3.9	10.6	2.6	7.2	3.2
Alzheimer's disease	0	0.0	0.0	3.9	2.4	6.5
Avian Influenya	1.7	2.0	0.0	0.0	2.4	0.0
Constipation	5.2	5.9	4.3	0.0	1.2	0.0
Chronic Fatigue Syndrome	1.7	2.0	4.3	0.0	3.6	0.0
Upper Respiratory Tract	1.7	2.0	2.1	0.0	4.8	0.0
Eye Defects	0.0	0.0	1.1	0.0	0.0	0.0
Σ	100.0	100.0	100.0	100.0	100.0	100.0

ES- experimental sample CS1 – control sample 1, CS2 – control sample 2, V_1 – input, V_2 - output

Both input and output evaluations showed dominance of cardiovascular diseases. ES students marked as most common diseases occurring as a result of an unhealthy lifestyle obesity (V_1 29.3%, V_2 33.3%), atherosclerosis (V_1 15.5%, V_2 3.9%) and acute myocardial infarction (V_1 12.1%, V_2 13.7%). In output testing 11.8% ES students marked instead of atherosclerosis diabetes mellitus. Significant difference was recorded in the choice of obesity in comparison of ES and CS1 results ($t = 5.256$, $p < 0.01$), and in comparison of ES and CS2 ($t = 5.539$, $p < 0.01$) in output testing. The most significant effect of experimental factor was observed in the evaluation of knowledge about the origin of diseases that arise as a result of an unhealthy lifestyle. ES showed in output testing better view in 12 indicators out and CS1 and CS2 in only 5 out of 15 indicators.

Conclusions

Above findings of the studied area: Importance of health oriented exercise (ES Chi = 9.75, $p < 0.01$), Health disorders (ES Chi = 14.21, $p < 0.01$) and Risk of health (ES Chi = 6.099; $p < 0.05$) allow us to make recommendation, that inclusion of theoretical knowledge about health and health disorders is an appropriate amendment for the P.E. & Sport teachers with the positive affect on students intellect.

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References

- Antala, B. & Labudová, J. (2008). Kurikulum telesnej a športovej výchovy pre vyšší sekundárny stupeň vzdelávania. *Tel. Výchova & Šport*, 18(2), 4-7.
- Bendíková, E. (2011). The current health status and reasons for student absence in physical and sports education classes. *Physical education and sport*, 21(1), 6-10.
- Bendíková, E. (2016). Changes in the posture of students due to equipment-aided exercise programs that are applied in physical and sport education. *Journal of Physical Education and Sport*, 16(2), 281-286.
- Cardon, G. M., et al. (2012). Physical activity promotion in schools: which strategies do schools (not) implement and which socioecological factors are associated with implementation? *Health education research*, 27(3), 470-483.
- Dobay, B. (2015). *Az iskolai sporttanfolyamok motivációs hatása a felnőttkori rekreációs sporttevékenységekre Dél-Szlovákiában*. Komárom: Kompress kiadó.
- Chovanová, E. (2011). Physical activities in out-of-school physical education in 10-12-year-old children living in the eastern Slovakia region. *Acta Universitatis Matthiae Belii. Physical education and sport*, 3(1), 37-42.
- Chovanová, E. (2013). The importance of physical activity school - age children with behavioral disorders. *Scientific review of physical culture*, 3(3), 190-194.
- Ghyppo, A., Tkachov, S. & Orlenko, O. (2016). Role of physical education on the formation of a healthy lifestyle outside of school hours. *Journal of Physical Education and Sport*, 16(2), 335-339.
- Gontarev, S. & Kalac, R. (2016). Prediction of physical activity factors in Macedonian adolescents. *Journal of Physical Education and Sport*, 16(1), 88-96.
- Fyodorov, A. & Erlikh, V. (2016). Health behavioral factors in modern adolescents. *Journal of Physical Education and Sport*, 16(1), 109-112.
- Ihász, F. & Rikk, J. (2010). *Egészségfejlesztés*. Győr: szerzői kiadás.
- Labudová, J. (2012). *J. Teória zdravia a podpora zdravia*. Bratislava: Univerzita Komenského v Bratislave.
- Labudová, J. & Nemček, D. (2009). Vedomosti žiakov základnej školy o pitnom režime ako východisko k obsahu vzdelávacieho modulu. [Knowledge about liquid regime as a basis to educational module in primary school pupils]. *Telesná výchova a šport*, 19(1), 10-13.
- Labudová, J., Nemček, D. & Antala, B. (2012). *Pohyb pre zdravie*. [Movement for health]. Bratislava, Slovakia: END.
- Nemček, D. (2008). Názory študentov stredných škôl na vplyv pohybovej aktivity na zdravie. In Peráčková, J. et al. *Telovýchovné a športové záujmy v rámci voľnočasových aktivít žiakov*. Bratislava: UK FTVŠ a MŠVVaŠ SR, p. 137-160.
- Novotná, B. & Slováková, M. (2016). The current problem of school children-lack of physical activity. *European Researcher*, 4(105), 231-238.
- Oršulová, N. (2014). Vedomosti žiakov vybraných stredných škôl o základných otázkach zdravia. *Scientia Movens Sborník príspevků z mezinárodní studentské vědecké konference*. p. 242-246.
- Rozim, R. (2005). Monitoring pohybových aktivít žiakov 1. stupňa ZŠ. *Zborník príspevkov z medzinárodne vedeckej konferencie „História súčasnosť a perspektívy učiteľského vzdelávania“*. B. Bystrica: PF UMB. p. 387-390.
- Štulajter, I. (2007). *Vplyv biorytmov na vybrané pohybové schopnosti vo futbale*. B. Bystrica : UMB FHV, 97 p.