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Online Complex Supporting the Distance Education Course in Human Anatomy for Foreign Pre-university Medical Students

Complexo em linha que suporta o curso da instrução da distância na anatomia humana para estudantes médicos extrangeiros da pre-universidade

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Contents

ABSTRACT:

This article presents the results of a cooperative project on creating an original online information-methodological support environment for foreign medical students training at preparatory and bachelor degree courses. The project was participated by the teachers of anatomy, Latin language and infor-mation technologies. The methodology is based on a multilingual approach. We have described the elements of a cloud technology called BYOD with mobile Internet access through the Word-online and Power Point online resources of the Microsoft OneDrive.

Keywords: foreign student training; human anatomy; multilingual approach; cloud technologies in education; online textbooks.

RESUMO:

Este artigo apresenta os resultados de um projeto cooperativo sobre a criação de uma informação online original-ambiente de apoio metodológico para estudantes de medicina estrangeira formação em cursos preparatórios e bacharelado. O projeto foi participado pelos professores de anatomia, língua latina e tecnologias infor-Matin. A metodologia baseia-se numa abordagem multilingue. Nós descrevemos os elementos de uma tecnologia de nuvem chamada BYOD com acesso à Internet móvel através do Word-online e Power Point recursos on-line da Microsoft onedrive.

Palavras chiave: treinamento de estudantes estrangeiros; anatomia humana; abordagem multilingue; tecnologias da nuvem na educação; livros de texto online.

1. Introduction

The pre-university stage of training has a particular feature: foreign medical students training in the field of "Medicine", "Pharmacy", "Ecology", "Veterinary" have to form a set of educational and professional competencies designed for effective learning of special courses included in the undergraduate program at the university. The major objective of the "Human Anatomy" course is to accelerate the process of learning professional terms not only in Russian, but also in other languages. This course requires forming a set of basic competences in the field of the subject and in terms of language proficiency in the period from two or three academic terms. Students have to know the following languages: Russian language as the state language of educational and professional communication in the Russian Federation, Latin language as the language of professional communication in the field medicine and related fields, and English as the language of international communication and the major language of Internet communication (Khavronina, 2010; State Educational Standard on Russian as a Foreign Language, 2015; Federal state educational standard of higher vocational education, 2015). Since the term of apprenticeship for foreigners is limited at the preparatory stage, their preparation is focused on independent work and new software systems are being rapidly developed, distributed and applied at the household level, the issue of using distant approach elements based on modern information and communication technologies (ICT) is becoming topical (Titova et al., 2011; Davletkeldieva et al., 2013; Matukhin et al., 2014; State Educational Standard on Russian as a Foreign Language, 2015). Moreover, in Russia, e-learning is supported by the state through the federal law N 313-FZ "On Amendments to the Federal Law ‘On Education in the Russian Federation’" (2016).

In studying the "Human Anatomy" course, foreign students rely on the lecture material and the teaching aids created for foreign preparatory students of the Faculty of the Russian Language and General Educational Disciplines (FRL&GED). They include the "Human Locomotor System" textbook (Titova et al., 2011; 2015) and an exercise book (Titova et al., 2013). These textbooks positively proved themselves for a number of years. Increasing requirements for the level of preparation and learning process efficiency, as well as the widespread use of modern ICT systems, have actualized the task of developing traditional training schemes with the available technical means of Internet communication in order to increase the volume of student’s independent work. As the educational institution lacks of IT rooms, it is quite possible to develop new teaching technologies based on the bring-your-own-device (BYOD) method for in-class and self-directed learning in the online mode (Matyash et al., 2013; Matukhin et al., 2014). Research on the degree of equipping with personal computers, laptops and mobile Internet access means showed that almost 100% of students have desktops, smartphones and tablets. They actively use these devices for online communication through e-mail, messengers and social networks. It was concluded that electronic versions of textbooks and exercise books will bring benefits. There is also a need in creating presentations on the topics of the course.

The review and study of software tools has revealed that world's leading educational institutions and software manufacturers are working intensively in this direction. Both special and public corporate e-learning systems are widely used, for example – Modular Object-Oriented Dynamic Learning Environment (MOODLE) and etc. Such systems with developed functions of learning process automation require large expenses for their installation and maintenance. Therefore, they are profitable only within the framework of large-scale educational systems.

