

Multimedia Lectures on Discipline “Machine Parts”

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The method of development and implementation of the multimedia lecture course on discipline «Machine Parts» into the learning process is considered in the article.

Key words: multimedia lectures, machines elements, computer technology, learning process.

REFERENCES

1. Kos'kin, A.V. Information-analytical resources in management of organization-technical systems : monograph / A.V. Kos'kin; Ed. by I.S. Konstantinov. – Moscow: Mashinostroyeniye-1, 2006. – 208 p.
2. Khudin, A.N. Management of sustainable development of educational process in university: abstract of diss-on ... Doctor of Ped. Sciences: 13.00.08 / Khudin Alexander Nikolayevich. – Kursk, 2008. – 39 p.
3. Borovkova, T.I. Monitoring of educational system development. Part 1. Theoretical aspects: manual / T.I. Borovkova, I.A. Morev. – Vladivostok: Far East University press, 2004. – 150 p.
4. Tarasova, M.A. Engineering Education. Rational technological resource base as a factor of innovative development: monograph / M.A. Tarasova; Ed. by G.M. Zomiteva. – Orel: Gosuniversitet – UNPK, 2014. – 202 p.
5. Tarasova, M.A. Engineering education. State and dynamics of academic-research-production base development: monograph / M.A. Tarasova; Ed. by I.S. Konstantinova. – Orel: Gosuniversitet – UNPK, 2012. – 228 p.
6. GOST R ISO 9001-2008. Systems of Quality Management. Requirments [Electronic resource]. – Moscow: Standartinform, 2008. – 65 p. –URL: http://smk.nspu.ru/file.php/1/GOST_R_ISO/_9001-2008.pdf, free. – Title from the screen (date of reference: 13.06.2015).
7. Korovkin, M.V. System of quality management in university / M.V. Korovkin, S.B. Mogilnitskiy, A.I. Chuchalin // Engineering Education. – 2005. – № 5. – P. 62-73.
8. Asaul, A.N. Management of Higher education institution in the condition of innovative economy: monograph / A.N. Asaul, B.M. Kaparov. Ed.by A.N. Asaul. – Saint-Petersburg: Gumanistika, 2007. – 280 p.
9. Tarasova, M.A. Rational technological resource base in educational institutions of academic-research-production complex as a factor of quality and effectiveness enhancement in engineering education // Engineering Education, 2013 – № 13. – P. 96-101.
10. Selezneva, N.A. Quality of higher education as a subject of systematic study: lecture-report / N.A. Selezneva. – Moscow: Issledovatel'skiy tsentr problem kachestva podgotovki spetsialistov, 2004. – 95 p.
11. Nikitina, N.Sh. Model of production processes and services in education / N.Sh. Nikitina, N.V. Nikolayeva // Universitet upravleniya: praktika i analiz. – 2007. – № 1. – P.62–68.

Over many years Machine Parts and Pick-and-Place Devices Department of Volgograd State Technical University has been developing and implementing computer technologies [1] into the academic activity in three main areas:

1) development of virtual laboratory works for computer classes;

2) design of techniques and special methodical support for testing in the course «Machine parts» performed in the platform «Moodle»;

3) development of multimedia lectures.

The multimedia lectures were based on the authors' series of lectures on the course «Machine parts and bases of design» [2, 3] initially amounted 51 hours. The first version of multimedia lectures started at the department as soon as 2010. Enormous preparatory work had preceded the lectures [4].

Firstly, it was necessary to systematize and structure the content of lectures. As our experience showed, the most suitable form of course presentation is its modular framework. To arrange the modules' interaction and manage them, a flexible set of hyperlinks was developed. It made the multimedia lectures universal and diverse. The universality of the given course consists of its multimedia use by the students trained in different specialties and majors. In this case, the main content of lectures remained unchanged, but specific feature of each major was included in

definite modules, which were referred to by the hyperlinks.

For example, lectures for the students studying the major 241 000.62 «Energy- and resource efficient processes in chemical engineering, petrochemicals, and biotechnology», and referring to the necessary hyperlink, one can show in the screen the slides demonstrating parts and components of machine and devices for chemical production. Such an approach is particular useful for a lecturer delivering lectures for students learning different curricula in the same term. Moreover, the hyperlink system allows the amount of hours to be changed from short course of 8 lecture hours (for part-time students) to 51 hours.

Secondly, a large amount of photo- and video aids was required to make lectures visual. Not only lecturers, but also students of different specialties and majors were involved in collection and preparation of such materials. As a result, the department collected resource of visual aids including more than 300 photos and videos. To design them, the outdoor photos and videos of different machines, parts, components, and their failures were made; methods of computer graphics, animation, Internet were used.

