

REALIZATION OF TEACHING METHODS BASED ON INTERACTIVE MECHANISM FOR THE IMPLEMENTATION OF PROJECT WORK

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Introduction

The purpose of experts preparation process of a direction «Technology of electronic multimedia editions» is formation of a highly skilled analyst who has modern theoretical knowledge and practical skills in creation and distribution of multimedia services. His formation provides harmonious development of abilities to scientific, pedagogical and design activity. So, there is a necessity in formation of above-stated competences in the course of training on the basis of creation of such training project which would include a scientific, pedagogical and design component.

Previous Experiences and Publications

The basic questions devoted to the organization and structuring of training process elements are given in works of many authors, among which are G. A. Ball (the theory of educational problems) [1], L. F. Spirin (the theory and technology of pedagogical problems) [2], M. I. Mahmutov (development of problem training technology) [3] and others. At the same time the researches on development and application of interactive mechanisms in MTC for realization of didactic methods haven't found proper coverage in the scientific literature.

Concepts

Research objective is to reveal existing mechanisms for realization of didactic methods in MTC, to make the structural analysis of the training project as system, to classify basic interactive mechanisms, to develop general recommendations about their application in MTC.

According to authors the effective approach to resolve such problem is creation by students of multimedia training complexes (MTC) which allow providing high level of presentation of teaching material, activation of educational activity of pupils, increase of education motivation. In this connection there was a necessity of formalization and systematization of knowledge used for creation of such complexes. One of directions of this process is creation of universal base of mechanisms for realization of the pedagogical problems which use would allow creating effective, methodically supplied MTC and to reduce essentially the time for their development.

Hypothesis. All multitude of training projects collected for formation of MTC can be divided into tasks presented by elementary learning situations which performance result can be directed on competences support formed in MTC (fig.1).

Each didactic method as the constituent of a learning component is realized in MTC through the certain interactive mechanisms connected with performance of fixed set of didactic operations. Having carried out the analysis of learning components it is possible to create base of mechanisms which will be used further for development of MTC. For each didactic method certain set of didactic operations and interactive mechanisms can be worked out and then the creation of a learning component will be carried out by formation of a set of such operations and mechanisms for the set multitude of didactic methods.

