

THE PEDAGOGICAL DESIGN OF MULTIMEDIA LEARNING SYSTEMS IN THE CONTEXT OF INTERACTIVITY

Prof. Dr. Oleksandr Pushkar
Kharkiv National University of Economics,
Chief of Computer Science and Technology Dept.
Ukraine
aipvt@ukr.net
Tetyana Lepeyko
Kharkiv National University of Economics,
Chief of Management and Business Dept.
Ukraine
tanya_lep@rambler.ru

Introduction

Creation of multimedia products for support of the process of training has put a number of theoretical and practical problems before researchers and developers. So, in the theory questions of personification the styles of training of the teacher and the student are insufficiently developed at creation of multimedia training complexes (MTC); there is a problem of compatibility the traditional system of training and multimedia programs, as tool of a virtual reality formation for training practical competences. Also a number of scientific and practical problems still remain unsolved: maintenance of effective communications of the trainee and MTC on the basis of interactive tools usages for the purpose of improvement of perception and material mastering; necessity for the teacher in development of didactic tool resources for realization of the pedagogical purposes in multimedia space.

The important place in the general circle of problems is occupied with a problem of theoretical bases of pedagogical design development in the direction of combining ideas and approaches for the general and special didactics with interactive design.

Beside this the problem of pedagogical design theoretical bases development demands the decision of some following problems.

Subject area of pedagogical design

Firstly, consideration of the subject area of pedagogical design and specification of the objects, the phenomena and processes. Secondly, a substantiation of the conceptual approach to pedagogical design MTC providing the interactivity, which based on existing theoretical and practical operating time. Thirdly, construction of element's sets for each of the basic components for area of pedagogical design, a substantiation of a method for pedagogical design of MTC as the procedure uniting all design actions of the teacher-designer. Fourthly, to choice and grounds a new tools of didactic interactivity for MTC. Fifthly, developing interactive multimedia training complexes (MTC), which will be based on a modern educational paradigm, use competence approach to consider features of educational space.

Theoretical researches show, that there are various approaches to definition of essence of pedagogical design. So, R.C. Richey in [1] makes following definition «the pedagogical design is a science of creation of the detailed description of conditions of creation, estimation and realization of the situations promoting training». G. McArdle [2] under pedagogical design understands use of regular process for understanding of learning problems, comprehension what is necessary to make for the decision of these problems, and then realization of this decision. But the fullest definition, from our point of view gives L.J. Briggs who considers, that the pedagogical design is a complete

process of the analysis of requirements and the purposes of learning and system engineering of ways to transfer the knowledge for satisfaction of these requirements [3].

However this definition is necessary for transforming taking into account the features of our research. In this work under pedagogical design we will understand process of regular designing of a content architecture of the academic discipline and the scenario of interactivity interaction between student and content for achievement of the didactic purposes set, which allow the student to mastering given competences.

In research we have set the task to prove the conceptual approach to MTC creation which will be allocated not only the sum of knowledge, but also certain level of skill of teachers at formation competence on the basis of didactic interactivity.

Thus, we consider the pedagogical design as a version of modern synthetic art. The student as the user of a multimedia complex “thinks” that he perceives knowledge and the reality displayed in them “as it is”, and actually it is conducted on this reality by the teacher, creating certain foreshortenings of comprehension the knowledge.

Concept of the pedagogical design of didactic interactivity in MTC.

The pedagogical design of didactic interactivity is based on:

- Understanding of a didactic problem
- Six-componential model of the competence
- Four kinds of knowledge (not formalized figurative-behavioral; not formalized operational; formalized conceptual; formalized system knowledge) with which each competence is represented
- Trajectory on an information field in the course of training
- Didactic tools of MTC (analogue of tools in software products for interactive design) which support individual pedagogical techniques and methods and are realized during didactic interactivity
- As a result of interactive interaction between the student and fragments of knowledge and didactic tools for the synthesis competence is carried out.

The teacher in process and result of pedagogical design carries out synthesis of educational space in the form of MTC which contains the built in tools of pedagogical interactivity. The student in the process of interaction with educational space in the form of MTC synthesizes the competence (synthesis of new mental models and behavioral patterns). We based on following principle: MTC is focused on the trained person (on the student, not on the teacher).

In the given context we will consider pedagogical design of MTC through an establishment of content interrelations with competence components and categories of knowledge (fig. 1) which define didactic problems. Then, on the basis of these problems and taking into account features of the student and the characteristic of his modality of the information perception, teacher-designer of MTC chooses from the offered list corresponding tools which providing in the best way didactic interactivity for formation set of competences among students with corresponding type of a modality (perception of information).

