Multimedia Tutorial In Physics
For Foreign Students Of the Engineering Faculty Preparatory Department

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ABSTRACT. Foreign students study physics and Russian as a foreign language at the preparatory Department. They are to be trained to study different courses. During only one year the teachers of physics and Russian should help students from Asia, Africa and Latin America to get ready to study in the university. To help students in a short time to learn physical terms, to understand physics by ear, to read and write, teachers are developing the online multimedia tutorial. It is placed on the cloud OneDrive. Tutorial includes the main themes in the Mechanics. They are physical processes and phenomena, units, physical quantities, kinematics, laws of mechanics and others. The Power Point presentation slides contain information on the topics. These slides help students learn to read Russian texts on physics. There are hyperlinks to sound files on slides. Listening to those recordings, students gain the skills of physical texts listening. After each module we placed the test. Students can prepare for it using the simulator. Tests and exercise equipment made in the form of EXCEL spreadsheets. We provide our students the opportunity to view, read and listen, the tutorial files via their own mobile devices. Thus they can study physics in Russian in the classroom, or at home, but in the library, in the Park etc. Also they have access to it when they are not in Russia, and in their native countries. The tutorial presented seems to be considered as the first attempt to develop the online multimedia aimed to assist foreign students to get success in their efforts to study physics in Russian. It helps our students to learn physics in Russian faster and better. Determined are the directions of further development and improvement of the tutorial.

Introduction. The elements and the structure of the online multimedia manual in physics are the basics for the organization of educational communication in natural and engineering sciences with elements of smart and BYOD technologies and webinars at the preparatory Department of the University. Here we observe a number of the main prospects of the MS OneDrive Internet resource as an IT platform to support the complex solution of the tasks of the formation and development of basic competences of foreign students in Russian language of physics as a foreign language, in physics and in modern information technologies for education including mobile access.

Foreign students come to the preparatory faculty of the University to get the Pre-university training to enter at the faculties with increased demands on natural-scientific disciplines. Its goal is to build a solid educational competent scope as the profile of science and in the language sector of the educational and professional communication. Teachers of physics develop advanced smart multimedia learning tools complex in collaboration with colleagues of the Russian language as a foreign language (RFL) department and IT experts. Compressed terms of training and the need to ensure wide access to the complex and it’s components faced developers the necessity to use Internet technologies. It is supposed to use the elements of smart technologies, webinars and mobile access. The vast opportunities of cloud Internet resources, such as MS OneDrive, make them...
adjustable for use as an IT environment for preparation, loading, storage, access and application of interactive tools to support learning in online mode. Simultaneously the problem of the increase of IT competency of all participants of educational communication was solving.

**Components Of the Multimedia Tools Complex For Enhanced Training Of Foreign Students In Physics.** One of the main items for future engineering-ditch of any specialty is physics. Teachers in physics on the preparatory level at the Russian Language and Basic Education Department dealing with foreign students coming to study at PFUR face a very complex problem. Despite the fact that foreign students already have some basic education in physics, their earlier knowledge needs to be adjusted to Russian educational standards. At the same time they are undergoing intensive training in Russian of science as a foreign language. Thus, the task of training at the preparatory faculty is not only bringing in accelerated mode of level of preparation of students on the subject in compliance with the standards of the Russian Federation on secondary education taking into account, that the level of knowledge of students from different countries varies greatly. It is also attended by teachers of profile disciplines in the formation of the basic professional educational competences of students in the Russian as a foreign language for scientific and physical purposes and in the sector of application of information technologies in natural science education. The aim of such an integrated approach is to achieve a level of preparation of students adjusted to enter the University and to study physics, and other engineering disciplines in Russian language as a foreign language of science based on modern means of information technologies successfully along with native Russian students.

One of the ways to achieve these goals is to use modern information technologies in the educational and professional communication [3-5]. In particular, their application creates interactive electronic training manuals, intended for the use not only offline, but also Internet-resources based. This will allow us to include in the program of training a set of smart elements of online communication [6], such as students’ self-training, including the self-test, mobile access, or conducting exercises with elements of webinars.

