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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

SCIENTIFIC BASIS FOR THE USE OF SYNERGISTIC APPROACHES IN TEACHING OF PHYSICS IN THE VI-IX CLASSES OF GENERAL EDUCATION

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GENERAL CHARACTER OF THE RESEARCH

The relevance of the subject. The process of teaching physics in grades VI-IX of a general education school is a complex system. This system involves teaching many different interrelated subjects. This so-called learning system involves the study of physics based on phases and relationships between elements within phases. The main indicator of synergistics is the study of the constituent elements of systems not by their properties, but by relationships.

The system of teaching physics in grades VI-IX of a general education school provides for the implementation of the necessary (accepted) sequence of interrelated stages of education. That is, training in this system is very close to the requirements of Haken's definition of synergetics. When teaching physics in this system, educational materials stand out from the information in the form of the chaos surrounding them. Order seems to emerge from chaos. When organizing an education system, that is, at any stage of its evolution, a stage is an educational offer of certain knowledge. This proposal stabilizes and realizes the demand in the surrounding information environment, "lives". The emergence and subsequent emergence of this stage means "survival", the emergence of order from "chaos". This explanation is consistent with Prigogine's theory of the relationship between chaos and order[1].

With explanations above, high school VI-IX. We proved that the process of teaching physics in the classroom is a system (ideal, theoretical) and that this system has synergistic features. But what are the benefits of having synergistic properties in this system? To find the answer to the question, we reviewed the scientific and pedagogical literature on synergy.

Kazakh scientist Mukushev B.A. singled out the following pedagogical functions of synergists:

1) synergy as a method of understanding and managing the pedagogical process;

2) synergy as a learning goal;

3) synergy as a means of integrating disciplines;

4) synergy as a methodology for the modernization of education.

Azerbaijani scientist N.Y.Safarov sees in synergy the key to improving education, and the Russian scientist N.N. Moiseev sees a development algorithm in synergy.

Azerbaijani scientists A.F.Abbasov, T.B.Allakhyarova, M.I.Murguzov, F.M.Gurbanov, foreign scientists V.G.Budanov, S.P.Kurdyumov, Yu.N.Nyazev, V.G.Vinenko, A.D.Sukhanov, V.M.Kureichik, V.I.Pisarenko, V.A.Ignatova, I.S.Yakimanskaya, V.M.Rozin gave well-founded ideas and suggestions on the necessity of a synergetic approach to the pedagogical process.

In the considered scientific and pedagogical literature, the philosophical essence, principles, pedagogical functions of synergists are considered, the need for a synergetic approach to the pedagogical process is proved. However, these studies did not address the following issues related to the use of synergistic ideas in teaching physics in secondary schools:

1. What conditions (conditions of synergy) must be met in the learning process in order to use synergistic ideas in education?

2. What is an approximate mechanism for the development (and not the acquisition of knowledge) in education when using synergy?

3. Secondary school VI-IX. To what extent do the teaching materials of physics textbooks meet these synergistic conditions?

4.VI-IX. What synergies are observed in the teaching of physics materials in the classroom?

On the one hand, the need for a synergistic approach to physics teaching in a secondary school, and on the other hand, the inconsistency of research on the possibilities and ways of a synergistic approach to physics teaching.

The importance of resolving conflict and the lack of resolution in the studied scientific and pedagogical literature determined the relevance of the study and made it possible to choose its topic "Scientific basis for using the synergistic approach in teaching physics in VI-IX grades".

If we approach the problem from the point of view of the development of education in our republic, then the relevance of the problem of a synergistic approach to education is determined by a number of other factors. These are: a) the transition from a closed

administrative-Emirati ideology to an open, democratic system at all stages of the educational process; b) adaptation of the structure and content of pedagogical activity to the global education system; c) taking into account national spiritual and cultural traditions in the education system, d) the need to develop a methodology for studying the scientific basis for the formation of the modern level of science and culture;

e) Checking the learning process for synergistic methodology.