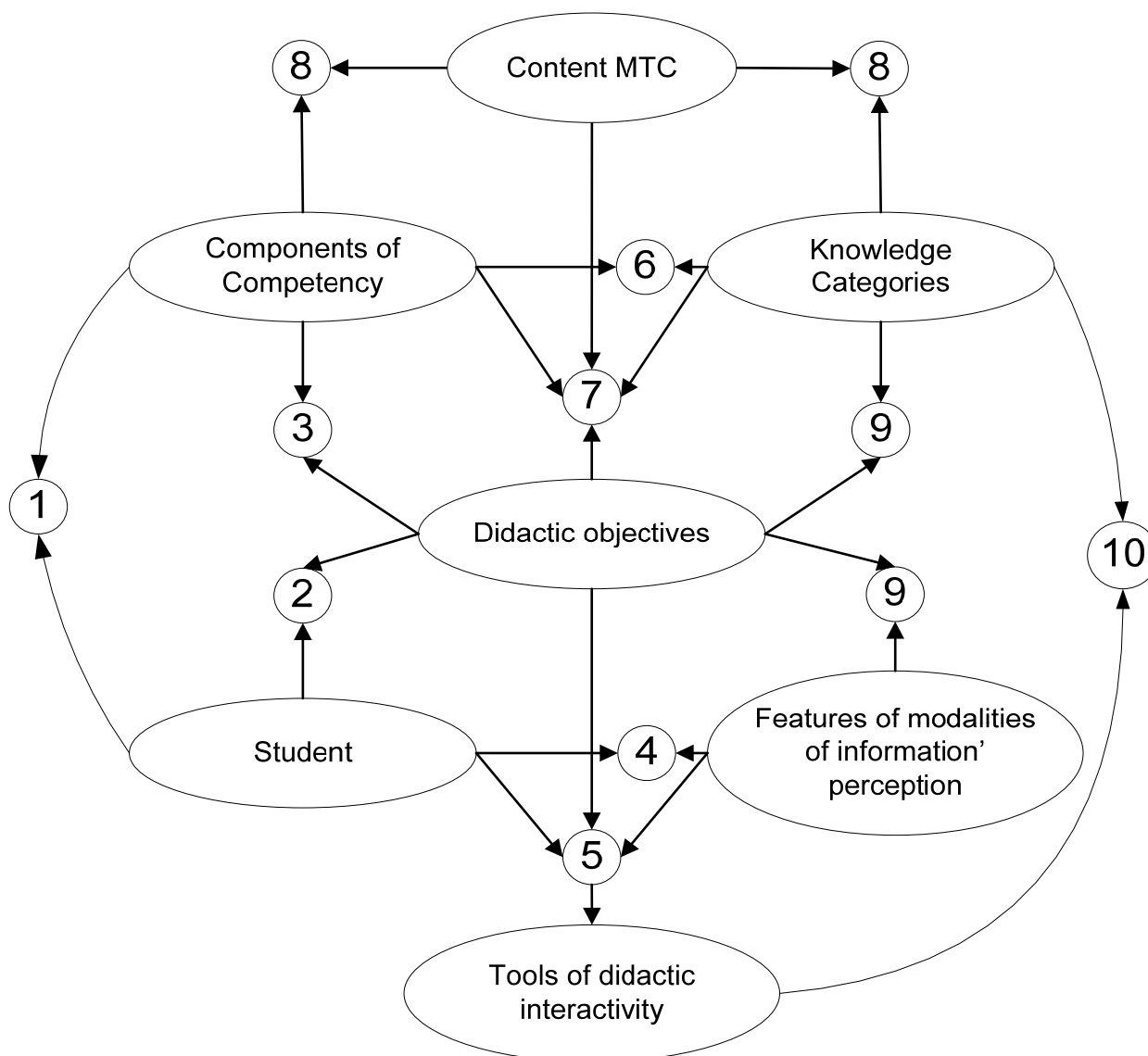


Fig. 1. The Subject area of MTC' pedagogical design.

Suggested symbols for fig.1: 1. The formation of the study purposes. 2. The definition of the didactic problems. 3. The definition of the desired results. 4. The choice of tools of the world comprehension (knowledge and skills of a unit or discipline), (Table 4, 5.). 5. Formation of interactive didactic instruments set. 6. Development of pedagogical scenarios for interaction between the trainee and knowledge, (Table1.). 7. Formation of the mark criteria. 8. Content preparation as a whole and its decomposition on fragments. 9. Formation the teaching material on levels (Table 2). 10. The choice (working out) of tools for the didactic interactivity (Table 3).