It is the ambitious idea to develop the project of multimedia manual complex in physics for foreign students, focused on special training on Russian language of physics as a foreign language. The basis for elaboration includes the principle of providing the wide access to and open use of components of the complex in different modes, including offline, on-line system with Internet access and in mobile mode. Multifunctional use of the complex presupposes how to work with the audience and for the students’ self-work. It also provides for the classroom and outdoor control of the level of training and learning of students. Mediacomplex includes audited presentation correlated with the adopted textbook [1] and applications for this tutorial [2] and a set of test tools for the preparation and monitoring of the level of training.

Test system consists of the set of the issues in physics (300 questions) and Russian language of physics as a foreign language (200 items), computer simulators, and tests. Elements of the set are performed in the mode of the table processor Excel files [7] and web pages designed under the specialized training tests environment Hot Potatoes [8].

Audited presentation on the course of «Physics» for foreign students of the preparatory Department forms is the basis of the mediacomplex. It is intended for training on the topics in mechanics. Slides of the presentation are designed to suit the requirements of the existing educational standards and in accordance with the level of education and language training of foreign students. Each slide contains the header, illustrations, definitions, physical formula. Audio records associated with slides allow students to listen fragments of the manual in Russian language. To increase the efficiency of media complex as a mean to support the training process the presentation is equipped with built-in elements of self-control. These mini tests are designed in the form of interactive web pages, which are prepared under the tests constructor HOT POTATOES environment. They contain the question, variants of the answer and the field to point the correct answer. They have a built-in check module and the test result display. Mini tests are embedded in a presentation after each section. They serve
as training elements for self control in personal studies. Assembly of different HP tests can be used both as training engines as well as means of the periodical and remote control in the online mode, including for self teaching on physics and for webinar studies. This is covered further in [5].

Computer training tools are included in the media complex formed as Excel tables are intended for self control in the process of the presentation study and for preliminary training, as well as for official testing procedures. Training tools are developed not only to be built-in the individual paragraphs, but also for practical topics of the course «Physics» for foreign students. Files of tests simulators are placed on the MS OneDrive network share. Hyperlinks on the test modules are available in its final part of each section of the presentation. They can be used by students themselves outside-taken in person and on the lessons in the computer class.

Using the test generator and the set of questions, everyone can create an unlimited number of control issues. They can include a number of questions for the control of both the audience and extracurricular. Possibilities and information about the IT support of the media complex built-in testing subsystem are presented in the papers [5-8].

**Multimedia Manuals On Rlfs In the Physical Education Of Foreign Students.** The need of the development of the broad access online media complex to support preparation for the application of foreign students of engineering and scientific areas, chosen their degree mastering in Russian language, was highlighted by the way of understanding of teachers of Russian language, Physics and Informatics of the difficulties faced by foreign students who participate in the core disciplines in parallel with beginning studies of the Russian as a foreign language and a language of the physical science at a basic level.

The problems in the grammar of Russian language are well-known. This is first of all specific syntax and its implementation with flexible word order, distinctive design, character of links between words in a sentence, case-case system of nouns and adjectives.

Modern realities in the language of engineering and natural Sciences compared with common language have their own specific features in terms of grammar, and in terms of vocabulary, which requires for elaboration of special technologies for correct educational content presentation and fastening. Therefore the main task of the media complex in conjunction with the apparatus of built-in tests on Russian language of physics as a foreign language is to create a foreign language tutorial focused on the implementation of the following linguistic tasks:

1) Development of lexical physical terms compatibility;
2) Development of the case system and verbal forms in a scientific context;
3) Development of syntactic structures and their implementations in scientific language. Implementation of these tasks was following by the tests of number of types:

1) Tests for approval kind and number of adjectives and nouns;
2) Tests on the use of prepositions, participating together with the endings in the formation of case grammatical values;
3) Tests to determine the cases of nouns in the syntactic context;
4) Tests for the presence of the verbal word form;
5) Run on understanding the functioning of words and word collocations on «Basic concepts in mechanics».

To support the solution of the above described tasks of teaching foreign students on Russian as a foreign language of science media complex includes interactive elements for training and monitoring of the achieved level of mastering the current language-acoustic material. It is
completing the mini tests embedded in slides, simulators, tests on the topics of the manual and sets options for mid-term and final testing.

Language mini tests are included in the presentation in parallel with tests in physics. Their presence allows us to combine the specialist training with the language in the mode of unity. This approach through is quite important for teaching of the contingent of foreign students of the preparatory faculty. And it allows provide the synergy effect from combination of two educational directions – study of physics and language training.

