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THE INTEGRATIVE STRUCTURE OF MULTIMEDIA COURSEWARE OF ELECTROTECHNICAL LECTURE COURSE

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Abstract: *The article deals with necessity and value of lecture courses in Higher Education Institutions, with animation of educational and cognitive activity of the students during the lecture course with multimedia courseware (MC) application, and with the integrative structure of multimedia courseware of electro-technical lecture course.*

Key words: *Education, multimedia lecture, multimedia-based courseware*

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Introduction

Lecture in a Higher Education Institution is a principal element of didactical cycle, aimed at development of target background for the students' further studying the material. The word "lecture" originates from the Latin word "lectio", literally meaning "reading". Lectures first appeared in ancient Greece and were further developed in ancient Rome. In Russia a great contribution into the development of lecturing as a form of education was made by M.V. Lomonosov, the founder of the first Russian University.

The forms and tasks of lectures were changing and improving together with development of Higher Education. In the Middle Ages, when there were no manuals, and lectures were the only source of knowledge for the students, the professors, standing at the lectern, were either fast or slowly reading their material. Since the 18th century lecture turned into the professor's oral narration. Nowadays lecture is no longer a reading of material or retelling a textbook, it is "an original investigation, an individual analyzing and synthesizing, considering of what one has seen with one's own eyes and apprehended with one's mind" [Ножин, 1983] . Previously being a monologue, "it is getting more and more a form of collective thinking aloud of both the lecturer and the students" [Фейгенберг, 1989] .

The essence of lecture was well shaped by Russian scientist P.A. Florensky: "The essence of lecture is spontaneous scientific life, it is considering scientific objects together with students, it is not issuing ready-made, stereotyped conclusions out of stores of chairborne scholarism. Lecture is introducing students into the process of scientific work, involving them into scientific creation, it is a sort of demonstrative and even experimental method-teaching and not just transferring "truisms" of science in its "modern" state...A lecture… must not teach this or that number of facts, conclusions or theories, it must teach how to work, form taste to scientific vision, give "catalizer", yeast of intellectual activity".

In the curriculums of Higher Education Institutions of Russian Federation lectures take 40-50% of academic time. This form of education is a guideline for the other forms of studying. The material, given to the students at the

lectures becomes a basis for their further educational and cognitive activity at seminars and laboratory classes. In spite of a great role the lectures have in the educational process many teachers report on the students' passivity and low level of their educational and cognitive activity at the lectures. That is why they suggest changing hours given for lectures with hours on individual work.

We can not agree on this point as:

- It is lecture that encourages students to developing necessity and motivation to learn the subject or the topic;
- It is lecture that enables transferring a great volume of information in a rational way, getting the students acquainted with the theory of the subjects;
- It is lecture that gives the scientific material directly, introducing the students into the lecturer's scientific laboratory, shows the lecturer's personal attitude to the subject, and besides students' claims and level of education are taken into account;
- It is lecture that develops a scientific outlook, gives examples and guidelines for individual independent work, trains in classification of notional units and their relation to methodological, theoretical and actual level of knowledge.

So, we believe that lecture still should remain both a leading method of teaching and a principle form of organizing educational process in the Higher Education Institutions, while animation of educational and cognitive activity of the students can be achieved by applying information technologies [Зайнутдинова, 1999] and unconventional lectures. Multimedia lecture is one of them, and it is read with the help of multimedia courseware.

Multimedia Courseware (MC) of Electrotechnical Lecture Course

We call Multimedia Courseware (MC) of Electrotechnical Lecture Course a complex of interconnected educational software (informational, training, modeling, reference and encyclopedic, checking-up) providing a complete structure of educational and cognitive activity: purpose, motive, the activity itself, result - on condition of interactive feedback, carried out according to multimedia techniques [Семенова, 2007].

Using this definition under MC of Electrotechnical Lecture Course we recognize a MC with dominating informational component.

To animate educational and cognitive activity of the students at the multimedia lectures we have elaborated an integrative structure MC (LC) comprising blocks of educational material putting to practice the lecture's didactic components and its principal functions (fig.1).