That is why before the teacher-designer there is a problem of creation the scenarios empowerment of MTC, providing it's with not only the sum of knowledge, but also certain level of the teacher's skill for competences formation.

Competence approach in MTC development

For its decision it is necessary to develop such model of the competence which would allow providing realization of didactic problems at pedagogical design of MTC.

The nature of the competences is investigated in works of many scientists. So in D.Makleland's researches [4] was attempt to analyze connection of the academic tests and

diplomas with actual quality of work for construction the program to develop the staff. L. M.Spenser-Young. and M.Spenser carry out the deep analysis of the competence nature for workers with the further construction of the competences model [5], and I. Zimnyaya in [6] actually investigates the nature of competences for using in socially-professional activity of the person and education. The example for application of the staff knowledge for the construction the dynamic models of the enterprise knowledge are in P. Senge's researches [7]. However it is impossible to transfer the competence simply within the limits of a course or even the block of courses. It is possible to show the competence, so the task of MTC - effective transferring to the student a complex of knowledge, abilities, representations, tools and technologies; help instilling him the ability and readiness to solve a problem of the set level independently.

In research we will be base on the standard model of universal descriptions of the competences (the Dublin descriptors) which include:

- Knowledge and understanding.
- Using the knowledge and understanding.
- Expression of judgments.
- Communicative abilities.
- Abilities to learn.

For the descriptions of didactic problems of MTC and didactic tools we will enter more detailed structure of the competence descriptors, based on categories of the purposes in Bloom's taxonomy: to know, to understand, to apply, to analyze, to synthesize, to estimate (fig. 2).