EXCEL kits of tests for the preparation, organization and holding of the computer training and testing on scientific language of physics at the level of Russian as a foreign strange similar to those described above sets of test in physics. Base of 200 questions is also the basis of the simulator and test generator. Using these tools, a set of options with a given number of issues, and embedded environments tools verification is to be designed. Sets of test tools on scientific language of physics are de-signed in such a way that they could be posted online. They may be downloaded and used in standalone mode or when placing on Internet services such as MS-OneDrive, apply for webinars and self-control, including mobile access. These tests are extremely important and useful for training in Russian language because foreign students translate grammatical phenomena from their language into Russian language, making countless mistakes. The instructor provides tests which help to reorient the foreign students from grammar realities of their native language to realities of Russian language. So online tests seem to be indispensable for providing foreign students the necessary time to reflect specific grammar of Russian language and give the opportunity of constant training at a convenient mode, including removed access. Therefore, the advantage of the system of allocation and access for the media complex and built-in tests on the Internet resource MS OneDrive is the fact that it can be used as taken in personal and outside of the classroom, self study language training of foreign students.

The means of IT support of training, similar to that described above, and their components may be effectively used in achieving the goal of preparing foreign students for the core disciplines, combined with enhanced language training under such conditions as the maximum availability and functionality. Solution of such tasks faces a number of certain difficulties.

The first and foremost is the problem of IT competence of the developers. Usually they are extremely well-educated experts in their field of knowledge and have extensive experience with a contingent of foreign students in pre-University stage. But they should not always be considered to be professionals in the field of information technologies, although master them at a level above the advanced computer user level. Thus, one of the tasks of the development and application of informational and methodological support of training is the best free choice of software tools and platforms for placement of their products, educational purpose. On the one hand, the instrument used should provide effective solution of these problems; on the other hand, they should not require significant time and effort on their study.

In the course of analysis of modern network resources and software tools, the aim was to choose the most appropriate subject to the following requirements indicated:

- Accessibility;
- Reliability;
- Easy to use;
- Functionality;
- Compatibility;
- Prospects and some others.

Several different platforms including corporate net-work of the University, some of Internet hosting and cloud services were explored. Most appropriate up-to-day tools taking into account the above
requirements in our opinion is the Internet-resource MS OneDrive, which is a subsystem of the portal service provided by the Microsoft Company [9].

The structure of catalogues for placing the media complex components based on this resource was created, including test simulators and sets of option tests. Methods of organizing the system of storage simplicity, its identity to the standard file system of Windows allowed developers of the tutorial in short terms to configure the main directory and file management operations under the OneDrive environment control. The Built-in component of the MS OFFICE-online package enables them to create and edit the elements of the complex using the collective mode of remote access. The advantage of the OneDrive resource is availability of developing the access control system. It provides the ability to assign different rights to different groups of users. Developers have the highest access level. They have the right to place components of the complex in the directory, edit them and provide access to users. Users have the right to view the available files and copy them to their computer or mobile device.

The OneDrive performs the function of file storage. This store is a reliable transmission element of educational information in computer mediated communication among teachers and students. Active resource options allow us to organize the direct communication and feedback in this process. The training materials and tests move in the for-ward direction from the teacher to the students. In the opposite direction — filled tests and results of their processing come toward a teacher. Thus, the OneDrive tools provide the opportunity to organize interaction without the chronotop restrictions of the communication. Apparatus for short links makes it possible to organize conveniently hypertext links to various components of the complex together in many different ways. For example, the developers of the complex took advantage of this opportunity to insert hyperlinks on tests and simulators directly in the presentation slides, on the pages of the training group in the office of a teacher on the portal of the University etc. Thus, the MS OneDrive been a part of a resolution of the main tasks effectively used as a medium for improving the IT competence of developers in the mode of self-education.

We particularly should note that the usage of this resource is very high, taking into account its dynamic. For example, recently some instruments were significantly developed. In particular, the functions of the embedded spreadsheet tool SURVEY. It allows us to design the on-line tests of all types with automatic collection of the results and their processing in real time. Currently the possibilities to use the programs for the application in the media complex are under investigation.

Summary. Discussed in the paper results on the development of media complex in physics for foreign students of the preparatory Department and organization of accommodation and access to its components based on Internet resource MS OneDrive and experiences of the network elements of the educational system allows to make a conclusion about the effectiveness of, and prospects for the selected configuration of its tools and to identify areas for further development.

References