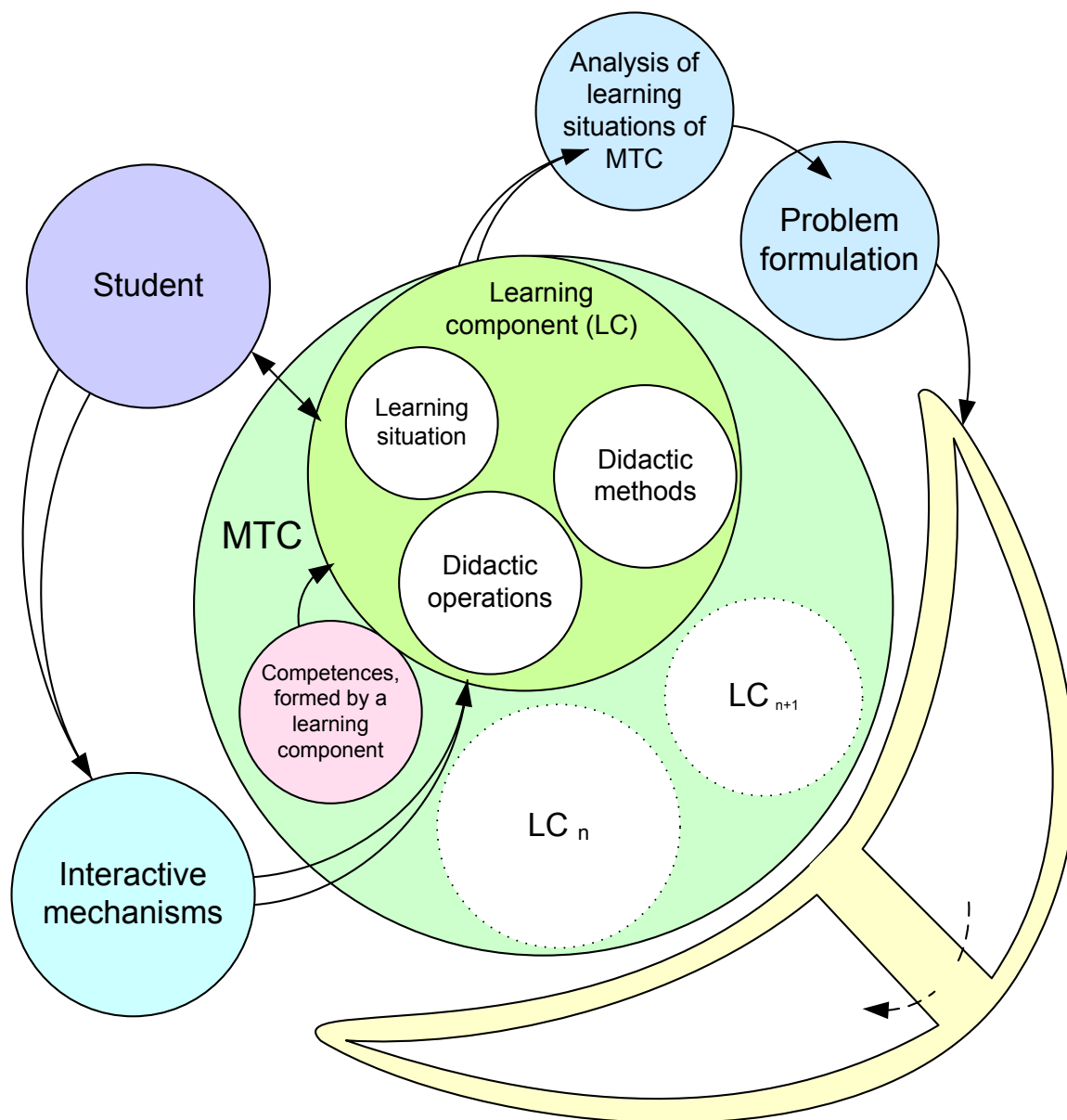


Fig. 1. Structure of research subject field presentation

As a result of realization of learning situations within the limits of the training project implementation by students of the course «Technology of electronic multimedia editions» the threefold competence is gained which consists of pedagogical (created interactive mechanisms should provide certain didactic operation of MTC), scientific (training project adapts under certain architecture) and design (designing of a multimedia product) component.

Training project is realized on the basis of problem formulation, initial data for which are received as a result of learning situations of MTC analysis.

Scientific Bases for Creation of the Training project

For formation of abilities which will be necessary for solving by experts of a direction «Publishing and printing industry» of practical problems on MTC creation of any complexity, performance of educational problems which can be realized in practice in the form of **training projects** is necessary.

As the **training project** we will understand a multitude of learning situations connected among themselves which performance result leads to achievement of the design purpose and is directed on professional competences formation.

Each training project is developed with the account of realization features of a **design method** – educational technology directed on acquisition by students of professional competences [4]. According to authors of given article the use of design method is the universal approach for MTC creation.

For the realization of such approach it is necessary to consider functions, architecture properties, features and performance stages of training project.

The training project implements a number of **functions**:

- **didactic** – the project acts as a students' tutorial;

- **student creativity support** – the project is the heuristic mechanism as students choose a design trajectory by themselves (a set and sequence of learning situations) for its performance;

- **competence** – students get professional competences on creation of multimedia projects.

Training projects with difficult structure will be considered as the **system** possessing following properties:

1. Synergy – an optimum coordination of all stages of the training project for educational purposes achievement.

2. Emergency – the result of performance of the training project has the new didactic and technological qualities rather than each separate stage of the given project.

3. Multiplicativity – efficiency of performance of the training project is a consequence of results multiplication of learning situations successful realization.

4. Purposefulness – the didactic project is directed on achievement of the certain educational purposes and competences formation.

5. Alternativeness of functioning ways and development – the heuristic approach to the learning task formation which resulted that the training project can have alternative realization ways.

6. Integrity – realization of learning situations totality leads to professional competences

formation impossible at realization of each learning situation separately.

7. Structural properties – realization of the training project passes stage by stage, the result of performance of each previous stage (realization of an learning situation) is entrance data for the following one.

8. Hierarchy – the training project is a component of educational process and includes a set of learning situations, therefore simultaneously is both system and a subsystem.