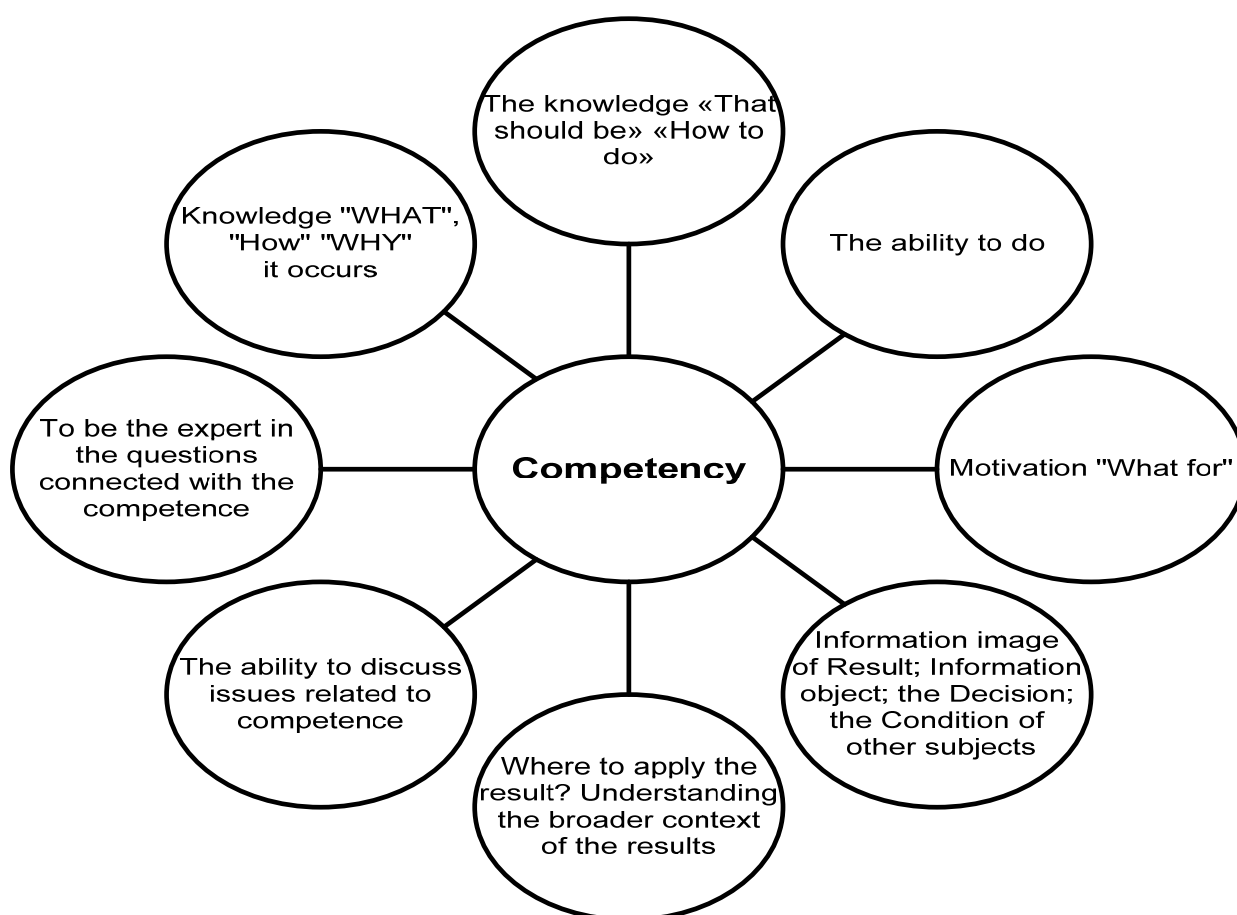


Fig. 2. The offered structure of the competence.

We will give more detailed description of the separate competences essence, based on the example of "Management" discipline:

- To know the school of management and evolution of approaches to control of business;
- To know the functions of management and their features in the chosen professional area;
- To understand the technology of decision making for the problem's solving for various classes;
- To be able to solve applied problems with use of technologies and management tools;
- To be able to analyze organizational structures of the enterprises;
- To be able to offer the administrative technologies necessary for the solving the problems of chosen professional area;
- To be able to estimate the results of decision-making at the problem's solving for the different classes of problems;
- Motivation: what for and in what situations the usage of the given competence is necessary.

Didactic tools for supporting the interactivity mechanism in MTC

The offered conceptual approach includes as a component the interactivity mechanism. Let's consider in more details what it is based on.

In generally interactivity is idea which opens character and interaction degree between objects as the universal form of change the conditions of the objects. Michael Moore distinguishes three types of interactivity [8]: interaction between the student and a studying subject, interaction between the student and the teacher and interaction between students. Interaction between the student and the content or a subject of studying he considers interaction as process of intellectual interaction with a subject.

In our conception we will consider interactivity as interaction of the student and MTC in which two types of interaction incorporate: the student and a teaching material and also the mediated interaction of the student with the teacher who has developed a content, didactic tools and movement scenarios on content space.

Such interactive cooperation between student and MTC is based on two-level model:

1) Didactic interactivity - interaction between MTC and student on the basis of a metaphor of two experts' conversation when the discourse one of them is defined by the content of the previous discourse of another. This type of interactivity provides the solving of didactic problem: formation of the competences by synthesis (and supports) of educational trajectories for the concrete student;

2) Technical (technological) interactivity – the ability of the MTC as information-communication system, to react actively and variously on actions of the user - learner.

One of components of a subject domain of pedagogical design (fig. 1) is a category of knowledge and their connection with the model of competences.

For structurization of knowledge in pedagogical design at development of MTC on a basis of competence approach we will take the advantage of the I. Nonaka and H.Takeuchi [9] idea about four kinds of knowledge in corporate systems, having modified it to conditions of pedagogical design of the university. Such kinds of knowledge we will consider:

Non formalized knowledge about activity and its results (NFN) - answers to questions with nonverbal image: How it becomes? How it is used? How it is projected? How it is made?

Weak- formalized knowledge the standard (operational) knowledge (WFON) - gives answers to questions through verbal tools: How it becomes? How it is used? How it is projected? How it is made?

The conceptual knowledge (CoN) - gives answers to questions through verbal tools: On what basis of conception is build? What basic idea is underlying? What basic general scientific models characterize the phenomenon, process or object?

The system scientific-theoretical knowledge (SSTN) – responding to questions: How it is arranged? Why does it work so? How it influences?

We will put in correspondence to competence elements those kinds of knowledge which most fully can realize an adequate element (Table 1).

Table 1

Compliance between the elements of competency and categories of knowledge

Components of Competency	Knowledge Categories			
	NFK	WFOK	CoK	SSTK
The knowledge «That should be» «How to do»			+	+
The ability to do		+		
Motivation "What for"	+			
Information image of Result; Information object; the Decision; the Condition of other subjects	+		+	
Where to apply the result? Understanding the broader context of the results	+			
The ability to discuss issues related to competence			+	
To be the expert in the questions connected with the competence	+	+		
Knowledge "WHAT", "How" "WHY" it occurs	+	+	+	+

Now let us consider in more detail the relationship between didactic tasks and categories of knowledge (fig.1). This correspondence is presented in Table 2.