Solution of particular problems of educational IT communication at the level of a particular teacher or department requires such an approach when, on the one hand, the solution is complete, and on the other hand – equal to a particular teacher, who is not a professional programmer, or a small team. Such problems are effectively solved at the level of relatively experienced users, who have basic skills in preparing information products with MS Office. Practical difficulties are overcomable at the stages of preparing lectures and presentations. Until

recently, difficulties arose only at the stage of online traffic and visualization of resultants. Text documents could be converted to web pages with Word's built-in converters, but their placement and access required special efforts. This has limited teacher's ability to create information products (Provotorova, 2013). Effective technologies of educational e-communication based on teacher's experience in working with the MS Office can be developed only now, when the online versions of Microsoft Word, aggregated into the MS OneDrive cloud storage service, became available. This resource allowed us to formulate the major objectives of the study and determine the following stages of our work:

- choosing initial materials for a cloud-based information-methodological support environment of the "Human Anatomy" course for foreign preparatory students;
- developing information-technological schemes of educational communication with OneDrive cloud storage service, and university teacher's corporate and personal websites;
- preparing original versions of notes, training aids, presentations and test materials in the MS Office;
- creating OneDrive catalog structure and placing teacher's information products;
- linking the websites and objects stored in a cloud for students to access;
- giving instructional lessons to students based on new tools;
- collecting and processing data on the results of such lessons, their analysis;
- drawing conclusions and allocating directions for improving the tools and methods of applying e-technologies in the learning process.

Below, we describe the methodology of solving the stated problems, as well as the results obtained in the course of the study.

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2. Methods

A cooperated cross-curriculum project was developed by the teachers of anatomy, Latin language and information technologies (Provotorova et al., 2013).

When it comes to the effective solution of the problem of educational and professional communication between the teacher and foreign students, the best results can be obtained by combining such tools as teacher's personal website, electronic resources of education and science, and specialized cooperative data storage designed for educational information products. Teacher's website (account) (Davletkeldieva et al., 2013; Provotorova, 2013) can be considered as a tool used to organize the operative remote access to the original information-methodological support environment (IMSE) through the hyperlinks. These can be university portals or pages with special e-systems for automated distance learning, for example – MOODLE, a popular corporate information system for university learning.

As a rule, corporate university portals do not provide enough space for all teacher's training aids and tools. For example, if personal file storage limit in about 200 MB, one cannot seriously expect to have a sufficient set of online training aids, including education and course programs, lecture notes, test books (2-5 MB MS-Word or PDF documents), test materials (up to 1 MB MS-EXCEL files) and presentations (20-50 MB MS-Power Point files).

Thus, university's corporate resources allow creating only web pages with basic information about the process and content of education, as well as the navigation system: hyperlinks to IMSE. The latter should be located in specialized Internet storage services. The size of their basic versions without financial expenses reaches tens of gigabytes. Besides, they can be created in any number if necessary.

Based on this approach, the available store size of corporate and network resources is sufficient to implement the multilingual approach in training foreign preparatory students at the university (Titova et al., 2011). Teacher can create and place the minimal amount of necessary information and navigation system not only in Russian, but also to duplicate it in any other native on his/her website, first of all – in English. In addition to it, these are the major European languages spoken by students from African countries, as well as the languages of the Middle East, Latin America, Southeast Asia, etc. This strategy significantly increases the

efficiency of educational communication, since it helps students to search for the electronic teaching aids and other materials on the university by eliminating the language barrier.

Information products described in this paper were created with Pentium 4 PC desktop: Windows XP/Microsoft Office 2003/Microsoft Office Word 2003/Microsoft Office Power Point/Microsoft Internet Explorer/ Google and Yandex search engines.

We have used the OneDrive cloud storage service for storing our developed information products. This service is part of the Microsoft online services. It has a number of advantages that have determined our choice. First of all, its availability is independent of any factors; its storage size is sufficient (10 GB). The service is user-friendly, as it is familiar for anyone, who is familiar with the MS-Windows operating system and MS-Office. Its interface follows the standard Windows folder structure. The service has different online versions of the major Microsoft Office components. This makes it easy to develop and learn simple technologies that do not require special preparation in the field of programming for forming and placing teacher's original information products and providing access to them for students.

In particular, we have designed a system for placing and accessing to the online IMSE as part of the learning kit of the "Human Anatomy" course. The learning kit of foreign preparatory students involves a textbook and a test book published in physical hard carrier format and online. The online versions are accessible via hyperlinks on the teacher's personal website. Let's drew our attention towards some components of the online complex.