According to the primary structural components of the educational and cognitive activity [Харламов, 2005], we distinguish between the following didactic components of a multimedia lecture: **objective, demand-motivational, conceptual, operative-active, emotional-volitive, control-regulational, evaluative-resultative.**

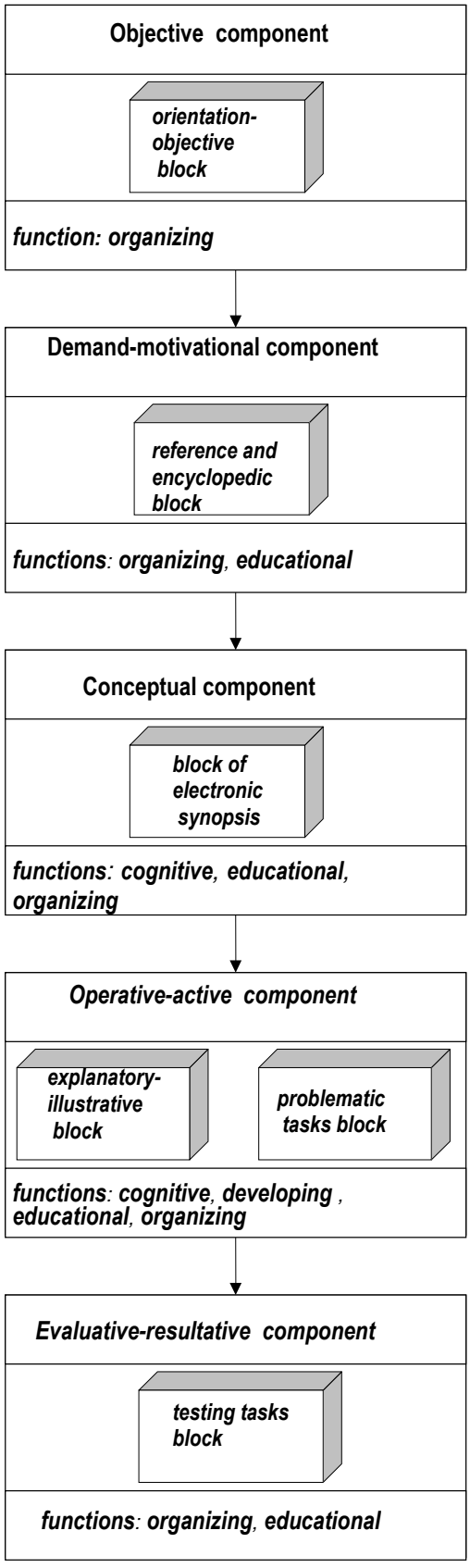

Fig.1. The Integrative Structure of Multimedia Courseware of Lecture Course

These components can be briefly characterized as follows:

The **objective component** includes the theme, purposes and tasks of the lecture, the link between this lecture with the previous and the following ones, as well as connections of the theme with other subjects and sciences, studied by the students at the senior courses.

The **demand-motivational component of the multimedia lecture.** The principal task of this structural component is to get the students interested into the theme of the lecture. If the task of objective structural component is easy to realize at both a traditional lecture and at a multimedia lecture, the main task of the demand-motivational component can be better realized when using Multimedia Courseware. To attract the students' interest to the theme of the lecture with the help of MC a lecturer can begin it with historical documents on the scientific contribution of the scientists into the development of the theme, or give some heuristic tasks faced by the electrotechnicians on the problem of the lecture. While considering and solving such tasks at the beginning of the lecture the students get a bit of motivating intellectual warming-up, stimulating their interest to the topic and programming them for effective work during the lecture.

The **conceptual component** is one of the principal didactic components of a lecture on any subject of the State Educational Standard, fixed in text-books, manuals, copyrighted lectures, including those in electronic form.

The content of the lecture first of all should be scientific and reflect modern tendencies of investigating the subject. As soon as an electronic synopsis can be easily amended and changed, it has an undeniable advantage as compared to a printed material. Moreover, the electronic synopsis allows shortening the time between its composing and issuing.

The main task of **operative-active component** is to organize the educational and cognitive activity of the students at the lectures, to facilitate perception of material as well as considering and effective memorizing information.

The **operative-active component** at a multimedia lecture can be magnified via visualization of the material and possibility to enhance the lecture with programs of imitative modeling, able to create problematic situations.

The **evaluative-resultative component** is a new didactic component of a lecture, substantially amending methods of reading multimedia lectures in comparison with traditional ones. This component provides the feedback and the students' self-control as well as correction of the reading methods by the professor.

The evaluative-resultative component at multimedia lectures is realized due to express-testing, which allows the students to self-check their knowledge while comparing their results with the reference material. The introduction of this component turns the multimedia lecture into a lecture of closed type of managing the educational activity.

The didactic and educational purposes of lecture are (according to [Виленский, 2004]:

- Giving to students modern, complete, interconnected knowledge with the level defined by the objective goal to every certain theme;
- Providing creative activity of the students together with the lecturer during the lecture ;
- Developing professional and business qualities of the students, stimulating their interest to the subject and shaping their independent and creative way of thinking.

According to the above mentioned purposes of the lecture, M.Y. Vilensky [Виленский, 2004] distinguishes between the following functions of lecture: cognitive, developing, educative and organizing.