The object of research is the process of a synergistic approach to the structure of the standards for the content of the physics course in grades VI-IX of a general education school, the definition of a modern model of a physics lesson and the content of teaching materials provided at individual stages of the lesson.

The subject of research. Scientific and methodological substantiation of a synergistic approach to the structure of standards for the content of a physics course in grades VI-IX of general education schools, the definition of a modern model of a lesson in physics and the content of educational and methodological materials submitted at individual stages of the lesson.

The aim of the research to provide a synergistic approach to the structure of the standards for the content of physics courses in grades VI-IX of general education schools, to determine the modern model of a lesson in physics and to provide a synergistic approach to the content of teaching materials at some stages of the lesson.

Research hypothesis: if the conditions of synergy are determined and observed in the approach to the structure of the standards for the content of the physics course in grades VI-IX, the definition of the modern model of the physics lesson and the content of educational and methodological materials published at individual stages of the lesson, the corresponding cases of synergy are realized, quality improvement can be achieved .

In accordance with the purpose, subject, task and hypothesis of the study, the following tasks were defined:

1. Reveal the essence and basic principles of synergy based on the analysis of available scientific and methodological literature.

2. To analyze the dynamics of the formation of the physical landscape of the world and determine its place in the teaching of physics

in a secondary school.

3. Analysis of scientific and methodological work, substantiating the need for a synergistic approach to education.

4. Overview of the synergetic methodology of the educational process.

5. Analyze research in the field of a synergistic approach to teaching physics in a secondary school.

6. Determine the conditions for synergy in the teaching of physics materials in a secondary school.

7. Secondary schools VI-IX. To identify cases of synergy in teaching physics in the classroom.

8. With a pedagogical experiment in grades VI-IX of secondary schools:

• Select and develop criteria to measure the impact of students' interest in the subject and the quality of their knowledge on related topics, with a synergetic approach to building physics teaching based on a modern lesson model and teaching content materials at some stage of the lesson;

• Checking the accuracy of the research hypothesis with the mathematical and statistical method used in pedagogical research.

In the course of the study, methods known in pedagogical research were used: theoretical analysis; pedagogical supervision; pedagogical interview; study of documents; mathematical and statistical methods; pedagogical experiment.

The **pedagogical study** was carried out in three stages: confirmatory, research and instructive. The experiment was carried out in 2013-2017.

The **scientific novelty of the researh** is determined by the following provisions:

The necessity of a synergistic approach to the structure of standards for the content of physics courses in grades VI-IX of general education schools, the definition of a modern model of physics lessons and the content of teaching materials provided at individual stages of the lesson is theoretically substantiated. ;

- a classification of synergetic cases is given by determining in which cases the teaching materials of the physics course of classes VI-

IX satisfy the conditions of synergy;

- It is shown that the classified cases of synergy are not enough for a complete study of physics as a whole.

The practical significance of the research: lies in the fact that it will provide a synergistic approach to improving the content standards in physics for the corresponding classes of general and senior secondary education, adapting physics textbooks to modern lesson models, as well as deepening the content of teaching aids in physics, increasing interest and students' knowledge.

The theoretical significance of the research: lies in the definition of complex systemic, multivariate, unbalanced systems, non-linear development, self-organization, bifurcation, chaos-order relations from the point of view of synergy in the process of teaching physics in grades VI-IX of secondary schools. and the synergetic approach is characterized as a methodological principle. The development of synergy through updating the content of teaching materials and the lesson model is demonstrated and confirmed by analyzing the content standards of the respective classes, the content of some teaching materials and the current state of the educational process.

The basis of the research. As a basic school for all phases of the pedagogical experiment, the city of Baku Adalat Abbasov 257, Gusar district Gulaliyev Elkhan 2, Khachmaz district Khudat, Telman Farzaliyev city 1, Gusarchay village of Khachmaz district Arif Mammadov were filled with secondary schools.

