

**DETERMINING THE IMPACT OF COMPUTER-AIDED CONTROL OF EDUCATIONAL  
ACHIEVEMENTS FOR THE HEALTH OF STUDENTS**

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**Annotation.** The problem of the health of students during the control of knowledge on the example of studying valeological disciplines. In the experiment involved 186 students. Age 17-19 years. The positive effect of regular thematic automated monitoring the health of students. In particular, during unit of knowledge and at exam time. Showed a statistically significant reduction in the average level of reactive anxiety in students of the experimental group, compared to its initial values (before the final test, it fell by 37.91). For comparison, before final testing of the control group, it only reduced by 10.42%. It was determined that a regular automated testing knowledge can be used to organize healthkeeping support professional development of future teachers.

**Keywords:** health, anxiety, student monitoring, testing.

**Introduction**

The problem of students health's worsening during professional formation of specialists is urgent as on to day. Such situation hinders self realization of personality in society, achievement of his (her) aims and satisfaction of demands [8, 10].

As on to day, health related pedagogic system in higher educational establishments is inefficient (S. Bondar, V. Smirnova, T. Vybornova, Yu. Gordieyev, I. Gordieyeva, B. Dolynskiy, V. Irkhin, S. Filipova et al.) and with every year of studying students' health become still worse.

Researches in this direction (Yu. Moseychuk, T. Boychuk, O. Libryk, V. Lykova, T. Tsyganchuk, N. Gayova, S. Kudin, O. Savonova, G. Poluliakh) show that main results of HEE educational process's influence are steady disorder in students' emotional sphere, acute mental and physical tiredness, which are manifested in dynamics of studying up to fifth year [5, <http://www.psyh.kiev.ua>, 4, 2].

Their appearing is explained by the fact that students have to fulfill academic plan of preparation of future specialists. Because in conditions of high loads and increased responsibility for the results of own study organism's functional systems return to norm slower, while necessity of overcoming of insignificant difficulties can negatively influence on general state of organism and psychic condition of a student [8, <http://www.psyh.kiev.ua>,9]. It is especially noticeable in the period of examination session or during current-module control of knowledge.

Scientists note that acute neurotic situations in control periods can be caused both by unfairly lowered evaluation, born by inefficient and formal-normative system of evaluation and by irregularity or subjectivity of examiners or by indefinite character of evaluation system and so on. As a result, expectation of resultant control and connected with it psychic tension can be manifested by students in different forms of psychic activity: from fear of teacher, who can put not objective mark, to more diffusive, less grounded indefinite anxiety in relation to future test or exam. Both these states are accompanied by rather expressed vegetative manifestations ( tension, anxiety) and can decelerate action of cognitive processes and condition teachers' negative opinion concerning students' knowledge of certain material [4, 2, 10].

From physiological point of view anxiety in the period of control measures causes additionally physiological changes of students' organism. They include: changes in cardio-vascular system (increasing of heart beats frequency, increasing of respiratory frequency, increasing of BP) and digestive tract (stomach disorders). And such anxiety states can result in heart ischemia, atherosclerosis, arterial hypertension, hypertension, gastritis, ulcer of stomach and duodenum as well as worsening of functions and abilities of immune system with further sharpening of chronic diseases or heavy cases of inflammatory or other diseases.

All these direct our researches to solution of problem how to reduce negative influence of educational process at HEE on students' health. Considering the fact that optimal form of pedagogic control is automatic control (AC) of knowledge, automatic testing (AT) [6], determination of influence of regular topical automatic control with application of author's methodic on students' health became urgent for us.

The research was carried out as per direction of scientific works of medical-biologic and valeologic health protection principles' departments of NPU, named after M.P. Dragomanov "Development of system of students' interactive testing at pedagogical HEE on disciplines of medical-biological and valeological orientation" (state registration No. PK:0110U001278) and as per direction of department of physical education and sports' biological principles of ChNPU, named after T.G. Shevchenko "Health related optimization of educational and training processes oriented on improvement of students' adapting responses' efficiency".