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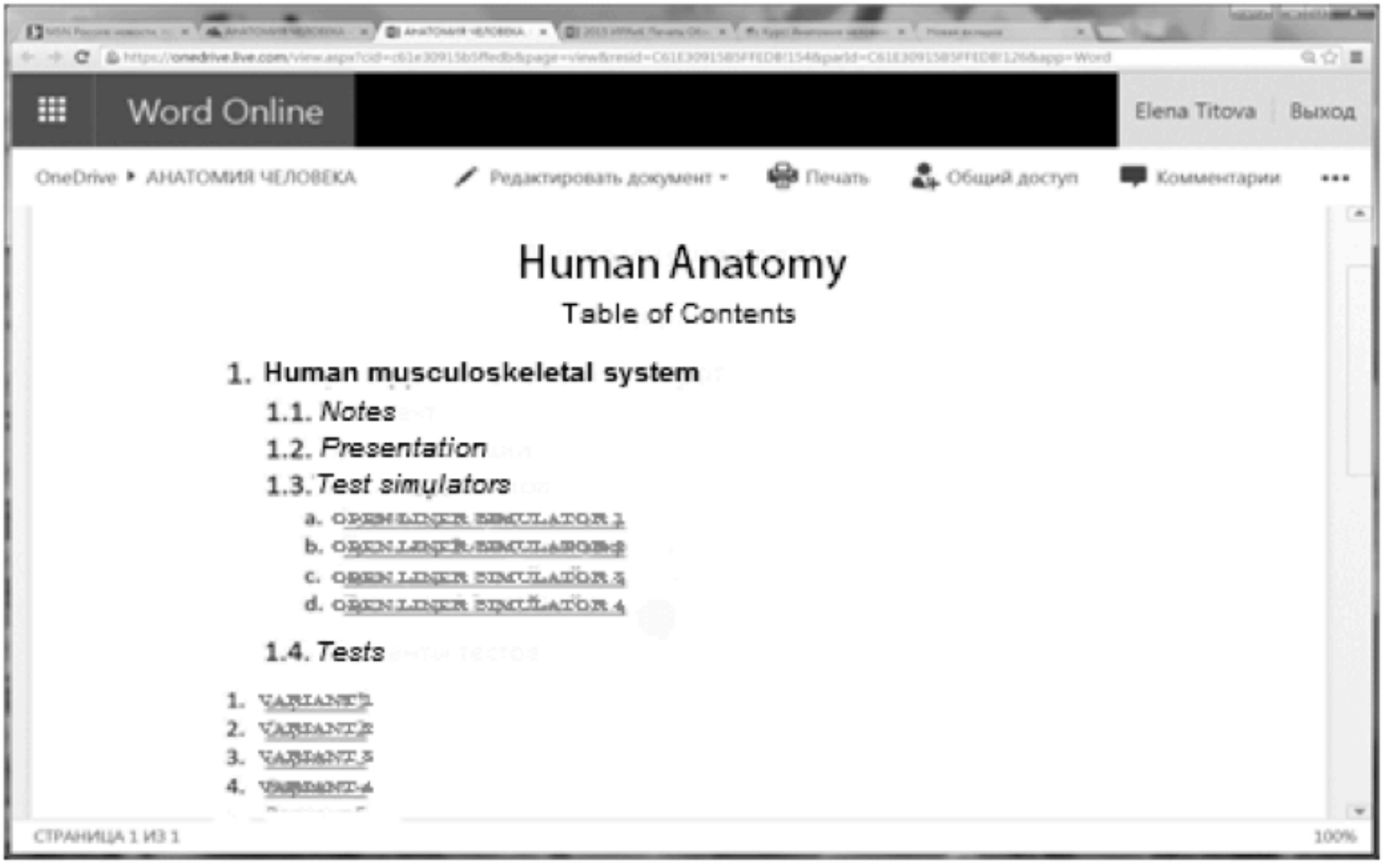
3. Training Aid used with the Human Anatomy Course

The training aid [textbook] was written for students training in the field of anatomy and related disciplines in accordance with the State Educational Standards and the State Educational Standard on Russian as a Foreign Language; it takes into account the classical principles of teaching Russian as a foreign language (Khavronina, 2010; State Educational Standard on Russian as a Foreign Language, 2015). At the same time, we have took into account the requirements determined by the prospect of its application as an element of the online complex supporting distance learning of foreign preparatory students at the university. The main objective of the electronic information education resource called "Anatomy. Musculoskeletal system" (Titova et al., 2011; 2015) is to help foreign preparatory students to learn basic concepts while studying human anatomy, in particular, the musculoskeletal system, independently. Its second objective is to form and develop the basic skills of professional communication at the basic level of Russian language proficiency in foreign students during the course. As the training aids are available online, they allow using them both in the classroom and independently, as well as combining them with physical versions. The teacher can increase or reduce the volume of proposed basic and supporting materials depending on student's knowledge and language proficiency.