The study covers the years 2012-2017.

The following provisions apply to defense:

1. The structure of the content standards of the VI-IX class physics course of general education schools, the construction of physics education based on the modern lesson model, and the content of not all teaching materials in some stages of the lesson in physics education, which is not based on the principle of superposition , theoretical and practical justification of the need for a synergistic approach to providing training materials that create conditions for non-linearity and meet the conditions of synergism in individual cases

2. The process of teaching physics in the VI-IX classes of general education schools can be defined as a subset of subsystems where

complex, multivariate, non-equilibrium, nonlinear, self-organization, bifurcation-induced, chaotic relationships exist.

3. Theoretical justification of the sameness of the development mechanism in the cases of synergism determined in the structure and content of physics teaching materials in VI-IX classes of general education schools.

4. Adaptation of the structure and content of teaching materials in physics textbooks VI-IX classes to an improved 7E learning model that meets synergistic requirements does not complicate the learning process, but has a positive impact on improving the level of scientific and practical application of physics courses in those classes.

Approbation of the research. The results of the research were presented at the International Symposium on Teacher Training Policies and Problems held in Baku (2013); International Inservice Program and Symposium at Gazi University, Turkey 21-23 0ctober 2015; At the International Balkan Egitim and Education Congress held at Thrace University, Turkey (16-18 October 2014); Training at the Hacettepe University, Turkey, was tested at the 4th ISPITE International Symposium on Politics and Challenges (May 15-16, 2014).

Structure of the dissertation. The dissertation consists of an introduction (15506), chapter I (48617 characters), chapter II (94373 characters), chapter III (34505 characters), conclusion (2557 characters), a list of used literature and appendices. A total of 214515 characters.

THE MAİN CONTENT OF THE RESEARCH

The introduction is based on the relevance of the chosen topic, the subject and the subject of the research, the purpose, objectives and hypothesis of the research, the research methods identified, its novelty, theoretical and practical significance, the methodological basis of the research.

I chapter named **"The Importance of Synergetic Approach and its Use in Teaching Physics in Secondary Schools"** consists of three subchapters.

The first half of the book, "An Analysis of the Dynamics of Physics World Formation," states that the main purpose of physics

education in secondary schools is to form a scientific outlook on physics fitness (DFM) in students. DFM plays an important role in physics education, as it is a key tool in systematizing and summarizing theoretical and empirical material from physics, and mastering physics theory and laws. Synergetics, emerging as a new theory of physics science, opened the way for new methodological, ideological, gnoseological and ontological systems of science, art, and culture at DFM.

The main ideas of the world's synergistic landscape are categorized as follows: the world is viewed as supersystem - the synergy studies the objects of research as a system of numerous elements, and the world is in a continuous global movement. This process consists of periodic disintegration and the emergence of new ones in the path of self-organization and complexity, where self-organization and complexity are possible only in open dissipative systems. This means that synergistic systems are constantly in the metabolism of matter, energy and information with the environment and are far from thermodynamic equilibrium; development takes place on nonlinear laws. Nonlinearity is the multivariate and alternative ways to get out of balance.

The second subchapter, named "The essence of synergetics: its basic principles," is described as a gnosological scientific theory that penetrates all areas of scientific cognition, and explains its principles.

The third part, entitled “The Need for a Synergistic Approach to Training: The Conceptual and Contemporary Solution of the Problem,” is systematized by the study of the work of world scientists, including Russian and Azerbaijani scientists on the use of synergism in training. Haken and Prigoji’s ideas, the creators of synergetics, have been interpreted from the perspective of the problem. It is their ideas that need to be implemented in the form of a series of interrelated phases of physics training in VI-IX classes of secondary schools.