**Purpose, tasks of the work, material and methods**

*The purpose of the work* is to determine influence of regular topical automatic control with application of author's methodic on students' health.

*The tasks of the work, methods and organization of the research:* the research was carried out among students, who studied in specialties “Psychology”, “Practical psychology” at NPU, named after M.P. Dragomanov and studied discipline “Psychovaleology”. For fulfillment of AC we used automatic testing system «CamomileNet» [7] author’s methodic of its organization and fulfillment [3], which was tested and implemented in practice of pedagogic activity at departments of valeologic principles of health and life protection of NPU, named after M.P. Dragomanov and at department of biological principles of physical education and sports of ChNPU, named after T.G. Shevchenko.

In order to ensure objectiveness of pedagogic experiment there were created control group (CG) and experimental group (EG) basing on results of initial questioning (IQ), which was oriented on determination of students’ basic level in valeological knowledge.

Identity of both groups was ensured by fulfillment of the following requirements: 1) by quantitative and qualitative characteristics of students, their levels of readiness (low, middle and sufficient) they were similar; 2) both EG and CG included every separate academic group of total quantity 90 persons and indicator of mean coefficient of readiness –  $0.5029 \pm 0.0140$ . Identity of groups was proved with the help of non parametrical criterion of coincidence Pirson’s  $\chi^2$ , according to which statistical difference between readiness levels was absent.

It was envisaged that during research, CG students, in the process of mastering of discipline “Psychovaleology” would pass only automatic resultant testing, while EG students were offered to pass repeated automatic training testing at every practical lesson in the process of studying of every topic of the discipline and, additionally, resultant automatic testing, like in the case with CG. Besides resultant automatic testing control profiles of students’ progress of both groups were determined in the forms of control works in the periods of first and second module controls.

Determination of AC influence on students’, who participated in researches, health stipulated determination of indicators of mean responsive anxiety values of both groups’ students: 1) at the beginning of studying of discipline – during initial questioning; 2) before first and second module control (MC1, MC2); 3) at the beginning of resultant testing (RT). For this purpose we used methodic of visual-analog scale of anxiety, which is suitable for psychic state’s control in any extreme conditions, including conditions of examination sessions and tests[1]. Because, owing to application of quantitative digital indicators during express-questioning, this methodic minimizes subjectivism of a researcher with interpreting of the obtained results. It is also is more compact, does not require much time, and, in opposite to other methodic, its application does not require special psychological knowledge from researcher.

For comparing of the obtained results by the level of expressiveness of signs, which did not meet standards of normal distribution, we used non-parametrical methods of calculation by Wilkinson and criterion *U*-Mann-Witny. In particular, distributions of student responsive anxiety’s indicators, separately for every group, during the whole period of study, which were dependent, were researched with the help of Wilkinson criterion’s calculation. And on the contrary, distributions of student responsive anxiety’s indicators in CG and EG, which were found before fulfillment of every control measure, were separately independent. That is why they were researched with the help of comparing of two independent samples and with application of criterion *U*- Mann-Witny.

### Results of the researches

Indicators of mean values of responsive anxiety of control and experimental groups, which were obtained during control measures, carried out with students of these groups, and their dynamics are given in fig.1.

Table 1

*Indicators of mean values of responsive anxiety, obtained during control measures*

Nos	Group	Control measures							
		Initial questioning (IQ)		Module control №1 (MC1)		Module control №2 (MC2)		Resultant testing (RT)	
		mean	Statistic error	mean	Statistic error	mean	Statistic error	mean	Statistic error
1	Control	71.44	1.22	26.10	0.72	36.69	1.28	61.02	1.24
2	Experimental	70.93	1.12	49.14	1.01	28.95	1.01	33.02	0.56

