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### INFORMATIVE – TRAINING ENVIRONMENT OF A MATHEMATICS LESSON

*The problems of the notions « space » and « environment » systematization are analysed in the article. The units of informative-training environment design of a Mathematics lesson are pointed out and the algorithm of the programme-methodic unit systematization that is significant for the process of training is developed.*

**Key notions :** space, environment, informative- training environment.

**Setting of the problem.** At the modern stage of the society's development in the process of constant changes of the labor market structure, availability of various kinds of information, rapid renovation of technologies, intensive growth of highly-technological manufacturing the essential changes in education, school in particular, take place. In the contents of the National strategy of education development the trends for the forthcoming decades are defined, first of all changes touch the perception of the aim of education: rising of availability of high-quality, competitive education for the citizens of Ukraine in accordance with the demands of the innovating stable development of the society, economics and every citizen ; guarantee of the personal development of a person in accordance with her/ his individual potential, abilities, needs on the basis of training during the whole life time [1]. In the result education must promote creativity formation of a person, that is the main factor of economic growth, national and personal competitive ability ; to answer an individual's requests, taking into consideration her/his significance and self-identification.

The above-mentioned, on the one hand is the reason for examining the important question of the providing environmental approach in school education, particularly in the sphere of the educational process organization at classes and at out-of-class activities. The enlightening of this question is connected with modernization of the contents of education, implementation of innovative didactical and means aids and as a result with renewal of the methodic support of training.

**Presentation of the main material.** The study of the environment design problem as the necessary condition of the effective implementation of the competence-orientated process of training is up to date, actual and needs system examination and regulation.

The analysis of the state of research and publications of national and foreign scientists showed that the notions «environment» and «space» were the subject of scientific reserch of many national and foreign scientists. Thus V. Bolgarina, L. Vashchenko, L. Vigotski, O. Leontiev, V. Panov, V. Rubtsov, S. Rubinshtein, O. Savchenko, A. Tsimbalaru, V. Yasvin examine the problem of school educational environment in their works. V. Artemenko, M. Glibovets, M. Zhuk, O. Kuzminska, N. Morze, O. Polotai consider the educational environment to be the object of design and the means of competence acquisition. V. Bikov, V. Gumeniuk, M. Zgurovski, V. Izvozchikov, V. Rudenko, etc. Examined the problems of education informatization, creation and functioning of the systems of information processes

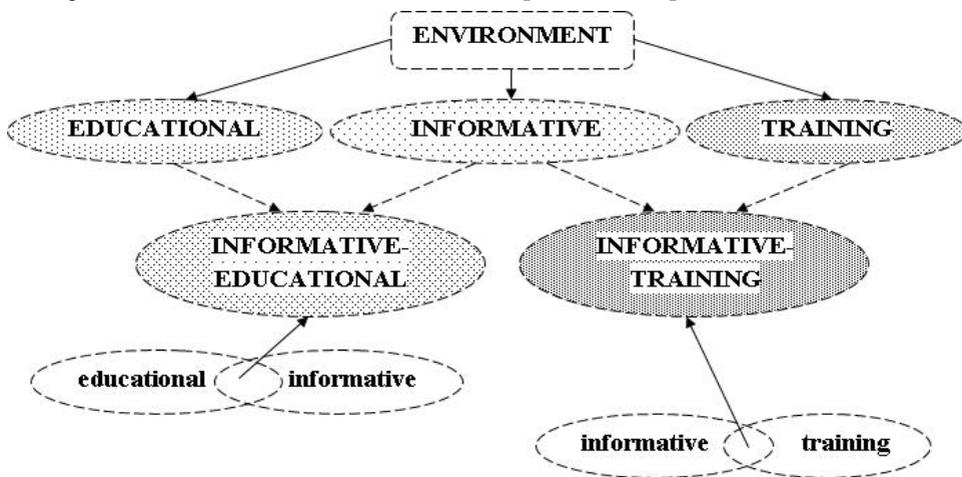
control, systematization of training environment. The investigations of V. Bikov, R. Gurevich, M. Zhaldak, I. Zakharova, I. Kukharenko, Y. Mashbits, E. Polat, S. Sisoieva, T. Chernetska, etc. Were devoted to the problem of informative-educational environment creation. But without denying the weightly contribution of above mentioned authors into the solving of the given problem it is necessary to mention that the question being discussed needs system examining and systematization.