There were substantiated ideas and suggestions on the need for a synergistic approach to the pedagogical process of V.G.Budanov, S.P.Kurdyumov, Y.N.Knyazeva, V.Q.Vinenko, A.D.Sukhanov, V.M.Kureychik, V.I.Pisarenko, V.A.Ignatova, I.S.Yakimanskaya, V.M.Rozin – foreign countries scientists.

The training summarizes examples and suggestions regarding the need for synergistic use were given in A.F.Abbasov, T.B.Allahyarova, M.I.Murguzov, F.M.Gurbanov, N.Y.Safarov – Azerbaijani scientists works.

The semifinal concludes that the scientific and pedagogical literature has investigated the philosophical essence of synergetics, principles, and pedagogical functions, and the use of synergistic ideas in physics education in mainstream schools, despite the need for a synergistic approach to the pedagogical process.

Chapter II consists of three-and-a-half chapters entitled "Use of a Synergetic Approach to Teaching of Physics Materials of VI-IX classes and its Impact on Learning Outcomes". The first section, entitled "Conditions of Synergism in Training and Cases of Synergy in Physics Education" defines the requirements for synergism in the learning process, which are called "conditions of synergism":

a) There are two or more sources of knowledge serving the same purpose;

b) knowledge systems derived from those sources of knowledge should be formed as the successors of each other; knowledge systems that are inherited from each other are analogues of each other; the inherited knowledge system has the same knowledge elements as the successor system of knowledge;

c) Integration of analogue knowledge systems with the aim of forming a new knowledge system - it is necessary to work together, to develop. This integration creates an environment of synergism (similar to the development of two drugs currently used in medicine);

d) synergism in the shared use of similar knowledge systems; these knowledge systems help each other to formulate a system of intended knowledge (which is similar to the use of prescribed drugs, while each drug fulfills its functions during the simultaneous administration of the drug);

e) The result of synergism is much more dependent on the co-operation of similar knowledge systems. When they are not used in a particular sequence, the synergism results in minimal, in other words, coherence and agreement in the use of knowledge (such as using the combined medication according to the doctor's prescription (eg 3 times

a day, 15 minutes after meals). treatment fails)

f) The role of the teacher in providing the coherence of the knowledge system and the activity of the student (such as the correct appointment of the doctor, the patient's adherence to this role, and the special role in the treatment of the disease).

In the semi-section it is shown that the greater the number of sources of knowledge that contribute to the field of knowledge of the electric field (multivariate), the more this “earned knowledge” will be gained by synergism. This is the essence of the system's multi-variability in synergetics.

Multiple synergies in synergetics enable the identification of several synergies in physics education in public schools.

• Synergy between classroom learning materials. It is known that the training material of each class was chosen to balance the requirements of several content standards. The standards of the standards mean that the training materials that follow their requirements are the successor and the counterpart of each other. Such analogies create an environment of synergism, that is, the upper class material that meets any standard is learned as the successor to the lower class material that meets that standard. Through the synergism of cognitive systems derived from the training of lower and upper class materials that meet the same standard, the knowledge system is expanded and enriched to balance the requirements of that standard.

• Synergy between subject topics and other subject topics that balance the requirements of the same sub-standard.

The knowledge gained from different subjects in order to meet the requirements of the same sub-standard is similar. These analogies create an environment of synergism. A knowledge system that balances the requirements of this sub-standard is enriched by the synergism of knowledge systems derived from the training of various subjects that meet the requirements of any sub-standard.

The interdisciplinary link provides synergism between the subject matter. The interdisciplinary link provides synergism between one subject and the other. Hence, interdisciplinary and interdisciplinary communication was created for the purpose of synergism.

• Synergy between the training stages on the topic.

• Synergy between sub-standards.

• Synergy between students' knowledge when solving a problem by a student's team.

The fifth chapter, entitled "Interdisciplinary Integration as a Provider of Synergism," also provides a justification. We talked about the multiple options in synergetics. For a broad and deep knowledge system that balances the requirements of sub-standards, it is necessary to have a greater number of knowledge sources (sub-systems) that contribute to that system. This means that the higher the number of degrees of freedom of the knowledge system.