Application of computer technologies in development of multimedia lectures not only provided modern attractive design, but also made possible to perform



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the incremental construction of complex schemes, drawings, and formulas (Fig. 1). In addition, colour parameter synchronization in the formulas, schemes, and comments made it easier for students to understand the lecture.

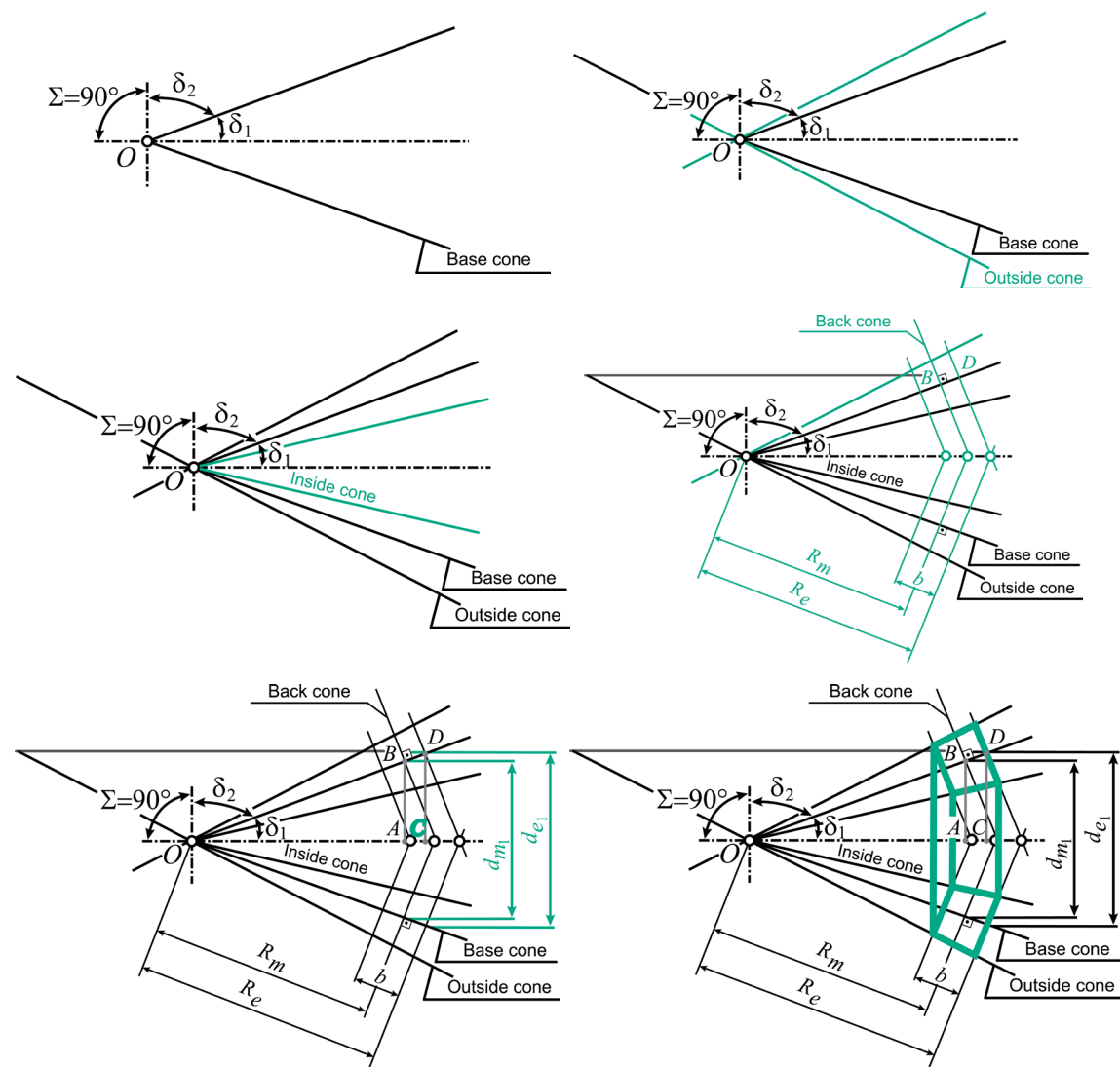
At present, every multimedia lecture includes large systemized material and teaching aids for its presentation in the form of slides in different course sections [5].

To assess how useful the multimedia

lectures were for students, we conducted mini sociological survey with the subsequent processing of the data obtained.