In writing the aid, special attention was paid to the linguistic aspect of forming and developing the basic professional communication competencies of future specialists in medicine and health due to a number of specific requirements for training aids designed for foreign students. First and foremost, these requirements involve the multiethnic and multilingual composition of foreign students studying at the FRL&GED, as well as the wide sphere of professional communication between medical and public health workers not only in Russian, but also in Latin and English languages. The training aid involves such special elements as tables of anatomical terms (in Russian, Latin and English) in order to expand the language range of professional communication and to facilitate the process of learning professional vocabulary, terminology and phraseology. These elements allow using this aid also with the purpose of supporting the process of learning a number of linguistic courses (including "Latin Language", "English Language", "Russian as a Foreign Language", "Culture of Speech", "Intercultural Communication", etc) focused on forming and developing skills of professional speech communication on the part of future medical and health workers,.

The information product was developed as an electronic MS-WORD document (version MS-OFFICE-2003) and can also be used in preparing the publication of training aid copies in physical hard carrier format. The online version involves such forms of educational information as text, illustrations (drawings, photographs), lists, tables and charts. We have also made an account for the possibility of creating an online complex of e-products supporting the "Human Anatomy" course based on the online version of the aid.

Figure 1
Human Anatomy Course: Learning Kit (navigation page)



Files containing original versions of the textbook downloaded to the OneDrive were automatically converted from the * .doc format to the * .docx format. New format files were converted into web pages after opening in the browser. This makes them available on mobile devices for all students. Figure 1 shows the navigation page of the e-learning kit. Students can access this page through a hyperlink on the corresponding page of teacher's website. The navigation page is designed as a standard table of contents to maintain the academic atmosphere while viewing. In this case, we meaningly avoid architectural extravagances in web design, limiting ourselves to traditionally strict one. Each content item is a hyperlink to the corresponding section of the online complex. Each section contains notes for this module. They can be downloaded on desktops or viewed through a mobile gadget.

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4. Test book

Chapters of the online notes are formed simultaneously with test materials. In particular, considered textbook is supported by the test book. Based on the latter, there is a set of online test tools created and placed on the OneDrive (Titova et al., 2013). In this case, we have selected the basic body of terms in accordance with the course sections and created a list of test questions.

As in the case of the basic training aid described above, test book is based on the multilingual

approach towards the process of forming a basic body of professional medical-anatomical vocabulary. It includes exercises focused on learning specific terminology in Russian, Latin, English and additional (native) languages. The aid can be used to organize student's independent work with a textbook, as well as to solidify knowledge and to carry out formative/summative assessment. As the aid is available online, it allows using it as a stand-alone, local and corporate network resource. Test book is presented as an online MS-WORD document (Book size: 106 pages; Visual support: illustrations and tables; References: 5 literary sources).

The process of applying new information technologies in teaching anatomical disciplines required certain improvements made to information products. In particular, we had to carefully structure the kit in order to place the files rationally on the cloud dick. We have allocated the following sections: **The Skeleton. Structure and Functions of the Skeletal System**; *Skeleton as a System; Backbone. The Thorax Structure. The Skull Structure*; **Appendicular Skeleton; Shoulder girdle**; *Lower Limbs; Joint; Axes and Planes of Symmetry in Human Body; Muscle as an Organ.*

The test book is based on a set of standardized assessment forms, including the feedback on the questions (quiz), filling in the blank spaces, compliance tests, multiple-choice test and structural schemes. The test book involves tabular multilingual vocabularies containing professional anatomical terminology.

The fill-in the blank tests require the respondent to fill in the empty spaces in the text fragment. Typically, this is a fragment of a paragraph that could be found in a textbook or a note. It has some gaps at the places where the key words – terms, verbs reflecting the function of anatomical objects, or adjectives corresponding to the object's features – should be. The purpose of the test is to control how the student has learned the specific issue presented in the textbook at the level of listed details. It is designed to develop student's skills in reading and professional speech writing in Russian.