In the first half, the synergistic environment for the integration of physics education with separate disciplines is explained, and the result is: using the integration tables to combine similar knowledge gained from other disciplines with the use of synergistic knowledge.

The role of synergism in the use of the 7E training model in physics education is based on the use of step-by-step training models (5E, 7E) in science education in developed countries to ensure synergism and development.

The dissertation outlines the shortages of the 5E model and provides a diagram of the transition between these models.

To consider the fact that physics is an experimental subject and that physics is the basis of modern techniques, production and scientific and technical revolutions, we think it is advisable to divide the stage into three parts. These are the parts of "Research", "Your Life" and "Assess Yourself".

Chapter III, named "Pedagogical Experiment and Its Consequences," consists of two sub-chapter. The first half of the article, named "Purposes and Objectives of Pedagogical Experiment, Methods of Organization and Conduct," opens the nature of the experiment. Pedagogical experiment was carried out in three stages: descriptive, exploratory, and educational experiments. The goals and objectives of each stage are defined.

A total of 594 students participated in the pedagogical experiment, including 145 in VI classes, 148 in VII, 144 in VIII, and 157 in IX classes.

In the 2013/14 academic year, schools performed a provocative

experiment. Performing the objectives of this phase, the physics textbooks and methodological resources for teachers in VI-IX classes were analyzed in terms of synergistic approach to the implementation of the content content and teaching process, attended by teachers and students in the classroom.

While examining the structure, content and current state of the physics course in VI-IX classes, it became clear that many of the topics were poorly utilized in interdisciplinary and interdisciplinary integration, and students may have difficulty recalling the basics of these topics. From the conversations with the students, it became clear that they were not able to actively participate in the new stages of the topic, whether they remembered the knowledge gained in physics or other subjects during the "Interests" and "Exchange and Discussion" stages. they have difficulty applying it to practice. Therefore, it was found that the need for placing an additional block to remember the beginning of the topics in the textbook was sufficient to achieve the purpose of the study.

In the VI-IX classes, a frontal survey was conducted with students to apply synergism in the learning process. Subsequently, the subject teachers participated in the VI-IX classes on various topics, monitored the activities of subject teachers and students, organized lesson discussions, interviewed teachers about the research problem, listened to their advice, and provided the necessary recommendations.

At the end of the first half of the school year, tests were conducted in classes VI-IX to test the overall learning outcomes of students according to the classroom standards in terms of physics literacy (one test case is given in Appendix 2). The results of these classroom inspections are shown in Table 1.

In the 2014-2015 academic year, a search experiment was conducted. At this stage, the quality of the students' knowledge and skills on the topics studied was studied. According to the researcher's recommendation, in the VI-IX classes of the schools where the pedagogical experiment was conducted, the physics teachers should apply new knowledge and skills gained during previous years to gain new knowledge and skills gained in physics and other natural sciences. . Based on these records, generalizations were made at the end of the school year.

Table 1

Schools	Classes		Number of students (n)	Grades				Indicator of success $k_m = \frac{(m_3 + m_4)}{n} \cdot 100\%$
				2(m_1)	3(m_2)	4(m_3)	5(m_4)	
CSS N257 to Baku city named after Adalat Abbasov	E	6^a	22	2	10	8	2	45,45
	N	6^b	23	2	11	8	2	43,48
	E	7^a	26	2	15	7	2	34,61
	N	7^b	26	3	15	7	1	30,77
	E	8^a	24	1	10	8	5	54,17
	N	8^b	22	2	9	7	4	50,00
	E	9^a	25	1	13	7	3	40,00
	N	9^b	23	1	12	8	2	43,48
CSS N2 to Gusar region named after Elkhan Gulaliyev	E	6^a	19	1	9	8	1	47,37
	N	6^b	19	1	10	7	1	42,11
	E	7^a	17	1	8	7	1	47,06
	N	7^b	17	2	6	9	0	52,95
	E	8^a	19	1	9	7	2	47,37
	N	8^b	17	1	8	6	2	47,06