The notions «space» and «environment» are quite polysemantic, their modern interpretation in education is considered to be an objective or subjective phenomenon connected with the individual.

The dictionary of the Ukrainian language [3] gives three meanings of the word «space», in particula: the absence of any limitation or barriers in something.

The word «environment» according to the same dictionary is given in three meanings : substance, body that fills some space and has specific property, sphere; complex of natural conditions, where life-sustaining activity of some organism takes place; social conditions where the life of a person takes place, environment. Thus, spaces are constructs of higher order as opposed to environments. There may be some environments in the space. The construct «environment» reflects the interrelation of the conditions that provide a person development. However the presence of a person in the environment, mutual influence, interaction of the environment and a person is provided. In the notion of space itself the involving of a person is not meant. The space may exist independently.

In literature such notions as «informative environment», «informative space», «educational environment», «educational space», «informative-educational environment», «training space», etc. are being met. The notions mentioned characterise different aspects of environment and space and to systematize them we should separate the word «space / environment». In the terms above mentioned one (simple) word or the combination of two words (complex) is left. The complexity indicated will be taken as a basis for generalizing of the terms. Lets examine in more detail «simple notions» and then «complex notions» that are regulated from various combinations of «simple notions» (pic.1).



Pic. 1. Streamlining environment

From Y. Shreider's point of view the peculiarity of the informative environment is «the possibility of getting necessary data, statements, hypotheses, theories, etc.» that turns it into some data bank or a guide of information [4]. But at that time the scientist pays attention to the fact that the ability to use information for some purpose defined should be specially developed in the process of training, namely it is necessary to create conditions for it persistently.

Informative environment is being examined in many aspects: firstly as one of the activity sides (a person is considered to be a member of the communication process), that is from the point of view of his/her ability to imagine personal knowledge in the form of information and having accepted the information to turn it into his/her own knowledge; secondly as a system of historically formed forms of communication; thirdly as information infrastructure created by the whole society that permits to put the communicative activity into practice on a scale that answer the level of the development of this society: publishers, libraries, information centers, data banks, mass media, etc.

One of the informative environment peculiarities is that it gives the possibility to get information necessary for a person and on the basis of the skills development to use it, permits to turn it into information.

Thus, if the informative space is formed in the result of all mankind's life-sustaining activity and is too conservative as for changes, the informative environment on the other hand is formed by the efforts of a separate group of people and is a dynamic one. If we examine the informative environment in educational process we will see that this environment is formed: by a teacher (defines the contents of the programme, the choice of educational material, etc.); by the educational institution teaching staff (defines the general requirements as for pupils, keeps the traditions of the given educational institution alive, the form of the relations between pupils and teachers, etc.); by the state as the social institution (defines the material security of education in whole, social services commissioning to form some system of knowledge, etc.).

The notion «educational environment» is more strict. Analysing different approaches to the problem of educational environment we see certain unanimity in the consideration of this term. Scientists direct their research from the perspective of the specific environment of the educational institution as the educational environment is the complex of material factors; space-object factors; social elements; interpersonal relations. All given elements are interrelated, they complete, enrich one another and influence every subject of the educational environment. At the same time the educational environment is formed by a person and is influenced by this person.

Speaking about training environments we mean interrelating processes of training (study) and teaching. The notion «training environment» is the specification of «educational environment», as the educational environment may include a great deal of training environments, but as opposed to the educational environment that may exist either in an organized way or spontaneously, training environments are always specially organized. V. Bikov interprets the term «training environment» as «an artificially built system, the structure and components of which promote the achievement of the educational process goals. The training environment structure defines its internal structure, interrelation and interdependence of its elements. The elements (objects, components, elements are indivisible parts) of the training environment. They serve on the one hand as its attributes

or the aspects of consideration that define the contents and material fullness of the training environment but on the other hand they serve as the resources of the training environment that are involved into the activity of the participants of the educational process, acquiring in this case the characteristics of education and upbringing facilities » [5]. Thus, the training environment is considered to be the interrelation of particular material, communicative and social conditions that guarantee teaching and study processes. In this case the pupil's presence in the environment and organization of mutual influence and interaction between the environment and a person are provided. To our mind the training environment is the specially organized environment that is aimed at the formation of the pupil's basic knowledge, skills, experience, attitudes, where the goals, contents, methods and organization forms of training become variative and accessible for the changes within the limits of a certain lesson. In other words, it is the outer organization of the pupil's activity aimed at satisfying his inner requirements that is the realization of the child's training and development processes.

