THE INFLUENCE OF VISUAL TEACHING METHODS ON THE QUALITY OF KNOWLEDGE ACQUISITION WHEN STUDYING THE SECTION "HUMAN ANATOMY AND PHYSIOLOGY" (ON THE EXAMPLE OF USING AN ELECTRONIC TEXTBOOK AND A MOBILE APPLICATION)

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ABSTRACT

In recent years, in the Republic of Uzbekistan, taking into account the tendencies of humanitarization and modernization of education, special attention has been paid to the problem of introducing advanced educational methods, in particular visual teaching methods, into the educational process. The Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030 identified priority tasks for the qualitative renewal of the content of education and the gradual introduction of modern methods, teaching technologies, as well as innovative projects into the educational process. However, there is still a need to improve the efficiency of using modern visual methods and teaching technologies to improve the quality of education and develop students' interest in the study of biological sciences. In this context, the organization of human anatomy and physiology classes using visual teaching methods, in particular, an electronic textbook and a mobile application, makes it possible to visually demonstrate the capabilities of the software being studied and save time, thereby intensifying the presentation of educational material. In other words, the effectiveness of the use of visual teaching methods depends on the quality of the materials used and the skill of the teachers involved in this process. Modern visual teaching methods provide students with access to new sources of information - electronic textbooks, educational sites, distance learning systems. This research work presented by Associate Professor, PhD M.I. Khamdamova fully shows the effectiveness of the use of visual teaching methods, in particular, an electronic textbook and a mobile application in the process of teaching the subject "Human Anatomy and Physiology".

Keywords: Modernization of education, modern visual methods, biological sciences, electronic textbook, mobile application.

INTRODUCTION

The world educational system in a market economy gives a special place to the training of highly qualified, competitive professional personnel. Much attention is paid to the development of a didactic system for the effective organization of students' cognitive activity based on the introduction of competence-based, as well as modern methodological approaches and technologies in the teaching of biological sciences. Within the framework of the tasks outlined in the UNESCO Incheon Declaration, calculated until 2030, which notes that "Education is the main driving force of progress and an important activity contributing to the achievement of sustainable development goals", a systematic development of practical projects related to the introduction of innovations in education is being carried out, cardinal innovations, as well as the continuous development of the education system.

After gaining independence, to this day, a lot of work has been done in the Republic of Uzbekistan to radically update and modernize the education sector. In order to improve the quality of education, the State Educational Standard, program, textbook, manual and teaching methods are always being improved in accordance with international standards. The large-scale changes taking place in our

country contribute to the entry of the Republic of Uzbekistan into the world educational space in the near future. This is evidenced by the Message of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev (2020) to the Oliy Majlis, which sets the task of joining our republic to one of the developed countries by introducing innovations in the field of science and educational activities.

In a market economy, a special place is given to the training of highly qualified, professional, competitive personnel. In the Decree of the President of the Republic of Uzbekistan No. PD-4947 "On the strategy of action in five priority areas of development of the Republic of Uzbekistan in 2017-2021" dated February 7, 2017 (2017), special attention is paid to tasks aimed at achieving the goal of training highly qualified specialists that meet modern requirements labor market.

LITERATURE REVIEW

Highly educated youth is the main strategic reserve of social and economic reforms in Uzbekistan (Anarkulova G.M. 2018). Our compatriot N.N. Azizkhodjaeva (2009), as well as other scientists (Radjabova R.V. 2017, Ruzieva D.I. 2018, Yusupov B.E. 2019) note that the development of the Republic of Uzbekistan is associated with the implementation of the modernization of education. Reforming education is aimed at creating new generations of personnel with a high general professional culture, creative and social activity (Dzhumaeva N.I. 2016), able to independently orient themselves in social and political life (Yusupov B.E. 2019). Other researchers hold a similar opinion, believing that the main trend of modern society is the mass training of specialists of the highest category (Karpenko M.P. 2007). A.I.Sultonov emphasizes that higher educational institutions play an important role in reforming the educational process and in training highly qualified personnel (2017).