9. Communicativeness – the training project should meet the requirements of academic subject, which constituent it is, and also its results can be used in following projects within the limits of the given discipline or in other disciplines.

10. Interaction and interdependence of system and environment – each training project is directed on resolving only a quantity of problems which are put before a training course. Content of the training project is dictated by the purposes, problems and formed competences of training course.

11. Adaptability – creation of the training project occurs according to the universal technology which input parameters are formed according to requirements to a training course.

System approach allows generating the universal architecture of the training project specification. Actions of the student on realization of such project will consist in maintenance of requirements to properties of the training project and its architecture with use of the creative approach.

Features of the training project consist in the following:

- the training project represents integral work as the result of which the end-product received in the course of new competences acquisition is estimated;

- the training project is difficult multi-stage work which assumes performance of multi-aspect tasks but at the same time united by the common idea;

- an obligatory component of the training project is practice presence;

- as input data of the training project acts the primary information, as the result of its processing the student gets practice of construction of his own conclusions;

- the training project has game elements which helps to strengthen motivation of the student.

Each training project consists of following stages:

1. Preproject preparation. The given stage includes formation of an educational problem, purposes of the project and competences definition which will be generated as a result of project performance; definition of a design trajectory; formation of design group if necessary; references analysis on a project theme.

2. Designing. At the given stage intermediate and total elapsed time of results granting of the project are defined; the basic functions and properties of an end result are formulated; the design trajectory is specified; the choice of multimedia technologies for project realization is carried out.

3. Organizational and research stage. The given stage assumes consecutive realization of all learning situations of the project.

4. Results representations. The given stage includes results publication process of the training project in MTC; check of a correctness of didactic operations realization of learning task of MTC by means of design result; revealing of merits and demerits of the received result and also the process of the project performance; a performance of the duties estimation by working group of the project.

The basic components of the training project on MTC creation are: the educational purposes, forming competences, methodical supply, a set of learning situations, learning task, technical supply, software.

Within the limits of the given research the concept «the learning situation» has dual character: on the one hand the learning situation is considered in the frameworks of the training project and on the other hand it is created by means of MTC for resolving of educa-

tional problems. Authors of article divide these two concepts according to the sense as in the first case the student is in an learning situation, and in the second - he creates by himself.

Within the limits of given research MTC will be considered as system of learning components (LC) which structural elements are represented in the form of tuple:

$$LC = \langle T, \{A\}, \{LS\}, \{DM\}, \{DO\}, \{IM\} \rangle,$$

where T – learning task, A – aims of task performance, LS – learning situation of MTC, DM – didactic method realization of which is provided with learning situation, DO – didactic operations, each of which is realized with the help of definite interactive mechanism (IM).

The set of MTC learning situations and didactic methods is formed according to the destination of MTC. Didactic method following the author of work [3] will be understood caused by a method concrete action of teacher or pupil which is characterized by completeness and conducts to achievement of the nearest educational purpose, to the decision of training private problem.

Realization of didactic method occurs by means of didactic operations. As didactic operation we will understand logic action which is directed on reception of private result within the limits of general didactic problem resolving. When all didactic operations are finished learning situation of MTC is considered to be realized.

Each didactic operation is realized by means of the certain interactive mechanism which most meets the requirements of MTC learning situation. Interactive mechanisms represent totality of means given to the user for change of MTC filling [5]. Interactivity of MTC is realized via many interactive mechanisms $I = \{IM_1, IM_2, \dots, IM_n\}$.

As the result of interactivity analysis were found base interactive mechanisms in MTC (Table 1).

Table 1.

Base interactive mechanisms used in MTC.

Name of IM	Definition of IM
«Keyboard entry»	Keyboard input of didactic task resolution
«Hot keys»	Keys or keys combinations for fast access to the MTC functions
«Click»	Click to chose the decision
«Click and confirmation»	Totality of clicks on right answer and on bottom of result choice confirmation
«Drag transfer»	Drag transfer of object by mouse to the definite segment of working area
«Drag transfer and confirmation»	Totality of drag transfers of object by mouse to the definite segment of graphical interface and click on bottom of result choice confirmation
«Input and confirmation»	Keyboard input totality of didactic task solutions and bottom of result choice confirmation pressing
«Event-trigger sound (sound response)»	Event-trigger sound on made action
«Accompanying sound»	Sound accompaniment of made action
«Graphical supply»	Graphical supply of made action
«Movable response»	Video and animation accompaniment as the result of made action
«Movable accompaniment»	Video or animation accompaniment of task
«Moving direction»	Definition of object moving direction with the help of cursors on the keyboard

Also authors have allocated the most widespread didactic methods used in MTC and have put in their conformity didactic mechanisms (Table 2).

