Authors:

Andrey Sverchkov, assistant of Department of computer-integrated systems in chemical technology
MUCTR
Moscow, Russia

Pavla Mikhaylova, assistant professor of Department of computer-integrated systems in chemical technology
MUCTR
Moscow, Russia

Tatiyana Savitskaya, professor of Department of computer-integrated systems in chemical technology
MUCTR
Moscow, Russia

Dinara Il'murzayeva, master of Department of computer-integrated systems in chemical technology
MUCTR
Moscow, Russia

Speaker’s

Andrey Sverchkov
Pavla Mikhaylova

D. Mendeleev university of chemical technology of Russia
Moscow, Russia
One of the most important tasks of a teacher is to develop among students the ability to independently solving problems in various fields and activities.

To be able to solve a wide range of educational and professional tasks, students need to improve their skills. Additional learning courses are a great way to improve skills.

The advantages of e-learning resources and modern digital technologies are increasingly being used in the educational process.

In educational process digital versions, of the tutorials as is known have being developed. Digital versions are allow maximum use of all the advantages of interactivity and multimedia content.

The application of the interactive educational manual promotes the growth of the quality of education, reduces the costs of organizing and conducting in-person classes, and also increases the efficiency of providing the educational process with educational and methodical means when changing the structure or content of the educational discipline, when it is supplementing, updating, modernizing.
From all of the above, it can be concluded that online tutorials are a relevant area in the development of information technology in general and electronic educational resources in particular.

The purpose of developing and using in the educational process multimedia manual “Database Application Development” is to create an electronic educational resource intended for self-mastery learning of students of non-specialized on profile of a information technology.
**OVERVIEW OF E-LEARNING AND ONLINE-COURSES**

1. A series of electronic academic manuals on programming, computer networks and systems (Department of Applied Informatics and Programming of the Sterlitamak branch of Bashkir State University);

2. Multimedia academic manuals in various programming languages (Turbo Pascal, Java, Visual C++, C#, Visual Basic, etc.) (MIOC - House of multimedia interactive online courses);

3. Electronic manuals on the basics of programming in C and C++ languages (the BaGER - automated learning system (Base and Generator of Educational Resources) developed at the CAD department of BMSTU);

4. Electronic educational-methodical complex (EEMC) for scientific and technical calculations in the Python programming language;

5. The program of additional education at Moscow State University which involves the use of four components: Learning Pascal software, the Moodle distance learning environment and the Internet-university for posting content and conducting practical exercises with remote databases in Microsoft Azure Cloud.
OVERVIEW OF E-LEARNING AND ONLINE-COURSES

(THE ANALYZE OF VARIOUS PLATFORMS OF LEARNING FOR DEVELOPING DATABASE APPLICATIONS).

1. THE COURSES FOR WORKING WITH DBMS "ORACLE" (ORACLE)

(At the current rate of the American dollar, the cost of the learning course is a little over 70,000 Russian rubles. This price includes annual access to the course and more than 80 hours of demonstrating video content).

2. THE ONLINE-COURSES: "DATABASES", "INFORMATICS FOR HIGHER TECHNICAL SCHOOLS", "PROGRAMMING ALGORITHMS AND DATA STRUCTURES" ARE PRESENTED ON THE COURSERA (COURSERA.ORG)

(MORE THAN 12 THOUSAND STUDENTS) AND "OPEN EDUCATION" (OPENEDU.RU) (MORE THAN 73 THOUSAND STUDENTS) PLATFORMS (THE ST. PETERSBURG NATIONAL RESEARCH UNIVERSITY OF INFORMATION TECHNOLOGIES, MECHANICS AND OPTICS (ITMO))

3. MOST ADVANCED ONLINE COURSES IN INFORMATION TECHNOLOGIES ARE PRESENTED ON THE STEPİK AND THE NETOLOGY PLATFORMS.

(But this platform is devoted to other applications, environments and languages)

MOST COURSES ARE AIM ONLY AT WORKING WITH DBMS, AND NOT AT INTEGRATION OF THE DATABASE WITH THE DEVELOPED APPLICATIONS.
**Reasons** for developing Multimedia academic manual “Database Application Development”:

1. **The absence of similar online-courses in English and Russian**;

2. **The absence of similar free online-courses that teach the development of database applications in the Microsoft Access environment and monitor knowledge in the Moodle educational environment**;

3. **The absence of similar courses that are suitable for people with non-specialized specialties (for example - Chemical Technology, Nanoengineering, etc.)**.
The choice of Delphi and MS Access is due to:

• Delphi, since it was originally developed to teach students the discipline of programming, and it focuses on the harmony and high readability of the written code. Over a quarter century of its existence (in February 2020, Delphi turns 25 years old), it has constantly evolved, acquired new opportunities. Today, using the same program code, you can create applications for: Windows, Mac OS X, iOS, Android and Linux.

• MS Access, since this DBMS (by analogy with Delphi), is selected because of its simplicity and the availability of auxiliary tools in the form of a table designer, an SQL query designer. This tool is quite enough for learning how to use the database, since the developed applications use small amounts of data and, as a rule, there is only one user.
Main Stages and Technologies of Development of Multimedia Manual

<table>
<thead>
<tr>
<th>STAGE 1</th>
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<tbody>
<tr>
<td>Destination block (The purpose and main tasks that are when studying the course are stating).</td>
<td>Lecture notes</td>
<td>Checking the text of lectures for the absence of spelling mistakes. The text is formatted, structured.</td>
<td>Structuring all material collected</td>
<td>Publishing a course component to a web server</td>
</tr>
<tr>
<td>Preparation of theoretical course materials</td>
<td>Graphic Images (Screenshots)</td>
<td>Images are added bright with high quality.</td>
<td>Creating a network component (website) on which the course is located.</td>
<td>The introduction of the created course in the educational process.</td>
</tr>
<tr>
<td>Creating a script for the course (methodically structured course content)</td>
<td>Video</td>
<td>downloadable video tutorials clearly show the real processes that are difficult to explain using other learning tools.</td>
<td>Combining materials into a single complex. Adding hyperlinks.</td>
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</tbody>
</table>
THE MAIN PAGE OF THE COURSE "DATABASE APPLICATION DEVELOPMENT" IN THE INTERDISCIPLINARY LMS

Course content
Provides information on developing applications in the Delphi integrated visual programming environment. The integration of developed applications with databases is considered. Considerable attention is paid to the construction of a structured SQL query language. The basic mechanisms for accessing data are provided. The presentation of the material is accompanied by a large number of examples that can be useful both when performing laboratory work, and when solving real problems.