Let's examine the complex notions such as «informative-educational environment» and «informative-training environment». Using it we run into the term «environment» more often than into the term «space». To our mind it can be explained by the fact that these notions are composed as the junction of «simple notions» and it gives certain limitation to their interpretation.

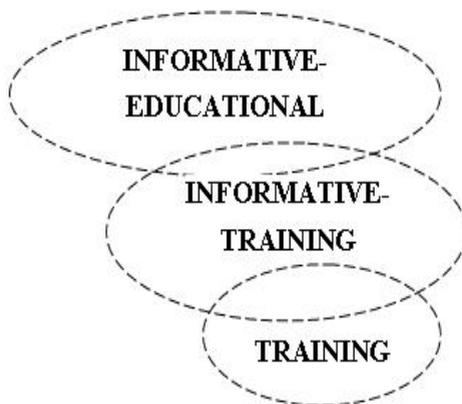
Some scientists consider informative-educational environment to be a system-organised complex of the means of data transfer, information resources, interaction records, hardware and programme, organization and methodics guarantee, that is aimed at satisfaction of users' needs. In the strict sense informative-educational environment is understood as some interrelated educational institutions existing under information interchange organized with the help of different software [6].

Analysing the approaches to the interpretation of the notions «informative-training environment» we see the unanimity in formulation. For example G. Omelianenko considers the informative-training environment to be a constantly developing knowledge base that unites the materials that are various, for the purpose intended, contents and form that take account of levels of a person's training into a united intergrated system. T. Semakova states this notion as an automated training system that includes didactical, methodic and informative materials on the educational subject and at the same time data ware that permits to use them for individual reception and academic performance rating in complex. The informative-training environment V. Oleksenko considers to be the environment that promotes emergence and development of the processes of informative-training interaction between students, teachers and means of new information technologies, and at the same time it promotes the formation of students' cognitive activity on condition that the environment components will include the subject contents of a certain course of study.

Thus while designing the informative-training environment it is necessary to take into account the complex of conditions that guarantee the process of training ;

- availability of the means of «communication» system;
- availability of individual work system as for the work with information and its preservation;
- availability of operable linkage functions between the participants of the educational process;
- availability of the functions of educational materials processing and renewal.

From above mentioned we specify the hierarchic subordination of the notions (pic.2).



Taking into consideration scientific works and authors' views of the investigations mentioned above, we offer some stages for designing the informative-training environment of a Mathematics lesson. The algorithm of design contains five units: value and objective, curriculum and methodic, informative and knowledge, communicative, technological.

Value and objective unit includes a set of aims and tasks of teaching Mathematics with a step-by-step concretization (State standard of the basic and full general secondary education. Mathematics. Educational curriculum for the pupils of the 5<sup>th</sup> -9<sup>th</sup> forms of general educational establishments. Educational theme. Lesson.) and technological scheme of their change and achievement. Curriculum and methodic unit contains all necessary information as for possible strategies, forms and curricula for pupils' teaching and methodical supplies for providing educational process. Informative and knowledge unit includes a complex of educational materials appropriate for every stage of education; systems of indexes, criteria of evaluation. Communicative unit contains some forms of interaction between individuals. Technological unit includes educational facilities (traditional and modern).

We offer the stages of designing the curriculum and methodic unit.

Stage 1. Design provides systematization of the study themes scheduling on the basis of the curriculum and annual methodical recommendations. Thus, while getting ready for the lesson the teacher will be able to work not only with the material that is learnt at some certain lesson but also with the contents of adjacent lessons. Moreover, he examines the lessons to the extent of the whole theme that allows to plan the system of lessons.

Stage 2. Concretization of the lesson aim that is based upon determination of the subject and key competences and general aims of studying appropriate themes. It correlates with the contents of the educational material and pupils' educational peculiarities. The aim is formulated by singling out practical, developmental and educational components. The teacher's most important task at this stage is taking into account systematic and consistent ways of the individual's competence formation.

Stage 3. The division of the contents of a lesson theme into case studies depending on its structure – theoretical knowledge, practical usage of theoretical knowledge, formation

of the ways of activity etc. While designing every case study the teacher should take into account efficient division of time among them.