Table 2.

Didactic methods used in MTC and corresponding to them interactive mechanisms.

Didactic method	Interactive mechanisms
Using the principle of visibility	Graphical supply; Movable response
Repetition of action	Click; Graphical supply
Imitation	Click and confirmation; Drag transfer and confirmation; Graphical supply; Moving direction
The prevention of an incorrect choice	Sound response; Accompanying sound; Movable response
Comparison	Click; Click and confirmation; Drag transfer; Drag transfer and confirmation; Graphical supply; Moving direction
Giving to the training project of a kind of a real practical situation	Drag transfer; Drag transfer and confirmation; Graphical supply; Movable response; Movable accompaniment
Association of objects from different	Drag transfer; Drag transfer and confirmation; Graphical

disciplines in one group	supply; Movable accompaniment; Moving direction
Search of mistakes	Click; Drag transfer and confirmation; Graphical supply; Movable response
Analogy	Click; Drag transfer and confirmation; Graphical supply
Competition	Hot keys; Graphical supply; Movable response; Movable accompaniment; Moving direction
Deduction in memories and reproduction of images	Click; Click and confirmation; Drag transfer and confirmation; Graphical supply
Raising of a level of complexity	Sound response; Accompanying sound; Movable response
Search and acceptance of decisions	Keyboard entry
Motivation (can be based both on encouragement and on punishment)	Sound response; Accompanying sound; Graphical supply; Movable response

Didactic methods presented in Table 2 can be used both in separate discipline and for intersubject communications that provides universality of interactive mechanisms application.

It should be noted that the majority of interactive mechanisms are directed on influence of visual, audio and kinesthetic representative systems of human. So the use of metaphors can be one of organization ways of the interactivity in MTC that allows generating concept about new object through an establishment of similarity with already known and thus influences an increase in efficiency of didactic methods realization and also helps to avoid an information overload of the pupil which can appear during MTC development.

Results of our Work

As an example of practical realization of the offered approach authors have chosen training projects on creation of illustrations for the multimedia edition.

The project purpose is creation of animated illustrations for realization of the interactive mechanism «movable response» of MTC. As a result of performance of the given project students get the competence on designing and

creation of animated illustrations and also on use of such illustrations as interactive mechanism of MTC.

The result of the training project should possess a set of properties (didactic and technical) and to implement a set of functions. Didactic properties of animated illustration can concern such as informativity, ergonomics, clearness [6], structural properties, diagnostics, problematical character; and technical – interactivity, dynamism, extensionality, chromaticity, reality, sketchiness, decorative effect). The basic functions of the given animated illustration will be: supply of perception completeness of the information and transfer of considered object emotional component.

In Table 3 there is design trajectory of the training project executed by students of Kharkiv National University of Economics within the limits of discipline «Multimedia publishing house» which includes a set of learning situations and intermediate results.

Realization of project trajectory learning situations.

Learning situation	Result of learning situation implementation
Forming concepts for future illustration, definition of its qualities and functions.	Creation of animated illustration concept.
Sketches and storyboards of future project (fig.2).	Drawn by hand drafts and scene storyboards.
Development of separate illustration elements (creation of characters and decorative elements) (fig.3).	Separate characters and decorative elements, made in style of modeling and plasticine.
Transformation of illustration fragments in digital form.	Digital images of characters and decorative elements.
Installation of separate illustration elements and their animation (fig.4).	Digital storyboards of animated illustration made in Adobe After Effect.
Illustration publication in MTC.	Video of animated illustration.

