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**MAKING FUTURE PHYSICS SCHOOL-TEACHERS MORE
PROFOUND IN SUBJECT COMPETENCE BY THE HELP OF
SPECIAL PERSONALLY KNOWLEDGEABLE METHODS OF
TRAINING DURING MASTERING THE COURSE OF GENERAL
PHYSICS**

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Abstract. *The system of personally knowledgeable theoretical and practical tasks for making future Physics school-teachers more profound in subject and cognitive competencies by the help of personally knowledgeable methods during mastering the course of General Physics is suggested. The system contains tests of different forms, questions, that assume a detail written answer, and questions, that assume a verbal answer. The system was approbated in the educational process.*

Keywords. *General Physics, system of personally knowledgeable tasks, subject competency, cognitive competency.*

Important changes in secondary and higher educations in Ukraine are conditioned by general acceleration of scientific and technical progress, demands to content and forms of organization of the educations, that are caused by it and are quickly changing, aspirations for making the educations nearer to the European ones. Basic accents are made on humanization and democratization of education for all this. In secondary school we have integration of disciplines of natural cycle, cutting down the number of school hours allocated to the study of Physics. This leads to very poor knowledge of content of school Physics course even by those students, who in future see themselves as Physics teachers of secondary schools [2—5]. Therefore, teaching of General Physics to the first year students of the specialty "Secondary education. Physics" becomes a rather difficult task. At the same time knowledge of scientific laws, experimental facts of the discipline is a base for preparation a professional, that will be able to apply his knowledge in practice, especially in non-standard conditions.

The author sees raising of subject, scientific and cognitive competences of students in General Physics in working out and implementation of special personally knowledgeable teaching technologies.

Present-day pedagogical science develops personally focused and adaptive technologies of training in secondary and high schools rather actively. But not only general theoretical elaborations are actual today. Concrete practical elaborations, related to the concrete educational subject, are very needed. The task is to teach our students to find new information and to transform it into knowledge.

The purpose of the article is to present a system of personally knowledgeable theoretical and practical tasks for development and monitoring subject and cognitive competences in General Physics for students, that are mastering a specialty "Secondary education. Physics"

First of all we will give a detail characterization of suggested tasks and methods of organizing control of so-called students' residual competences. By residual subject competences we understand competences of students by some part of educational discipline 5-8 weeks of examinations period after. We characterize such residual competences of students statistically (into an academic group, between academic groups of a stream) and individually (personally for every student) by the results of a special control work. The level of residual competences for every subject is determined by the difference between marks of the last examinations period and such control work, statistically (for academic group) and individually (for every student).

Statistical mark allows us to compare teaching and educational work of a teacher, curator and the most active members of the corresponding academic group before examinations period and after it for separate academic group, for different academic groups and departments by the same discipline. This is more significant after winter examinations period if the corresponding academic discipline is continued to study in spring semester because of the fact, that in such a case composition of the academic group usually is not changed.

If students continue mastering the corresponding discipline in autumn semester, composition of the academic group may change (by different reasons sending down of students is possible, reinstatement of students is possible). Because of the correctness of the statistical estimation decreases this in this case. Personal successes of student in his study of academic disciplines in most cases are more predictable (and manageable).

The teacher of the discipline and the curator of the academic group (personally and through the parents) can mobilize the students to academic work as the main aspect of their activities.

Every teacher prepares a list of main topics of the disciplines, that have been submitted during the previous examination period, at the beginning of a new semester.

At the beginning of the new semester the teacher prepares a list of the main topics of the discipline, that was imposed in the last examination session, to conduct control work for identification the level of residual knowledge.

The teacher introduces the list to the students and informs them about the schedule of consultations on the topics of the list. The consultations must take place at least once a week. These consultations are especially essential for students who have not passed the corresponding control by this subject at the previous examinations period. The teacher prepares 30 different variants of questions, according to the list of topics. During the consultation the teacher informs the students about supposed forms of the questions. The questions may be in form of tests by different forms. This can be a simple test, that assume a single momentary answer. This can be a complex (composite) test, that assume several momentary answers. This can be a simple test, that assume a single answer on the base of laboratory experiment. This can be a simple test, that assume a single answer on the base of graphic dependence. This can be a simple test, that assume a single answer on the base of mathematical calculations.

An example of a simple test, that assumes a single momentary answer.

TEST № 1	Residual subject competencies y in General Physics	
theme	Fixed and travelling blocks	
question	What block gives gain in a force?	
variants of answer	A	fixed
	B	travelling
	C	none of them
	D	both of them

The right answer is B.

An example of a complex test, that assumes several answers

TEST № 2	Residual subject competencies in General Physics	
theme	Rotatory movement along the circumference	
question	What are the features of rotatory movement along the circumference?	
variants of answers	A	The limited space of movement
	B	The temporal periodicity of movement

	C	Curvilinear trajectory is closed and stable
	D	Total displacement for each period of movement equals to zero
	E	A possibility of a stable acceleration of movement
	F	The presence of own energy, that is stable in condition of isolated system
	G	The law of conservation the momentum of impulse is taking place
	H	The lack of position of equilibrium is taking place

The right answers are A, B, C, D, E, F, G, H.

An example of a complex test, that assumes several answers

TEST № 3	Residual subject competencies in General Physics	
theme	The phenomenon of inertia.	
question	Show the right finish of the statement: the property of inertia...	
variants of answers	A	is inherent to every material object, that has its own kinetic energy
	B	is expressed in prolongation of movement with the speed of a body, that is just "liberated" from an accelerated frame of reference
	C	is expressed in prolongation of movement with the speed of the state of rest in an inertial frame of reference
	D	is not invariant for transitions from one frame of reference to another

	E	does not submit to the law of equality of action and reaction
	F	is the result of action of non-real forces

The right answers is A, B, C.