Table 2

Using the categories of knowledge for the realization of didactic tasks

Didactic tasks	Knowledge Categories			
	NFK	WFOK	CoK	SSTK
Updating support skills and knowledge			+	+
To give concept about a subject			+	+
Provision of perception, comprehension and memorization of the primary knowledge and methods of operation, connections and relationships in an object of study	+	+	+	+
Establishing the correctness and awareness of mastering new teaching material		+		+
Identify gaps and misconceptions and their correction		+		+
Maintenance of new knowledge mastering and ways of actions at application level in the changed situation		+	+	+
Demonstrations of skills application	+	+		
To promote the application of knowledge	+	+		
Forming a complete system of knowledge on the topic		+	+	+
Allocation of philosophical ideas			+	
Identify the quality and level of knowledge mastering and ways of action to ensure their correction		+		+
Analysis and evaluation of the achieving success		+		+
To assess the received knowledge		+	+	+
Establishing the correctness and length of assignments		+		
Provide emotional support to students	+		+	
Providing motivation and goal-making students learning and cognitive activity	+		+	

However during the pedagogical design for the realization of interactivity context it is necessary to pick up such didactic tools which allow to transfer knowledge from a subject area completely and to form one or the several competences. We develop the list of such instruments (tab. 3) and established their correspondence with categories of knowledge which will allow teacher-designer of MTC to realise didactic problems and to provide effective adoption by students the portions of knowledge as much as possible.

Table 3

Tools of didactic interactivity for working with various categories of knowledge

	Tools	Knowledge Categories			
		NFK	WFOK	CoK	SSTK
Information flow to student					
T01	Presentation with hyperlinks on audio and video components		+	+	+
T02	Interactive lecture				+
T03	Video recording of consulting sessions	+			
T04	Video clip of work in coaching	+			
T05	Video recording of training	+	+		
T06	Interactive video recording of training	+	+		
T07	Simulation game	+	+		
T08	Discipline portfolio (as a whole and on topics)	+			
T09	Tasks for the student		+		
T10	Construction of the texts on the basis of question-answer method				+
T11	Didactic calculators		+		
T12	Video clip, demonstration of skills' application	+	+		
T13	Video clip, demonstration of skills' application with the audio instruction	+	+		
T14	Virtual tours and video tours	+		+	
T15	Flesh-animation of action, rule or principle (law) demonstration		+		+
T16	Real life examples	+			+
T17	Demonstration of the problems solving with using trial and error method		+		
T18	Demonstrations of research object's samples, pictures of the various scientific phenomena		+		+
T19	The description of resources and ways of the problems decision		+		
T20	Examples of examination works of the last years		+		+
T21	Information Presentation in the form of concepts' list				+
T22	Information representation in dictionaries, directories, in the form of a glossary				+
T23	Information representation in the form of definitions				+
T24	Information representation in the form of a distributing material (theses)				+
T25	Information representation in the form of audio files		+		+
T26	Metaphors of some ideas in the form of interesting examples, histories, jokes			+	+
T27	Marking of the presented information by underlining and allocation by color				+
T28	Visualization of a material by use of block diagrams, drawings, video-fragments, slides		+		+
T29	Video clips with gestures and vivid facial expressions and figurative speech			+	+
T30	Information representation on the basis of sign system		+	+	+
T31	Figurative Information representation with use of diagram's and schedules		+	+	+
T32	Presentation of objects' appearance using color matching, location and design information		+	+	+
T33	Presentation of the "big picture" of the main idea topic			+	+
T34	Video coaching	+	+		
T35	Video consulting	+	+		
T36	Video training	+	+		
T37	The basic abstract		+		+
T38	Bank of cases (situational exercises).		+		