Stage 4. The formulation of goal-oriented tasks to every case study, the choice of teaching methods and devices that are advisable for every goal-oriented task in accordance with its didactic functions and the contents of the educational material and the choice of the forms of organization of the pupils' studying activities that correspond to the contents and methods of the work. At this stage the teacher should:

1. Choose teaching methods. The following classifications of the teaching methods are considered to be the most widely used in pedagogics: according to the source of transmitting and perception of the training information: verbal, visual, practical (S. Petrovski, Ye. Holant); according to the character of the pupils' cognitive activity: explanatory-illustrative, reproductive, topical, partially searching, research (I. Lerner, M. Skatkin); classification in the context of the integral approach to the activity in the process of study course – methods of organization and studying-cognitive activity realization; pupil's stimulation and motivation, control, self-control, mutual control and correction, self-correction, mutual correction in studying (Yu. Babanski).

2. Teaching devices are certain operations, teacher's and pupils' cognitive or practical acts which reveal or enlarge the way of material learning that expresses the given method. For example, the devices of mental activity activation during oral presentation of knowledge (comparison, confrontation); stimulation, control, mutual control and self-control devices; method of conversation (includes the following devices: presentation of information, attention and thinking activation), memorizing device, illustration, demonstration devices etc.

3. To choose the form of the pupils' studying activity organization that will correspond to the contents and methods of the work.

The following forms of the pupils' studying activity organization are distinguished in pedagogics: individual, pair, group, frontal, collective.

4. Choose and systematize educational facilities. The most widely used of them are: the objects of the environment taken au naturel or prepared for training tasks (live and dried up plants, samples of rock formations, minerals, machines and its parts, archeological findings and etc.); models of machines, mechanisms, devices, buildings and etc; dummies and moulages; self-made cards, brochures, fliers etc; devices and means for demonstrational experiments; graphic means (drawings, pictures, geographical maps, schemes); teaching aids (smart board, multimedia projector, system for interactive testing etc); textbooks, manuals, encyclopedias.

According to the subject of activity educational facilities can be theoretically divided into teaching facilities and learning facilities. Teaching facilities are mainly used by the teacher for explaining study material and pupils use learning facilities for mastering it. At the same time some part of educational facilities can be of both kinds depending on the stage of the study course. To use educational facilities at the lesson the teacher needs to choose some appropriate quantity of them, work out the technology of their usage.

Stage 5. Technological interrelation setting while choosing the contents, methods, devices and forms of study with the planned aim and predicted, expected result-based orientation.

Let's single out some certain methodic tasks of the teacher the solution of which

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will promote the realization of the given stage. The teacher should: single out the basic text situations that must be outlined obligatory; work out the ways for directing pupils' attention to the main theoretical/practical situations of the lesson; determine the devices of positive motivation formation; establish cross-curriculum contacts of the lesson with disciplines of general education; choose practical tasks that are based on pupils' life and study experience; choose the methods of textbooks and manuals usage at the lesson and while doing independent homework; choose the devices of solution educational aim at the lesson.

Stage 6. The formulation of students' academic performance rating technology. The main attention here should be paid to the inline control because its efficiency is defined by the frequency of holding and the volume of the material controlled.

Stage 7. Regulation of homework volume and contents. With the aim of the training process personalization it is necessary to differentiate homework volume and complicity for different student groups according to their proficiency.

The example of filling out.

The sources of methodic information :

1. Scientific-methodic, methodic aids.
2. Articles.
3. Websites.

The sources of training information :

4. Main textbook.
5. Additional textbooks, training and electronic aids.
6. Websites.
7. Additional training materials (printed, electronic).

Name	Form	Appendix number
Card for individual work	Printed	Appendix 1
Tests	Electronic	Appendix 2

The aim of the lesson (*is formulated according to the character of pupils' activity*): study constituent; developmental constituent; educative constituent.

Technical equipment and software.

Course of the lesson

Index number and the name of the structural stage of the lesson

Teacher's activity				pupils activity	
Goal-oriented task	Aim	Form of organizing, control of the pupils' activities	Number of the source of teaching information, page	Result	Form of reports

**Conclusion.** The process of the lesson environment designing consists of a number of serial actions and procedures carrying out of which gives a teacher some possibility to regulate the environment marked in the dynamic subordination to the informative-educational environment of the lesson. In this case we pay attention to the questions of psychological support, that was left unexpended in this article. At the same time the teacher while designing must take into account a great number of essential factors, for example:

certain psychological new growths correspond to certain age; training should be organised on the basis of the main activity; well thought-out interrelations with other kinds of activity and their realisation.

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