In total, 100 students took part in the survey including 49 boys and 51 girls. The 3d and 4th year-students' groups of Chemical-engineering, Electronics and Computer Science Vehicle and Weapon Systems Departments were chosen for the survey. They had listened to the course of multimedia lectures in the subject «Machine parts and bases of design»

Fig.1 Stages of complex drawing design



previous academic year. The respondents were asked to answer five questions.

The survey showed that multimedia lectures were preferred by 53% respondents, out of which 31% boys and 22% girls; traditional form of lectures was chosen by 43%, of which 16% boys and 27% girls, and 4% could not answer the question (Fig. 2).

As the main advantage of multimedia lectures the respondents pointed out their visibility, 46% voted for it, the second place was given to simplicity in perception (29%), then comes information capacity 10%. 9% did not see any advantages and 6% suggested their own options. Among the students' suggestions were possibility to take photo of slide, to show video, and to choose the speed of lecture delivery.

Most part of the respondents regarded multimedia lectures as a more convenient form for lecture perception with 57% being voted for them, 41% giving their preference to traditional form and 2% having no definite opinion.

Answering the question «Which type of lectures allows learning more amount of information?» the opinions were divided,

32% of the interviewed students gave their preferences to multimedia lectures, the same number of respondents thought that both types of lectures allowed learning the same amount of information, 26% of respondents voted for traditional form of lecture; 10% could not answer the question.

Use of photo, video, and audio aids in the lecture was considered useful by 90% of respondents.

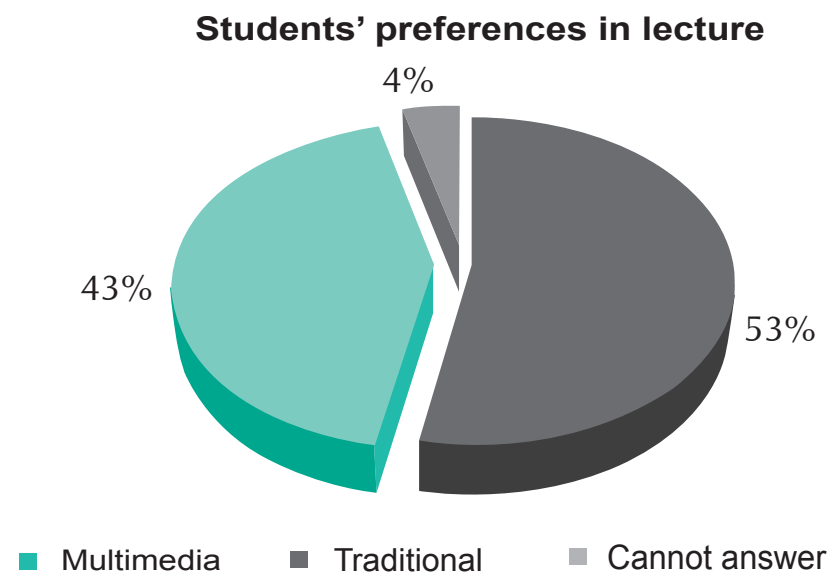
From the students' point of view, multimedia lectures have a number of advantages in comparison with traditional ones.

In their opinion, the most significant advantage is informative layout in the slide. It sufficiently simplifies note making and understanding a lecture.

As for figures and schemes, traditional lectures yield multimedia ones as well.

Possibility to use video in addition to lectures allows a student to develop a visual image in his mind that improves the process of learning information, in future helps to write laboratory reports and prepare for exams. Besides, when commenting the schemes in the course of multimedia

Fig. 2. Results of students' opinion survey



lectures, stage-by-stage introduction of parameters enhances understanding and memorizing information in comparison with notes on the board, where sometimes it is impossible to place a large amount of comments without erasing some parts of figure.

In addition to the mentioned above, one can note that the slide design itself draws students' attention to the key points of multimedia lecture by means of highlighting the text in colour different from the colour of the main text or framing «the main idea».

Thus, our experience in multimedia lectures allows for the following conclusions. Multimedia approach to lectures provides significantly their visibility. Visualization, brightness, dynamics of figures performed

with multimedia computer tools help to explain the most complicated phenomena and processes to learners. Students better understand complicated information requiring visual support, moreover, multimedia lectures shorten the time of learning information and improve the efficiency of academic activity in general.

Some sections of multimedia lectures were included in programs of different transmission design. The program of belt transmission design in its hauling capacity was given the protection [6].