	Tools	Knowledge Categories			
		NFK	WFOK	CoK	SSTK
Information flow to student					
T39	Guidelines for discussion of situational exercises		+		
T40	Bank of business games and training exercises.	+	+		
T41	Bank of Internet resources.	+	+	+	+
T42	Bank of scientific publications of the teacher.	+	+	+	+
T43	MM - the content of topics (discipline)				+
T44	MM - interactive (for navigation)				+
Information flow from students					
S01	Portfolio of student on completed assignments		+		
S02	MM development		+	+	+
S03	Chat in Skype	+	+		
S04	Web chats	+	+		
S05	Collection of visual material in Internet (photographs, drawings)	+	+	+	+
S06	Discussion with other person in a blog topics' content	+	+	+	+
S07	Use of drawings, photos, for illustration of thoughts	+	+	+	+
S08	Essay preparation			+	+
S09	Developing a list of new terms			+	+
S10	Rereading records by student			+	+
S11	Conversion charts, graphs in the approval			+	+
S12	Answers to questions on the multiple choice		+	+	+
S13	Drawing up by the student plan of presentation with notes in it, paragraphs and subparagraphs		+	+	+
S14	Discussion of scientific problems with other students and teachers		+	+	+
S15	Explanation of new ideas to other people		+	+	+
S16	Record by the student of the abstract in an audiofile and record listening			+	+
S17	Reading by the student abstract aloud			+	+
S18	The analysis of the thoughts, the basic ideas on a topic and their record			+	+
S19	Pronunciation of their answers aloud to himself			+	+
S20	Rearrangement (reconstruction) images in different ways (classification of the different characteristics)	+		+	+
S21	Transfer of the received information in sign system			+	+
S22	Presentation in memory of the brightest moments of lectures and practical classes	+		+	+
S23	The transformation of visual images in the linguistic construction	+		+	+
S24	MM - created by the student (for the synthesis of the knowledge)			+	+
S25	Working writing-book based on WIKI technology	+	+	+	+
S26	FAQ	+	+		

Except all mentioned above, the offered concept of MTC' pedagogical design should consider the students learning styles and the models of training inherent to the teacher - designer of MTC. On the one hand, the teacher should create a contour of a feedback or entrance testing so that for students with different styles of training to construct comfortable trajectories for training as much as possible. On the other hand, knowing values and limitations of the learning style, and also possibility of all other learning styles under the design of MTC to use the maximum variety of tools and the receptions directed on effective perception and processing the information, activation the students with different models of training.

We will accept hypothesis about styles of training (modalities), the stated by Nejlom D. Fleming and Charles K. Bonvellom [10].

Fleming and Mills in 1992 have allocated four categories, as defining feelings of their students: Visual, Aural, Read/write and Kinesthetic. And then in later works was used acronym VARK as reduction for modes of perception the educational information. Features of teachers and students in perception and information processing at different modalities are presented in Table 4.

Table 4

The generalized characteristics of modalities of perception and processing of the educational information

The type of the student	Features of strategy of training
The character of the information perception	
Visual	Preferably display of the information in the form of drawings, diagrammes, block diagrammes and all those symbolical lines, circles, trees and other elements which are used instead of words by teachers for information representation.
Aural	This mode of perception describes preference of perception of the information «on hearing». Students with such modality are better trained through lectures, seminars, listening of the lessons, group discussions, a web chat, and just conversations about the subject.
Read/write	It is preferable the information represented in the form of words. Not a secret, that many academic techniques are exclusively directed on this mode. A perception mode will shift towards text input-output - reading and a data recording in all its forms.
Kinesthetic	By definition, this modality concerns to «perceptual preference of use on experience and in practice (simulation or reality)». As such description can go with other modalities, a key is that the student always « connected to a reality», through experiences, examples, practice or simulation.
The character of the information processing and formation of judgements	
Thinking	Thinking students prefer to use the objective facts for decision-making and opinion formation. They feel themselves at collisions with other students more comfortably and prefer concrete statements, work directly with facts.
Sensible	Sensible students are aimed towards emotions, value of the person at decision-making and opinion formation, and they prefer group harmony, as if beliefs of such students depend on intuition and emotional reaction, they require tutorship for comments and analysis.
Experts	Students-experts are inclined to do instant conclusions on the basis of the most initial dates. Limitation of such students that they do premature conclusions on the basis of unchecked dates.
Studying	The studying student does not do conclusions, until all data will not be received. Their problems that they can tighten with conclusions, expecting when they will gather a lot of facts.
Sensory	Sensory students prefer to known facts, procedures and linear presentations. Such students memorize easier the knowledge in difficult courses. But at the same time we would recommend to impart to such students the conception of "the big picture".
Intuitive	Intuitive students prefer to be between casual data files, but thus not to remember the details. We would recommend to such students to see external frameworks, filling them subsequently with details.

If modalities of the teacher and the student do not coincide, the material prepared during the pedagogical design will not provide the effective decision for all didactic problems. Thus, the problem of MTC pedagogical design is to put in a multimedia complex interactivity tools corresponding to all students' learning styles and the problem of the teacher is to develop recommendations (interactive helps) on formation of a learning trajectory for students who are working with MTC considering modalities.

For this purpose we have to embed in MTC the testing system (for example, VARK), allowing the student to define their modalities. Or we can provide student's on-line testing at the site <http://www.vark-learn.com/english/index.asp> with the subsequent embedding of estimated modalities in trajectory designing.