	E	9^a	18	1	9	6	2	44,44
	N	9^b	16	1	7	7	1	50,00
CSS N1 to Khudat city named after Telman Farzaliyev	E	6^a	17	1	9	6	1	41,18
	N	6^b	17	2	8	6	1	41,18
	E	7^a	18	1	11	5	1	33,33
	N	7^b	16	1	10	4	1	31,25
	E	8^a	15	1	9	4	1	33,33
	N	8^b	15	1	8	4	2	40,00
	E	9^a	19	1	10	7	1	47,37
	N	9^b	20	1	11	7	1	40,00
CSS to Gusarchay vilage, Khachmaz region named after Arif Mammadov	E	6^a	16	1	8	6	1	43,75
	N	6^b	17	2	8	6	1	41,18
	E	7^a	16	1	10	5	0	31,25
	N	7^b	16	1	9	5	1	37,50
	E	8^a	16	1	7	6	2	50,00
	N	8^b	17	1	8	6	2	47,06
	E	9^a	17	2	9	6	0	35,29
	N	9^b	15	2	8	5	0	33,33

At the end of the exploratory experiment, we came to the conclusion that the structure and content of physics in all experimental classes was based on the 7E model in order to provide synergism in physics education in VI-IX classes during the experimental experiment. It should begin with the “Remember (or Remember)” phase, followed by successive stages such as “Interests”, “Research”, and “Sharing and Discussion”, “Deepening”, “Implementing” and “What You Learn” with new knowledge. It is advisable to organize.

The course "Implementation" of the lesson consists of 3 parts - "Free research" (here is the performance of a simple school experiment or solution of various issues); “Coordination with Life” - the application of the acquired knowledge to the solution of scientific, domestic and industrial issues; In the section "Assess Yourself" is an independent assessment of the students' physics literacy and the extent to which they acquire the knowledge.

The semi-section entitled "Results of Pedagogical Experience" states that the improvement of the structure and content of materials in class VI-IX physics textbooks, as well as the methodology of its teaching, led the pedagogical experiment to determine the level of influence of students' interests and knowledge on the subject.

The students were divided into five groups (zero-level, low-level, middle-level, high-level, and high-level) according to their level of interest in physics.

These levels are graded on a 50-point scale: zero-level - 10 points; low level 10,1÷20 points; average level 20,1÷30 points; 30.1÷40 points above average; high level 40,1÷50 points. Subsequently, the average value of the development dynamics of students' interest in physics was calculated by means of the above equality:

$$K_i = \frac{n_3 + n_4 + n_5}{n} \cdot 100\%. \quad (1)$$

Where n is the number of students; $n_3, n_4 və\ n_5$ the number of students who showed results at Levels III, IV and V respectively; - a percentage of the variance in students' physics interests in physics.

Based on these indicators, the results of the experimental and

control classes were examined in three stages: Phase I - the beginning of the exploratory experiment; Phase II - the end of the exploratory experiment and the beginning of the experimental experiment; Stage III - the end of the educational experiment.

The accuracy of the results was verified by a mathematical statistical method defined for pedagogical research. The results obtained at the end of the learning experiment are presented in the following table (table 2).

The difference between these results obtained in the experimental and control classes is more pronounced in the diagram 1.