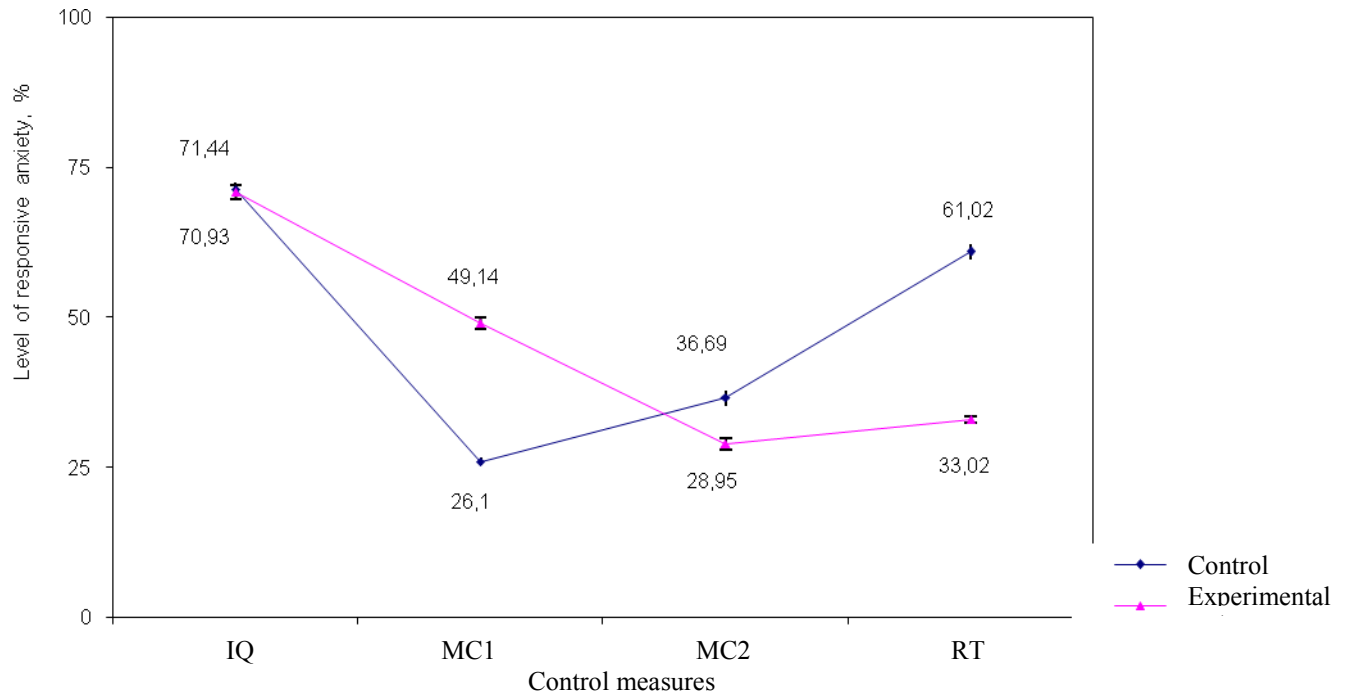


Fig. 1. Dynamics of mean values' indicators of CG and EG students, obtained during control measures

Results of calculation of Wilkinon's criterion for dependent samples are given in the following below tables 2 and 3.

Table 2

*Wilkinson's criterion. Ranks*

Group	Control measures	Ranks	Number of ranks	Middle rank	Sum of ranks
Control	IQ-MC1	Deducted ranks	1	1.00	1.00
		Added ranks	85	44.00	3740.00
		Links	0		
		Total	86		
	MC1-MC2	Deducted ranks	64	43.21	2765.00
		Added ranks	15	15	394.50
		Links	3		
		Total	82		
	MC2-RT	Deducted ranks	77	45.99	3541.00
		Added ranks	8	14.19	113.50
		Links	1		
		Total	86		
IQ-RT	Deducted ranks	18	37.00	666.00	
	Added ranks	72	47.63	3429.00	
	Links	0			
	Total	90			
Experimental	IQ-MC1	Deducted ranks	6	5.25	31.50
		Added ranks	87	49.88	4339.50
		Links	0		
		Total	93		