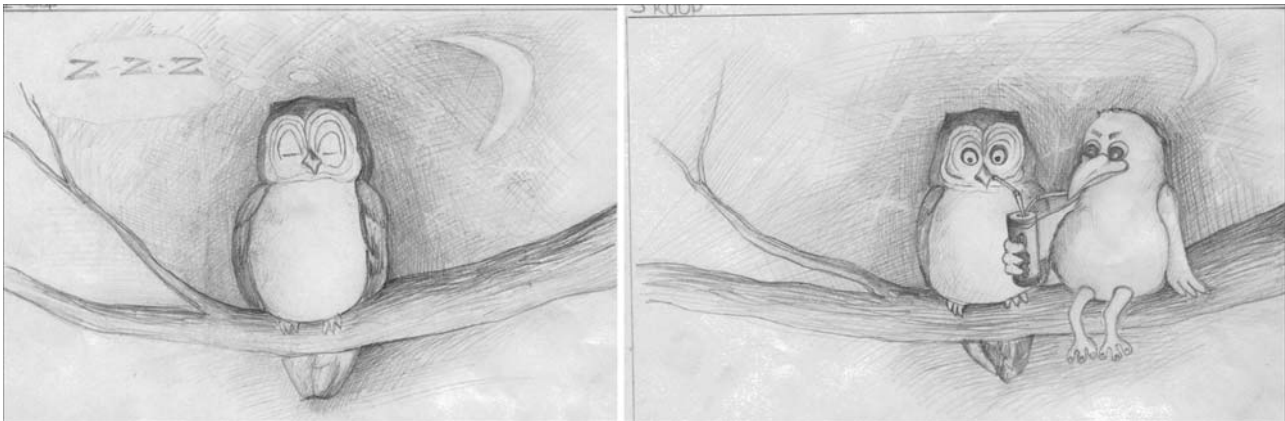


Fig. 2. Fragment of training project scene selection

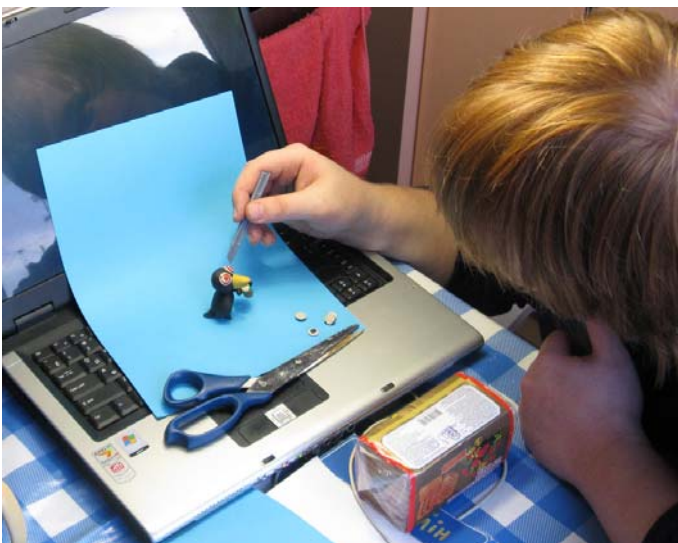


Fig. 3. Development by students of animated illustration characters (modeling with plasticine)