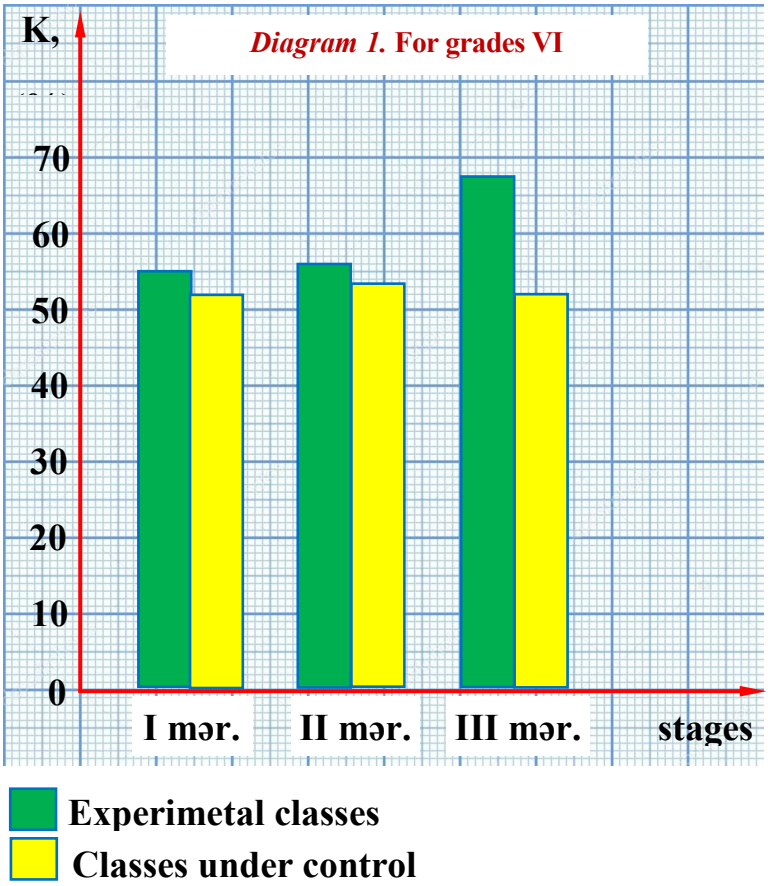

Table 2

Stages	Classes		Number of students	The level of development of cognitive interests in physics										$K_i = \frac{n_3 + n_4 + n_5}{n} \cdot 100\%$
				zero		Below		Medium		High than medium		High		
				%	n_1	%	n_2	%	n_3	%	n_4	%	n_5	
I	VI	E	77	1,3	1	44,15	34	33,77	26	19,48	15	1,3	1	54,55
		N	75	1,33	1	46,67	35	32,00	24	18,67	14	1,33	1	52,00
	VII	E	74	2,7	2	56,76	42	28,38	21	10,81	8	1,35	1	40,54
		N	76	2,63	2	53,95	41	27,63	21	15,79	12	0	0	43,42
	VIII	E	77	1,3	1	42,85	33	35,06	27	16,88	13	2,60	2	54,54
		N	75	1,33	1	44,00	33	34,67	26	17,33	13	2,66	2	54,66
	IX	E	74	2,7	2	45,95	34	33,78	25	16,22	12	1,35	1	51,35
		N	71	1,41	1	47,89	34	35,21	25	14,08	10	1,41	1	50,70
II	VI	E	77	1,3	1	37,66	29	32,47	25	23,38	18	5,19	4	61,04
		N	75	1,33	1	45,33	34	32,00	24	20,00	15	1,33	1	53,33
	VII	E	74	1,35	1	41,89	31	33,78	25	16,22	12	6,76	5	56,76
		N	76	1,32	1	53,94	41	27,63	21	15,79	12	1,32	1	44,74