	MC1–MC2	Deducted ranks	12	23.96	287.50
		Added ranks	76	47.74	3628.50
		Links	3		
		Total	91		
	MC2–RT	Deducted ranks	73	45.09	3291.50
		Added ranks	20	53.98	1079.50
		Links	0		
		Total	93		
	IQ–RT	Deducted ranks	1	6.00	6.00
		Added ranks	95	53.98	4650.00
		Links	0		
		Total	96		

Table 3

*Statistics of criterion*

Group	Parameter	OQ–MC1	MC1–MC2	MC2–RT	IQ–RT
Control	Z	– 8.050	– 5.794	– 7.510	– 5.559
	Asymptotic value	0.000	0.000	0.000	0.000
Experimental	Z	– 8.254	– 6.952	– 4.238	– 8.846
	Asymptotic value	0.000	0.000	0.000	0.000

Results of calculations by criterion *U*- Mann-Witny are given in the following below tables 4, 5.

Table 4

*Criterion U-Mann-Witny. Ranks*

Nos	Control measure	Group	q-ty of students	Middle rank	Sum of ranks
1	IQ	control	90	97.89	8810.00
		experimental	96	89.38	8581.00
		total	186		
2	MC1	control	86	55.13	4741.50
		experimental	93	122.24	11368.50
		total	179		
3	MC2	control	86	109.44	9411.50
		experimental	93	72.03	6698.50
		total	176		
4	RT	control	90	138.62	1247.50
		experimental	96	51.20	4915.50
		total	186		

Table 5

*Significance of criterion U-Mann-Witny*

Nos	Parameter	Control measures			
		IQ	MC1	MC2	RT

1	<i>U</i> – Mann-Witny	3225.000	1000.500	2327.500	259.500
2	<i>W</i> – Wilkinson	8581.00	4741.00	6698.50	4915.00
3	Asymptotic significance (two-sided)	0.281	0.000	0.000	0.000

The carried out analysis of the obtained data as a result of comparison of mean values of EG and CG students' responsive anxiety in compliance with control measures (see fig.2) permits to state the following.

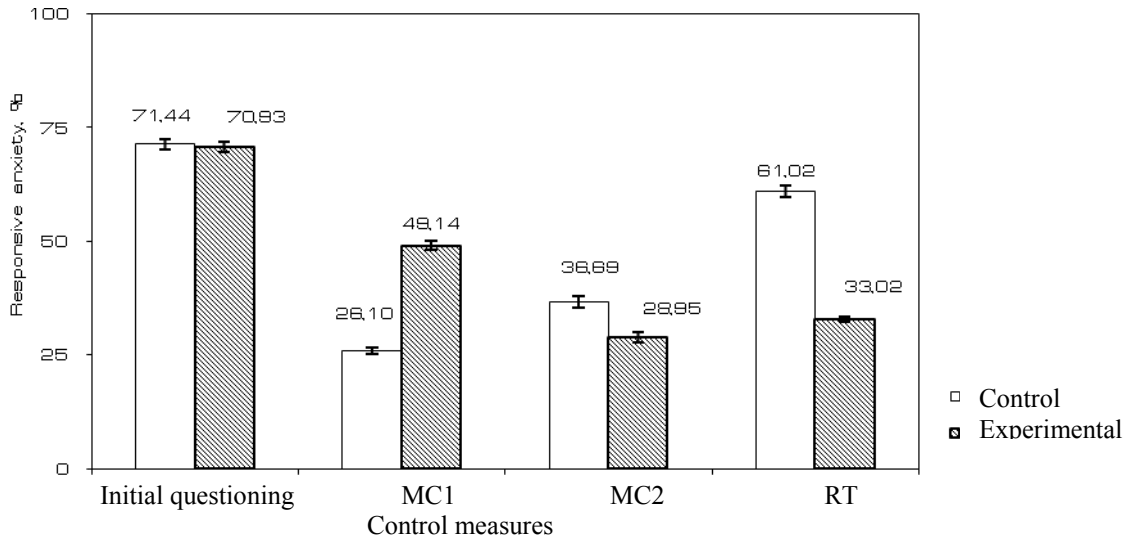


Fig.2. Comparison of mean values' indicators of CG and EG students, obtained during control measures