Task 132. General Terms. Full in the table – translate Russian terms into the Latin language

Table 1
Tabular Russian-Latin mini-vocabulary

General Terms – NOMINA GENERALIA			
Russian	**Latin**	**Russian**	**Latin**
Вертикальный (Vertical)		Краниальный (Cranial)	
Горизонтальный (Horizontal)		Каудальный (Caudal)	
Фронтальный (Frontal)		Вентральный (Ventral)	
Срединный (Median)		Дорсальный (Dorsal)	
Правый (Right)		Латеральный (Lateral)	

Левый (Left)		Верхний (Upper)	
Медиативный (Medial)		Нижний (Lower)	
Сагиттальный (Sagittal)			

The test book contains many tabular exercises. These tables are mini-vocabularies. The task is to translate the name of an object provided in one language into another language. First and foremost, these are Russian-Latin mini-vocabularies (Figure 2) and Latin-Russian mini-vocabularies; there are also pairs with the English language. The online aid allowed us to simply generalize the accumulated array of tables into other languages by adding English-Latin and Latin -English pairs. We also considered it appropriate to add the number of exercises and tasks focused on student's native language. Thus, we have formed a set of tables with "additional" language. It can be either the native language of a student, or any language, which he/she would like to learn based on the content of the training aid. This approach also provided another bridge through the language barrier for beginners and for students focused on expanding their language background with professional language.