We carried out analysis of the pedagogical tools providing didactic interactivity (Table 3), which give us the chance to develop a matrix of tool support for didactic tasks connected with different learning styles which fragment is resulted in Table 5.

On the basis of the proved conceptual approach to pedagogical design and taking into account interactivity, the method of pedagogical design has been synthesised. The given method allows forming an information field of discipline on the basis of MTC as sequence of the teacher-designer actions.

Table 5

**The matrix of instrumental support teaching objectives for different learning styles
(fragment)**

Didactic problems	Styles of training			
	Visual	Listened	Reading / writing	Kinesthetic
Opinion formation	Mind maps	Webinar discussion	Essay writing	Portfolio of Discipline
Memorizing information	Mind maps		Writing abstracts	Mind maps
Demonstration of skills application	Videoclip, demonstrations of skills applications	Video clip, demonstrations of skills applications with the audio instruction	Methodical instructions	Didactic calculators
To give understanding about a subject	Presentations	Audio lecture	Presentations	Examples from a subject area
To cause motivation of students	Video coaching	Coaching	Written coaching	Coaching
To promote application	Portfolio of the student under the tasks which done	Portfolio of the student under the tasks which done	Portfolio of the student under the tasks which done	Portfolio of the student under the tasks which done
To assess the knowledge	Testing	Audio-testing	Testing	Self-testing
To provide emotional support	Chat in Skype	Web chats	Web chat	Chat in Skype

1. The purposes which we are put before the multimedia edition are formulated: a subset of the purposes of the student as user of MTC and the purpose of MTC' teacher-designer.

2. The didactic problems which solved by the student at work (use) with MTC are defined and formulated.

3. The desirable results, which reached by the user and the teacher-designer are described. Following classes of results can be received: informative; emotional; relaxational; psychological - interests, valuable orientations and needs.

4. Resources for comprehension of the subject area presented in MTC are chosen from following set: logic thinking, emotional experience, game, creativity, discussion and search problem solution.

5. The potential set of interactive didactic tools for each of the task is formed.

6. Pedagogical scenarios of interactive communication of the trainee with elements of knowledge and tasks are under construction.

7. Sets of criteria for estimation influence on the user various kinds of media-information are formed.

8. Fragments of content for each MTC' problem under each competence and categories of knowledge are prepared:

- Structural preference and definitions of the content structure on the basis of the chosen sources.
- Decomposition and distribution of initial sources - formation of information objects set.
- Recomposition – developing of a new content on the basis of initial sources fragments - formation of the representation the information objects structures in which reflected specific tasks demanded for the decision.
- Structurally-stylistic editing.
- Developing of sequences is carried out on the basis of the given results and criteria.

Sets of information objects include: the usual text, the hypertext, hypermedia; the tabular information; illustrative materials - schedules, photos, schemes, explanatory drawings, the cartographical information; fragments of filming and video shootings; sound recordings; the music written down and recreated under notes; animation sequences (give the chance to present physical, technological, natural and other processes); computer interactive materials: interactive tables and schedules (the user independently defines a kind of tables and schedules, lists of indicators, character of sizes); interactive animations (allows to carry out transitions in different stages of processes which are in animation, replacement different parameters of objects of animation) which give the chance to define by practical consideration a difference in development considered processes.

9. The material is built on levels (if necessary), and specifications are formed:

- what components of multimedia will be developed for the most effective problem solving;
- character of access to them;
- author's wishes on design;
- keywords and navigation tools;
- necessary supplements of multimedia.

10. Tools of didactic interactivity for work with various categories of knowledge for available content are getting out.

11. Sketches of illustrations and animation fragments are developed; sources for video and sound design of MTC are selected.

Examples of didactic tools applications

In Table 3 didactic tools which are used in MTC for realization competence approach are presented. The authors consider as the most interesting from the didactic interactivity point of view application of the following tools.

1. A discipline portfolio (as a whole and on units if necessary). This portfolio contains information images of all possible practical results which the student can create, having mastered the competence.

2. Tasks. These are examples, micro projects, and projects on discipline as a whole, which demand from the student the reproductive and creative activity. These tasks in full or in part realize the competence.

3. The portfolio of the student under the executed tasks contains all results of practical work of the student on sections of discipline in the form of texts, tables, drawings, schedules, schemes, calculations and avenue.

4. The texts containing system scientific-theoretical knowledge are developed on a basis a question-answer method (That? Where? When? How? What for? For whom is it necessary?) .