Before initial questioning (at the beginning of studying of discipline) mean indicators of CG and EG students' responsive anxiety were nearly equal – (71.44 in control group and 70.93 – in experimental). Value of criterion *U*-Mann-Witny, which was obtained  $U=3225,0$  and its comparatively great asymptotic significance 0.281 ( $0.281 > 0.05$ ) witnessed about the absence of statistically significant difference between levels of anxiety.

In comparison with initial questioning, before MC1 we observed reduction of anxiety's indicators both of CG and EG students. They were correspondingly 26.10 for control and 49.14 for experimental groups. With it, stronger reduction of responsive anxiety indicators was observed at control group, in comparison with EG students (accordingly by 45.34 % and 21.79 %). Statistic significance of Wilkinson's criterion, being much less than 0.05, witnessed statistic difference between mean distributions of anxiety' indicators of the researched groups. Comparing of mean indicators of responsive anxiety of both groups' students, fulfilled with calculation of criterion *U*- Mann-Witny, proved at high statistic level  $p < 0.01$  the presence of statistically confident difference between them.

Comparing of distributions of responsive anxiety indicators of both groups students, obtained before MC1 and MC2, witnessed that value of EG students' mean responsive anxiety reduced relatively to previous while the same of CG students – increased. In particular, before MC2 mean value of CG students' responsive anxiety increased, in comparison with MC1, up to 36.69 and was 51.36% from its initial level, while the same of EG students continued to reduce and reached value of 28.95 that was 40.81 from its level before IQ. Comparison was fulfilled at high statistic level of  $p < 0,01$ . The results of calculation of criterion *U*- Mann-Witny, witnessed about confident difference between mean values of EG and CG responsive anxiety, determined before MC2; in particular, for CG it was 109.44 and for experimental group – 72.03.

Before resultant testing, both at CG and EG we observed increasing of mean values of responsive anxiety, comparing with previous values. In particular, before resultant testing, mean value of control group students' responsive anxiety increased, in comparison with MC2, from 36.69 to 61.02 and became equal to 85.41% from initial level. Concerning EG students, responsive anxiety increased from 28.95 to 33.02 and was 46.55% from initial level. Thus, mean value of EG students' responsive anxiety was by 28.00% lower than the same of cg students before resultant testing.

Calculation of Wilkinson's criterion witnessed the presence of statistic difference between results of EG and CG student' responsive anxiety's indicators. Comparison of distributions of responsive anxiety indicators, determined before IQ and RT, with high statistic significance  $p < 0.01$  confirmed confident difference between these distributions. In its turn, results of using criterion *U*-Mann-Witny for comparing of distributions of both groups students' anxiety before resultant testing also confirmed the difference between these distributions.

### Summary

Results of the researches witness about confident reduction of mean level of experimental group students' responsive anxiety before resultant testing, comparing with initial value (it reduced by 37.91%). In control group this

indicator reduced only by 10.42 %. It means that fulfillment of systemic automatic training topical current control of students' progressing in the course of studying of a discipline facilitates further reduction of their responsive anxiety in the periods of modal controls and examination session. It happens owing to creation of psycho-physiologically comfortable environment and ensuring of calm working atmosphere for all students without exclusions, owing to absence of any pressure on the tested from the side of teachers that is ensured by application of automatic testing system and author's methodic of its organization and conducting. So, systemic automatic control can be regarded as modern health related technology, which is able to ensure health related maintenance of professional formation of future teachers.

*The prospects of further researches* stipulate determination of possibility to ensure health related maintenance in the period off students' adapting to conditions of HEE.

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