An example of a simple test, that assume a single answer on the base of laboratory experiment.

TEST № 4	Residual subject competencies in General Physics	
theme	During physical experiment somebody drops a steel ball on a massive steel plate. After hit, the ball jumps up.	
question	By what sign, without instruments, you can determine, that the hit has not been absolutely elastic?	
variants of answers	A	Absolutely elastic hits don't exist in nature
	B	The height of the jump of the ball is less than the height it has fallen
	C	The hit does not remain dents in the plate

The right answer is B.

An example of a simple test, that assume a single answer on the base of graphic dependence.

TEST № 5	Residual subject competencies in General Physics	
theme	A boy is swinging on a swing. The figure shows a graph of dependence of centripetal acceleration of the boy from linear speed of his movement. The centripetal acceleration of the boy has reached a value of 8 m/s^2 .	

question	What is the linear speed of the boy?	
variants of answer	A	8,0 m/s
	B	6,4 m/s
	C	5,0 m/s
	D	3,7 m/s

The right answer is C.

An example of a simple test, that assume a single answer on the base of mathematical calculations.

TEST № 6	Residual subject competencies in General Physics	
theme	The coordinates of the solid are changing by the law: $x = 1,5t^2$; $y = 2t - 2t^2$.	
question	What is the modulus of acceleration of the solid?	
variants of answer	A	3,5 m/s ²
	B	5,0 m/s ²
	C	6,5 m/s ²
	D	8,0 m/s ²

The right answer is B.

The questions also may assume 1) a detail written answer; 2) a verbal answer.

An example of a question, that assume a detail written answer.

№ 1	Residual subject competencies in General Physics
theme	Simple pendulum
question	The equation of motion. The period of oscillation.
demands to the answer	A complete answer may include: formulations of definitions, numerical values and units of measurements of physical quantities, formulas and explanations to them, diagrams, pictures, graphs and explanation to them, examples. On every sheet of paper with the answer the student must write his surname.

At the beginning of the control work, that is assumed to show residual subject competencies of the students in General Physics, every student is suggested to take any sheet with an individual task from a set of 30 ones. It is strictly prohibited to use any information technology except of calculator. By the results of such control work we can't change the mark in student's examination book in greater or less for students, whose answers by the subject in the last examinations period have been stated the value of 60 and more numbers by the ECTS scale. And it is independent of any mark they have received. They even can not come to such control work and thus receive unsatisfactory mark. Their personal rating formally will remain the same even in case of lowering the statistical estimation of their academic group. The teacher of the discipline can motivate the attendance of students to the suggested control work and improvement showings of the work in case of informing them about taking into account the marks of this control work, devoted to the residual subject competencies of students in previous examinations period, in the upcoming examinations period. It can be made by adding 10 numbers to the mark of student's answer at the corresponding exam in the upcoming examinations period if the student's answer at the control work is not less than 90 numbers according to ECTS scale, by adding 5 numbers in case of the answer's mark is within the limits of 82-89 numbers, or by adding 3 numbers in case of answer's mark is within the limits of 74-81 number.

The case, when the level of residual subject competencies in the content of some academic discipline is defined after finishing the study of full course of this discipline, is more probable. Preparation to the control work admits increasing and consolidation scientific and educational competences of the

corresponding subject for all students. And for students, whose mark by the corresponding academic discipline in previous examinations period has been within the limits of 50-59 numbers, the result of the control work may be reckoned with a rating of 60 numbers according to ECTS scale as a re-sitting the corresponding examination of the previous examinations period if the result of the control work amounts no less than 60 numbers.

The teacher, who have prepared personal knowledgeable tasks to some educational discipline and keys to the right answers to the tasks, makes detailed analysis of the tasks and their right answers during the corresponding tutorial after checking the students works. The teacher gives to students of the corresponding academic group (academic groups of the stream) the electronic version of the tasks and answers.

Our experience shows, that tasks with compactly gathered together composite answers are the most effective (see the tests № 2, № 3) since these topics of the course are usually the main ones, the tasks and the answers to them can serve as a brief summary for individual preparation of students to the upcoming examinations periods and to the attestation at the graduation semester.

Students of the first course, who are mastering a specialty "Secondary education. Physics", in a course of General Physics, study material on mechanics. This material includes the basic laws of Physics of macro-objects, in particular, the laws of conservation of mass, energy, impulse and momentum of impulse. With the appropriate additions this material is studied also in other parts of Physics course as of higher, as of secondary schools [1, 6].

Our experience makes us evidence, that from the beginning of the second part of every semester for students, who are mastering the course of General Physics, there is a sense to conduct special control works by the current material, twice by theoretical part and twice by practical part of the course. The forms of tasks of such control works must be similar to the forms of described tasks of the control work, that will characterize the residual subject competencies of the students. Such current control works will ensure an adequate preparation of students to the upcoming examinations period and an adequate level of their residual subject competencies.

Conclusions. Suggested system of personally knowledgeable theoretical and practical tasks of General Physics for development and monitoring subject and cognitive competences of students later allows them to be successful in applications of their knowledge in practice, including teaching.

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THE RIGHT TO EDUCATION FOR STUDENTS WITH DISABILITIES: ARIEL UNIVERSITY EXPERIENCE

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Abstract. *In recent years, the number of students diagnosed with disabilities who are attending into Higher Education has increased dramatically. Members of the largest group of students with disabilities have learning disabilities. Students with disabilities are often overlooked or misunderstood. Understanding the implications of disabilities, preparing to teach students with diverse characteristics, and learning to accommodate students with disabilities are essential for faculty and staff to provide academic and career opportunities for these students that are equivalent to those provided to their nondisabled peers.*

Keywords: *disabilities, brain disability, academia*