5. Video coaching and on-line coaching is used for formation of a motivational component of competence.

6. Mind Maps (MM) development on the basis of built in MTC the special supplement. The student creates a MM on the studied topic. Carrying out of this task, he concentrates on basic concepts, ideas and other objects of a unit, thinking over their nature and relationship.

7. Elements of a feedback for support the technology of training in MTC.

Element 1. Understanding the material. For its achievement on each slide (or in elementary educational unit) the set of pictogrammes (for example, from a scale of tones) which denoted the level of understanding by students' educational material takes placed.

Element 2. The organization of the material (on a slide and in the text of methodical materials) as realizations of certain job function which will require from the student using of this material in the future professional work.

Element 3. Self-diagnostics. The MTC contains the module allowing the student to carry out self-diagnostics of the material development and to diagnose gaps in knowledge. The given didactic tool should offer in an automatic mode to the student a material promoting liquidation of these gaps. This approach is realized through the special organization of the control questions list. Each question can be accompanied two pictogrammes, as it shown in fig.3.



Figure 3. Pictograms for self-diagnostic (for pictograms we used pictures of artist S. Tiunin)

The student, having answered a question, presses a symbol with a sign "!". In a case if he cannot answer the question he presses a symbol with a sign "?". After answering to questions the list of questions is developed in listing with answers to those from them which the student could not answer right.

Let us consider a number of the general recommendations concerning design of the MTC.

Animation fragments of teaching materials are necessary to build on the basis of fixing the appropriate slides added with explanatory texts and a drawing.

MTC is better to create on the basis of use of documentary video films (fragments of "live" video). For the illustration of the mechanisms underlying the studied subject area, the most suitable tool is animation. Disclosing of the content and logic of theories' construction is better for carrying out with use of an animation drawing.

Audio components of multimedia resources are used as facilities of attention activization, accentuation for the some expounded in MTC material. For testing fragments the considerable effect gives audio support application (encouraging exclamations for the true answer or sound correction for the process of the decision). Application in MTC technologies of "the voice password" and "saying" answers to control questions allows to building systems of intellectual assessment.

Under the development in MTC laboratory works and research of the processes, which in real conditions cannot be realized practically, it is necessary to apply multimedia training apparatus and the virtual worlds. Multimedia training apparatus allow to study environments (animated fragments) by analogy to fact-finding practice of students. Training apparatus can be used as virtual analogues of real technical systems.

Dominating media component in MTC depends from the discipline: for designers - video component; for fundamental and general technical disciplines - the dynamic drawing; for technology - virtual training apparatus.

Conclusion

The conception which allowed to approach on the same basic positions to development of learning space' pedagogical design oriented on features of the modality of each students and based on implementation of didactic interactivity tools was offered.

The conception of didactic interactivity and tools of didactic interactivity which gives the chance to approach to designing of the MTC through two interconnected contours: pedagogical design and design of the MTC as multimedia product was entered.

The application' method and recommendations of the various elements of pedagogical design was developed. They allow to realize the concept of pedagogical design in practice: on the basis of the given concept and with the usage of methods and tools considered in work at the Kharkov National University of Economics working out MTC for disciplines for specialties «The computerized publishing systems », «Multimedia technologies», «MBA» is conducted.

References

1. Richey, R. C. The theoretical and conceptual bases of instructional design. London: Kogan Page, 1986
2. Geri McArdle Developing Instructional Design. USA: Bawden Printing Company, 1991
3. Leslie J. Briggs, Walter W. Wager Handbook of procedures for the design of instruction American Institutes for Research, 1977
4. Дэвид К. МакКлелланд, Поняття компетенції -http://www.timetogo.ru/articles/what_is_competency.htm
5. Лайл М. Спенсер_мл. і Сайн М. Спенсер. Компетенції на роботі / Пер. с англ. М: HIPPO, 2005. - 384 с.
6. Зимня И.А. Ключові компетентності як результативно-цільова основа компетентностного підходу в утворенні. Авторська версія. М.: Дослідницький центр проблем якості підготовки фахівців, 2004. 38 с.
7. Сенге П. Новая задача лидера: построение обучающейся организации // Стратегический процесс /пер.с англ.- СПб : Питер,2001. – 404 с.
8. Michael G. Moore, The American Journal of Distance Education, Volume 3 Number 2 (1989)
9. Nonaka and H.Takeuchi The knowledge – creation company. NY: Oxford University Press, 1995
10. Nejlom D. Fleming and Charles K. Bonvellom VARK – a guide for learning style. - <http://www.vark-learn.com/english/index.asp>.