Figure 2
Illustrated tetra-lingual mini-vocabulary test

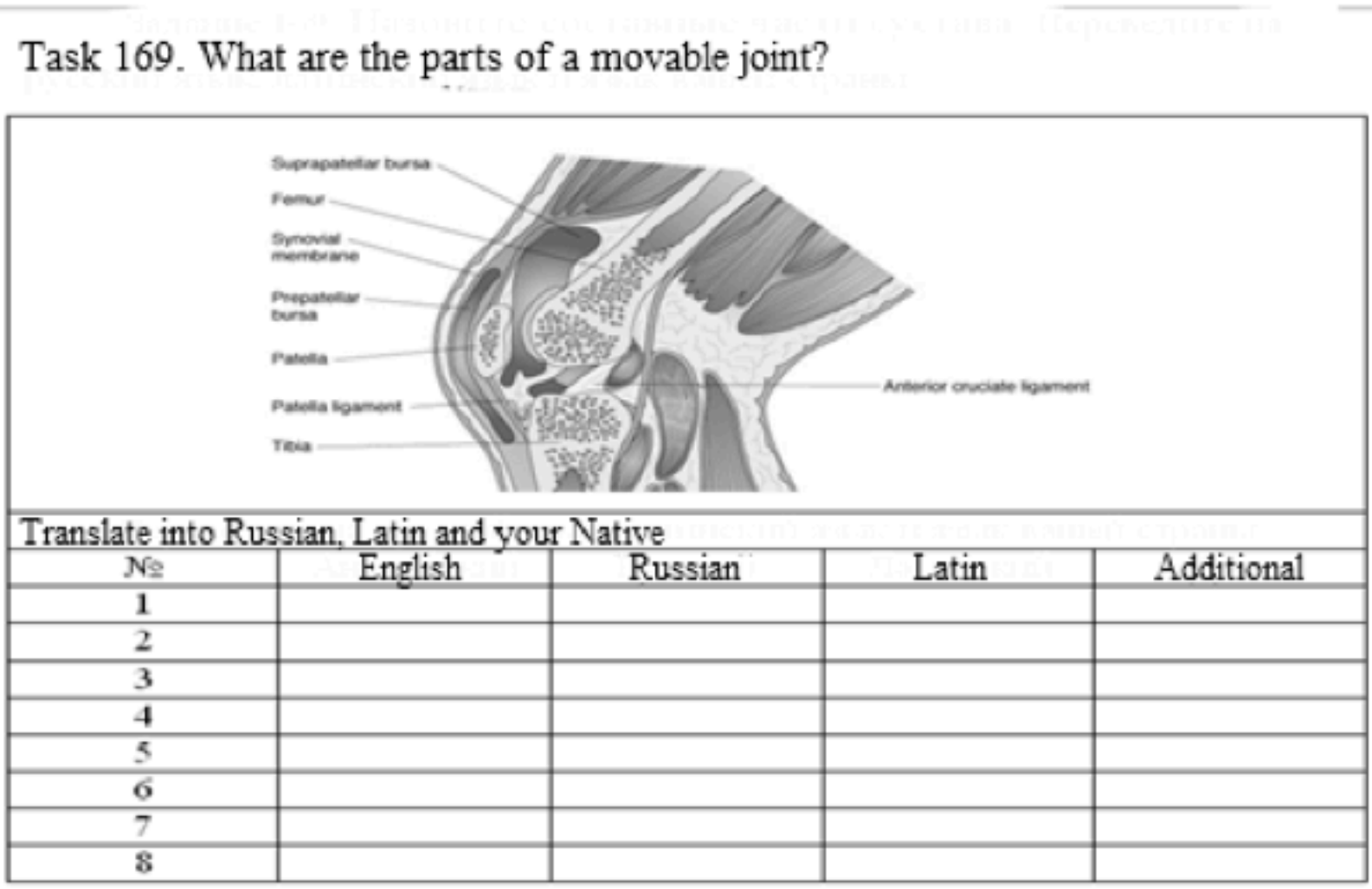

Figure 3 shows an example of an illustrated tetra-lingual mini-vocabulary test. Such exercises contain a large amount of linguistic material. The illustrations provide visual support and contribute to the process of strengthening visual-associative links while examining the object and passing the test.

It should be noted that the system of presenting training and test materials as e-tables allowed

us to develop a simple technology for converting them into simulators and tests in the form of Excel spreadsheets. We have developed a number of different simulators, a test generator and different test materials. They can be used in stand-alone mode and/or placed in the cloud storages in the same way as the text materials and presentations are. They can also be available on the mobile devices through the Excel converter. Since the volume of the article is limited, we plan to present the obtained results in the following publication.

5. Discussion

Our scheme for placing and accessing e-learning kit was tested in class with foreign preparatory students, who have arrived from such countries as Sri Lanka, Nepal, Lebanon, Jordan, Syria, Cameroon, Ghana, Grenada, Costa Rica, Colombia, etc. The test has showed that online components of the learning kit are effective in terms of simple access, file entity view modes and preparation for assessment. The practice has shown that online versions are intensively used by students during the class and independent work. This is evidenced by the page traffic monitoring and the number of downloads. According to the access counter, intensity of student's work with our training aids increases dramatically during the assessment periods.

The e-learning kit components were also used as a demonstration material at the advanced training courses for humanities and natural science teachers under the "Online Technologies in Educational Communication" program. Part of them were reviewed at the scientific and practical conferences (Matukhin et al., 2014; Titova et al., 2015). We have tested our simulators and tests, and received copyright registration certificates (Center for Information Technologies and Systems - CITIS, Science and Education United Fund of Electronic Resources – OFENIO).

E-learning has more advantages then the traditional education:

- higher adaptability to the level of basic training and students' abilities, material situation, health, place of residence, etc. and, accordingly, the best opportunities for accelerating the learning process and improving the quality of education (Chang et al., 2014; Auriacombe et al., 2017);
- improving quality of learning by focusing on the computer-based training and testing systems, specialized training aids with compulsory test questions, self-control tasks, etc. (Smith et al., 2015);
- teaching and learning process is based on the latest achievements in information and telecommunication technologies. Such an approach teaches also how to work with ICT (Bediang et al., 2013; Ilic et al., 2015);
- concentrated presentation of educational information and multi-access to it increases the efficiency of learning (Lahti et al., 2014);
- immediate methodological support update, as updating instructional materials is much easier on data mediums (Bediang et al., 2013).

6. Conclusions

Creating and using original information products (traditional training aids presented in physical carrier format and online) is effective considering the specific nature of professional activity teachers specialized in language disciplines and working with foreign medical students. The online IMSE can be created with the Microsoft OneDrive cloud storage service that provides enough space for storing online notes. Students can get to the stored objects through their mobile gadgets (smartphones, tablets, net-books) using hyperlinks placed on teacher's website.

As a result of the project participated by human anatomy, Latin and IT teachers, there were developed a layout and a system of storing and accessing the e-learning kit components for foreign preparatory students. This online complex is hosted on the OneDrive. It includes online notes on the course topics in the form of text documents available for viewing on mobile devices through the Microsoft Word converter. Online text products can be used during the class even if the IT rooms are not equipped with desktop equipment. They also can be used on mobile devices during the independent work and webinars. The tabular teaching material opens the prospect for an effective conversion of e-learning kit components into test material.

The new ICTs entail the development of pedagogical and didactic aspects of training foreign preparatory students. In particular, increasing share of independent studies can come together with expanding use of learning-through-play mode in class. In addition, our products will improve the IT competence of students in the process of applying online training aids.

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