The **cognitive function** of lecture provides students with fundamental notions of the science and defines scientifically based ways of solving its practical tasks and problems. The **developing function** of lecture is in orienting students to rely on their thinking, not on their memory while studying. The cognitive function corresponds to reproductive level of educational and cognitive activity, while the developing function corresponds to the productive one. The **educational function** is realized in case the lecture includes not only actual knowledge in this or that professional sphere but also idealogic, general scientific and humanitarian information. The **organizing function** of lecture is in managing the independent work both during the lecture and while self-preparing.

All these functions are true for multimedia lectures, moreover they become even more valid due to a higher level of program and psycho-pedagogical potential of MC (LC).

In philosophy structure is a form of the content existence. So, the structure of Multimedia Courseware should be a combination of blocks of the educational material in this or that sphere. We distinguish between the following blocks: **orientation-objective** block, **reference and encyclopedic** block, the block of **electronic synopsis**, **explanatory-illustrative** block, the block of **problematic tasks** and that of **testing tasks**.

Here are brief characteristics of the blocks.

The **orientation-objective** block corresponds to the objective didactic component of multimedia lecture. The material of the block is structurally represented according to the functional purpose of the objective component and it includes the themes of the lectures within the program of the course, their aims and tasks; skills, types and ways of activities for the students to master.

As soon as the educational process is first of all connected with its clear target-setting and the students' acceptance and understanding of these targets, the primary function of orientation-objective block is organizing one.

The **reference and encyclopedic** block is responsible for demand-motivational component of MC due to the included biographical data and main achievements of outstanding scientists of the sphere; information on results of new scientific achievements and prospects of further development; principal notions and definitions on the subject according to the State Educational Standard.

Students' demand for knowledge and their interest to it are influenced by a great number of pedagogical methods, devices and other factors. I.F. Kharlamov [Харламов, 2005] notes, that the teacher as a person, his outlook, his erudition and experience are very effective in this aspect. If a teacher profoundly knows his subject, while teaching he or she users interesting facts and details, impressing students with the range of his or her outlook and charming them with his or her educational level. In this case following psychological mechanism to copy, students come to the inner conflict between their level of knowledge and the desirable example, and wishing to cope with the disharmony they get a push to a more active learning.

The information of this block contributes to the students' interests to the subject, stimulates their desire to study, develops their scientific outlook, and greatly influences their personal growth.

The block of **electronic synopsis** corresponds to conceptual component, representing a text synopsis of lectures with explanations to every slide of the explanatory-illustrative block. The block of electronic synopsis can be used both by lecturers while preparing for multimedia lectures and by students of all forms of studying while reading for seminars. The main functions of the block are: cognitive, organizing and educational.

The **explanatory-illustrative** block provides reproductive level of educational and cognitive activity of the students, it is used while giving the material through explanations and illustrations. The block includes multimedia lectures in modules – i.e. structurized by topics. Every module contains the title of the theme, educational material in slides to be shown by the lecturer (photos, electric circuit diagrams, charts, schemes). While composing slides for the multimedia lectures the teacher should follow ergonomic requirements. The main functions of this block are: cognitive, developing, organizing and educational.

The block of **problematic tasks** manages the productive level of educational and cognitive activity of the students, providing problem-solving presentation of material. It is represented by the complex of problematic tasks, grouped thematically. Every problematic task is a computer-visualized data of the problem to be solved with theoretically possible decisions, provided by the lecturer. The latter uses it via programs of imitating modeling. The main functions of this block are: cognitive, developing, organizing and educational.

Both blocks – the explanatory-illustrative and that of problematic tasks realize the operative-active component of MC.

The block of testing tasks serves for express-testing at multimedia lectures and represents a number of tests to every theme. Express-testing at the end of multimedia lectures makes educational-cognitive activity of the students conscious and instills self-discipline in students.

MC of lecture course in the subject “Theoretical backgrounds of electrotechnics” was created in the HTML-format and registered in the Brunch Collection of Algorithms and Programs (Moscow). The orientation-objective, reference and encyclopedic blocks and that of electronic synopsis are made in **Word** in the form of hypertext. The explanatory-illustrative block as well as blocks of problematic tasks and tests are created with the help of **Micromedia Flash** and **Power Point** programs, with their animating and sound effects, possibilities to insert photos, video clips, fragments of imitating modeling in **Electronics Workbench** and **Matlab**. The lecturer regulates reproduction of this or that animated picture by clicking the mouse pointer.

Conclusion

The MC lectures turned out to be visually dynamic, convincing, emotional, colorful. The results of the questionnaire survey held among the students and joint scientific investigation of Multimedia Technologies laboratory and The Health Centre of Orenburg State University proved that the volume and quality of the retention of material by the students considerably grows at MC lectures, motivation to study the subject appears, educational and cognitive activity becomes more vivid.

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