	VIII	E	77	1,3	0	40,26	31	36,36	28	18,18	14	5,20	4	59,74
		N	75	1,33	1	42,67	32	36,00	27	17,33	13	2,67	2	56,00
	IX	E	74	0	0	43,24	32	29,73	22	21,62	16	5,41	4	56,76
		N	71	1,41	1	45,07	32	36,62	26	15,49	11	1,41	1	53,52
III	VI	E	77	0	0	32,46	25	25,97	20	31,17	24	10,40	8	67,54
		N	75	1,33	1	46,67	35	32,00	24	18,67	14	1,33	1	52,00
	VII	E	74	0	0	41,89	24	32,43	21	18,92	22	6,76	7	67,57
		N	76	1,32	1	50,00	38	30,26	23	17,11	13	1,32	1	48,69
	VIII	E	77	0	0	35,07	16	38,96	30	16,88	19	9,09	12	79,22
		N	75	1,33	1	41,33	31	37,33	28	17,33	13	2,67	2	57,33
	IX	E	74	0	0	32,43	24	32,43	24	22,98	17	12,16	9	67,57
		N	71	1,41	1	43,66	31	35,21	25	16,90	12	2,82	2	54,93

The results of the Pedagogical Experiment are given in the half-way and it is emphasized that the experiment confirms the hypothesis of the proposed research.

The results of the research are as follows:

1. The need to use a synergistic approach to teaching physics in secondary schools is theoretically justified by analyzing the scientific and methodological literature on synergetic pedagogy.

2. The definition of physics education in VI-IX classes of general education schools is complex, multivariate, non-equilibrium, nonlinear, self-organized, bifurcational, chaos-system relations, as a subset of subsystems, the synergetic approach was characterized as a methodological principle.

3. The terms and conditions for the content and structure of the training materials have been identified and combined under the terms "synergy terms" in order to use a synergistic approach to teaching physics in general education schools.

4. The following classification of cases of synergism was defined by examining the cases under which physics education materials of VI-IX classes meet the conditions of synergism:

a) synergy between classroom learning materials;

b) synergism between subject topics and other disciplines that balance the requirements of the same sub-standard;

c) Synergy between the training stages within the topic;

d) synergy between sub-standards;

e) Synergy between students' knowledge when solving a problem by a student's team.

5. It has been established that there is insufficient number of synergistic classifications for Class VI-IX physics materials for a comprehensive study of physics. To do this, the content and structure of the training materials should be changed in such a way that these materials can be learned as successors in the learning process.

6. Separate mechanisms of earning knowledge in the case of synergies present in the teaching of physics materials of VI, VII, VIII and IX classes have been established and the concept of "synergism is a guarantee of development" has been established.

7. Pedagogical experiment has shown that the adaptation of

appropriate classroom textbooks to improved learning models, which partly provide synergistic conditions for the structure and content of the textbooks in order to provide a synergistic approach to classroom physics education. This will result in the development of generalization skills, as well as improved knowledge and increased personal responsibility in the classroom.

8. The structure and content of textbooks in the textbooks on the basis of modern pedagogical and psychological principles, which provide the synergistic approach to physics education of VI-IX classes, does not complicate the learning process; indicates

The pedagogical experiment confirmed the working hypothesis of our research.

The main contents of the dissertation are reflected in the following works of the author:

1. The need and main directions of synergetic approach to general education - synergetics in physics education. // Pedagogical University News. 20013, No. 4, pp. 447-449

2. Synergetic approach to physics education in general secondary school. International Symposium "Teacher Training Policies and Problems" dedicated to the 90th anniversary of national leader Heydar Aliyev. BAKI 2013 p. 153

3. High Guality of Future Physics Training Teachers under synergic conditions. International In-Service Program 19-21 october and Symposium 21-23 0ctober 2015. Gazi Education Faculty, Gazi University, Ankara / Turkey p.35

4. International Balkan Egitim and Education Congress "21st Century Synergetic Education Age". Thrace University, Edirne / Turkey, 16-18 october 2014, p. 415

5. Formation of a modern scientific outlook based on synergistic ideas in the preparation of future physics teachers. International Symposium on Teacher Education and Problems IV ISPITE 2014. 15-16 May 2014, Hacettepe University, Egitim Faculty. Beytepe Campus, Ankara / Turkey 206–208

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