The manual is intended for students of the disciplines "Languages and programming environments", "Programming and numerical methods in the problems of chemical technology", related to the variable part of block "Disciplines (modules)" and which are disciplines of choice of students of the main educational program for the preparation of bachelors in Direction 26.03.01 - Energy and resources-saving processes in chemical technology: petrochemistry and biotechnology: performing training courses research and development projects and projects, laboratory and final qualifying work. The manual can be useful to undergraduates, graduates, postgraduate students and teachers of other areas of training in the development of programs designed for integrated work with databases.

Includes 8 sections:
1. Creating tables. Entering and editing data in Microsoft Office Access
2. Data Search in Microsoft Office Access
3. Multi-table database in Microsoft Office Access
4. SQL Basics
5. Formation of complex SQL queries
6. Delphi Database Tools
7. Navigation way to access data
8. Relational way to access data

The methodology for the presentation of educational and methodological material allows you to use this manual for independent work if you have knowledge on the use of the Delphi programming language.

Methodological instructions for using the multimedia academic manual «Database Application Development»

Multimedia academic manual «Database Application Development»

Final test for knowledge control on the course «Database Application Development»

cis.muctr.ru/alk
THE MULTIMEDIA ACADEMIC MANUAL HAVE PRESENTED IN THE FORM OF A SET OF WEB PAGES, MULTIMEDIA AND AUXILIARY FILES THAT ENSURE THE CORRECT FUNCTIONING OF THE EDUCATIONAL RESOURCE.

DUE TO THE CONCENTRATION OF MATERIALS OF DIFFERENT NATURE ON ONE RESOURCE, THE POSSIBILITY OF MULTIFUNCTIONAL NAVIGATION HAS PROVIDED. THIS NAVIGATION CAN MAKE IT EASY TO NAVIGATE BETWEEN EDUCATIONAL MATERIALS THROUGH HYPERTEXT LINKS. THE STRUCTURE OF THE MANUAL INCLUDES THE FOLLOWING SECTIONS:

• MULTIMEDIA MANUAL;
• VIDEO MATERIALS;
• LECTURES.
MULTIMEDIA manuaL — THE HOME PAGE THAT CONTAINS THE MANUAL DESCRIPTION AND THE MAIN SECTIONS IN THE FORM OF CONTENT.
VIDEO MATERIALS — A PAGE WITH VIDEO CONTENT ELEMENTS FOR EACH SECTION OF THE MANUAL.

THE iSPRING CAM 8 PROGRAM WAS USE TO RECORD MANUAL VIDEOS. IT IS FREELY AVAILABLE FOR ALL CATEGORIES OF USERS AND INCLUDES A BASIC SET OF FUNCTIONS FOR CREATING PROFESSIONAL VIDEOS.

THE VIDEO WAS SAVED IN WMV FORMAT AND THEN UPLOADED TO YOUTUBE.
OTHER PAGES OF THE MULTIMEDIA ACADEMIC MANUAL

Creation of database applications for the catalog of products manufactured by a chemical enterprise

Lectures – 8 child pages formed by the template of the main page, which are detailed information on each topic of the manual, supplemented by graphic images, tables.

In the process of site layout HTML, CSS, JavaScript were used.

To organize the most convenient structure of the electronic academic manual, a vertical menu was create for the sections of the manual and a horizontal menu to go to the manual content and video content elements. Access to the content has provided on all pages of the resource.
TEST QUESTIONS FOR MEMORIZING THE STUDIED MATERIAL

What is the relationship between the Products and Orders tables?

Choose one answer:

1. One to many
2. One to One
3. Many to many
4. One to no one

Match the keyboard command and where each command moves focus when navigating the Access table.

- Keyboard command Page Down moves to the first field of the first record
- Keyboard command End moves to the next page
- Keyboard command Tab or Enter moves to the next record
- Keyboard command Ctrl+End moves to the last field of the current record
- Keyboard command Shift+Tab moves to the previous page
- Keyboard command Page Up moves to the previous record

TOTAL NUMBER OF QUESTIONS – 154
CONCLUSION

Compared with other electronic academic courses for developing database applications, the developed manual has the following advantages:

- The manual has integrated into the modular object-oriented distance e-learning environment Moodle. This e-learning environment allows the student to pass a knowledge test by answering questions for self-control at the end of each section, as well as passed the final test in the Moodle with fixing and analysis of the results (answers);

- The manual can be useful to bachelors, masters, postgraduate students and teachers of other areas of learning in the development of inter-faculty courses, additional educational programs designed for integrated work with databases.
Thank you for attention!

Speaker’s contacts:

Andrey Sverchkov  Pavla Mikhaylova

Department of computer-integrated systems in chemical technology

D. Mendeleev university of chemical technology of Russia,
125047, Moscow, Miuuskaya Square, d. 9

e-mail andrey_sverchkov@mail.ru  
web-site http://cis.muctr.ru/alk