Multimedia lectures obtained four-year approval, correction, and are completely used in academic process at the department of «MP and PPD», VolgSTU.

REFERENCES

1. Matlin, M.M. A system of computer technologies for studying the course «Machine parts» and «Theory of Machines and Mechanisms» / M.M. Matlin, S.Yu. Kislov, I.M. Shandybina // International Conference on Theory of Mechanisms and Machine Mechanics devoted to the 100-the anniversary of I.I. Artobolevskiy (Krasnodar, 9–16 October, 2006): proceedings. – Krasnodar: Kuban State Technological Un-ty, 2006. – Part 1. – PP. 275-276.
2. Bases of calculation for vehicle parts and components: manual / M.M. Matlin, A.I. Mozgunova, S.L. Lebskiy, I.M. Shandybina – Volgograd: VolgSTU, 2010. – 279 p.
3. Calculation of vehicle parts and components: textbook / M.M. Matlin, A.I. Mozgunova, S.L. Lebskiy, I.M. Shandybina, A.V. Pobedin. – Volgograd: VolgSTU, 2014. – 311 p.
4. Matlin, M.M. Machine parts and bases of design [Electronic resource]: electronic training complex / M.M. Matlin, S.Yu. Kislov, I.M. Shandybina – Volgograd: VolgSTU, 2011. – 1 CD-ROM. – № GR 0321100012. – Registration certificate № 21083 of 13 January, 2011.
5. Multimedia approach to the course «Machine parts» / M.M. Matlin, I.M. Shandybina, S.L. Lebskiy, A.A. Tetyushev // Innovative Information technologies: proceedings of International Scientific-Practical Conference, Prague, Czechia, 22–26 April 2013: in 4 Vs. – Moscow: MIEM NRU HSE, 2013. – V. 1. – PP. 279-282.
6. Certificate № 2014618681 Russian Federation. Program of belt transmission design in the hauling capacity: certificate of official registration of the software / I.M. Shandybina, M.M. Matlin, M.V. Topilin, A.N. Goncharenko, A.S. Klimov; The rightholder: Federal State Budget Educational Institution of Higher Professional Education Volgograd State Technical Un-ty (VolgSTU). – № 2014616694; applied 10.07.2014; published 20.09.2014. – [1] p.

UDC 001.14(1).132

Scientific Knowledge Concept: Case Study Technology and Its Practical-Oriented Application

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Shaping the competences of a Master-student within the framework of Federal Education Code new generation of Higher Professional Education is implemented through an innovative methodology, i.e. case study (portfolio). This methodology is coupled with such aspects as self-control, cooperativeness and, especially, teamwork. This article is a continuation of previously published papers [3, 4, 5].

Key words: scientific knowledge concept, shaping Master-student competences, innovation in engineering education.

New generation programs of Federal Education Code (FEC) oriented at the competency-based approach are focused on the development of those tools involved in the shaping of Master-student competences, as well as innovative methodological documentation. Such a discipline as “Philosophy and Logics” for Master-students of different engineering domains has been introduced in Tyumen State Oil-Gas University. The above-mentioned problem is solved by the application of innovative teaching methods in combination with designed integrated courseware, which, in its turn, are being tried and tested within the framework of the Master-student programs.

Besides, the existing traditional tools, certified teaching methods, management and monitoring organization procedures, newly updated methods and techniques have also been introduced. The proposed learning-teaching package includes course schedule, lecture and practicum plans, and self-instruction guidelines – for tutorials and self-directed learning. The guidelines include a set of assignments, forms and possible procedures to determine the qualitative and quantitative parameters for learning outcomes.

The methodological recommendations in defining the quality evaluation of the learning outcomes are as follows:

shaping Master-student competences, i.e. the readiness (including motivation and personal qualities) to demonstrate one's abilities (knowledge, skills, experience) in future professional and research activities under the existing conditions of today's national science and domestic economy. Learning outcomes are determined by the acquired competency qualifications of a Master-student both after the completion of a course and education program (specialization). Competency qualification is expressed in a score-system integrated as a learning table-matrix, as well as final assessment as a credit test.

Learning outcome elements are those independent abilities (knowledge, skills, and experience) which could enhance a Master-student's performance in research of this or that topic, field or specialization and further his/her research results in step-by-step practical application.

Design goals are to investigate the common characteristics of scientific knowledge in the domain of logics oriented at science and technical-engineering methods; and to explain their interdisciplinary and cross-disciplinary interaction. The discipline “Philosophy and Logics” is included in the general courses of Humanities and Social Science-Economics. The objectives of this discipline are as follows:



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