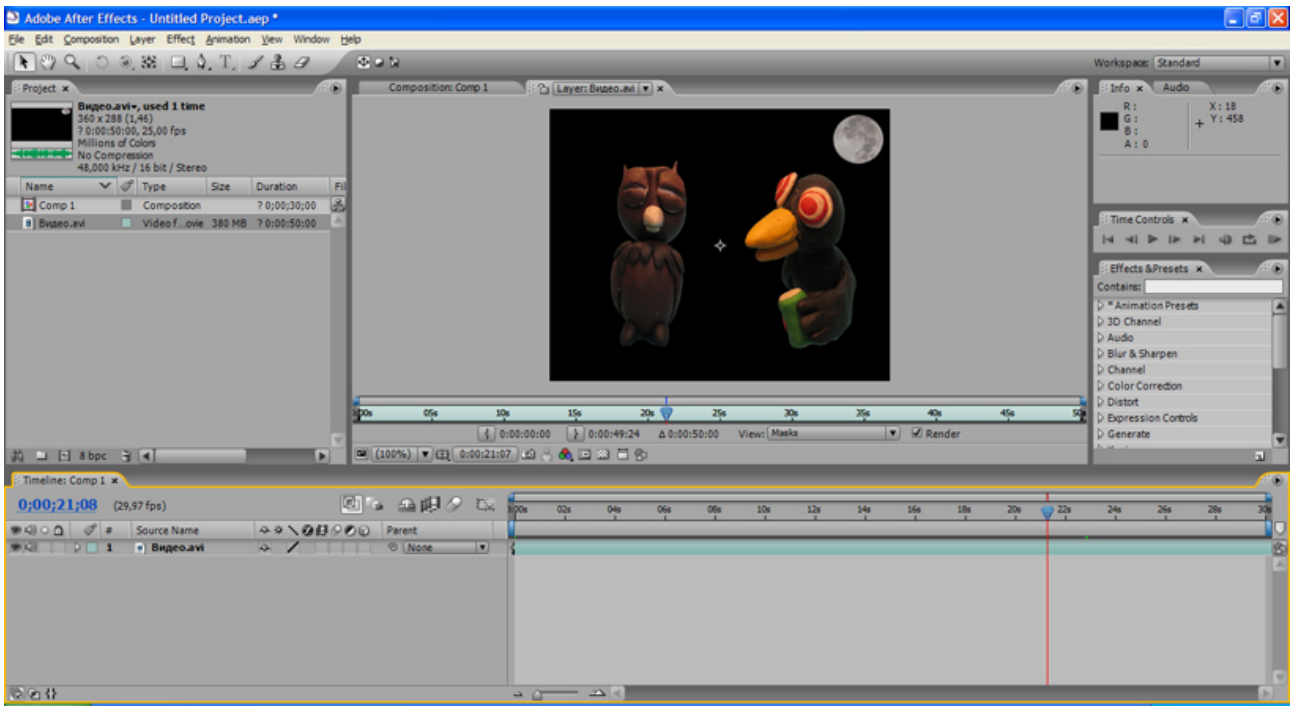


Fig. 4. Installation of illustration elements

As a result of design trajectory realization multimedia illustration has been published in MTC as the interactive mechanism «movable response» for learning situation of MTC realization presented in Table 4. To provide learning situation of MTC with support of all necessary

interactive mechanisms students should execute training projects on their creation. Thus, as a result of performance of some training projects the base of interactive mechanisms of MTC will be created.

Table 4.

Example of training project in MTC result realization.

Task	Learning situation	Task	Didactic operation	Didactic method (DM)	Interactive mechanism realizing DM
Image stylization.	1. From the given figures create as much as possible different stylized images	Creation of stylized images with the help of geometric figures.	<ol style="list-style-type: none"> 1. To study images, offered for stylization. 2. To chose one image for stylization. 3. To form stylized image of first level. 4. To form stylized image of second level. 5. To estimate received resulted. 	<ul style="list-style-type: none"> - using the principle of visibility; - comparison; - search and acceptance of decisions; - repetition of action; - motivation. 	<ul style="list-style-type: none"> - graphical supply; movable response; - click; drag transfer; graphic supply; - click; graphical supply; - click; graphical supply; - sound response; accompanying sound; graphic supply; movable response.

From the table it is clear that the result of training project performance carries out support of such didactic method as motivation.

Conclusion

Approbation of the approach offered by authors for the organization of training projects has allowed proving in practice existing hypothesis and providing formation of elements of scientific, pedagogical and design competences of students of «Technology of electronic multimedia editions» preparation direction.

During research the structure of training project representation has been generated, the structure of learning situation of MTC is defined, law of its components interaction is revealed, some base concepts of investigated area are specified, and interactive mechanisms of didactic receptions realization are classified.

Results of research allow developing further the principles of MTC designing on special disciplines and generating concepts of MTC construction for special didactics applied in a

At creation and use of interactive mechanisms it is necessary to consider perspective developments in the sphere of information technologies and multimedia that will allow forming new qualities of MTC and using increasingly the didactic methods based on communications between subjects, developing communicative abilities of the student. It is necessary to note the prospect of development of such interactive mechanism as input of the vocal information for acknowledgement of actions of the user.

Formed structure of the training project and structure of learning situation of MTC representation on the one hand will allow formalizing process of creation of multimedia training programs, and on the other hand - creating the tool of abilities formation for practical activities. Formalization and structurization of knowledge used for creation MTC allow passing to creation of multimedia training environments (such as «multimedia class», «multimedia university»).

statement of technical disciplines for students of engineering specialities.

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