Today, the modernization of education is directly related to the introduction of multimedia technologies and teaching aids into the educational process. V.S.Damodharan (2007) makes a comparative analysis of traditional and innovative teaching methods, considers the role of multimedia technologies and teaching aids in the educational process.

Thus, it can be noted that the use of visual teaching methods is one of the promising areas of informatization. This is confirmed by the studies of foreign scientists who argue that an important aspect of any field of activity is professional competence.

Based on judgments and recognizing a set of general pedagogical skills presented by V.A. Slastenin (1990), we believe that for the effective implementation of the teaching of biological disciplines, a teacher must have such qualities as:

- literacy in finding, evaluating and selecting the necessary multimedia information;
- ability to apply multimedia teaching aids in practice;
- be proficient in the use of multimedia technology and the Internet;
- the ability to creatively present their knowledge in full to students;

Thus, the improvement, optimization of visual teaching methods and the use of new ICT is a necessary condition that will allow students to learn the structure or functionality of individual systems of the human body during one academic lesson, as well as consolidate this knowledge in the process of doing laboratory work.

METHODOLOGY

Uzbekistan is a country where the main composition of the population is young people (32%, or 10 million people). The level, quality, tasks of education play an important role in the formation of a full-fledged generation of young people. One of the urgent tasks of education at present is the upbringing of a socially active, educated, morally and physically healthy person (Golovneva E.V. 2017).

It should be noted a special role in the application of modern visual methods in the educational process of multimedia tools that have an impact on the senses, when using which the student sees and hears, which allows you to more fully assimilate the educational material. Thus, multimedia learning tools contribute to the transformation of a traditional lesson into a multimedia lesson. Let's look at this with an example.

In this article, we consider the use of visual teaching methods in teaching Human Anatomy and Physiology. I would like to note that this research work was carried out at the Tashkent State Pedagogical University named after Nizami. This course "Human Anatomy and Physiology" is conducted among students of biologists, students in the 2nd and 3rd year of undergraduate studies. In the context of the foregoing, it should be emphasized that the subject "Human Anatomy and Physiology" is taught more with a methodological bias, since the university trains specialists - future teachers. In the course of the research work, we collected a lot of materials that we classified and divided into 8 sections where lecture materials are displayed in an electronic textbook and 26 laboratory lessons in a mobile application. Let's take a detailed look at the use of an electronic textbook and a mobile application using an example:

The electronic textbook on the subject "Human Anatomy and Physiology" was developed in accordance with the qualification requirements of the curriculum "Human Anatomy and Physiology" of the TSPU named after Nizami, approved by Order of the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan No. BD-5110400-2.06 dated 14.08.2020 for students of pedagogical universities in the direction of education "5110400-Biology". A certificate of official registration of the program for electronic computers No. DGU 11017 was received.

Brief information about the e-tutorial:

- computer type: P-IV, 512 MB RAM, 200 MB HDD, CD, 670 MB free space;
- programming language: Lua, C++, XML, FastStone Capture, iSpring Suite 9, EclipseCrossword;
- OS: FROM: Windows XP, Windows 7, Windows 8;
- program size: 210 Mb.(Fingure №1)

Fig.1. The main sections of the electronic textbook "Human Anatomy and physiology"

The electronic textbook on the subject "Human Anatomy and Physiology" provides the following features:

1) read and download all lecture materials on the subject "Human Anatomy and Physiology" in electronic form (in PDF format), including sections: introduction to anatomy; musculoskeletal system; muscular system; internal organs; the cardiovascular system; secretion glands; nervous system; analyzers;

2) get acquainted with the video materials on the subject: introduction to anatomy; the structure of the human cell and tissues; the structure and connection of the bones of the trunk, skull, upper and

lower extremities; the structure of the muscles of the trunk, head, neck, upper and lower extremities; structure of internal organs, digestive, respiratory, excretory systems; the cardiovascular system; secretion glands; nervous system, structure of the spinal cord and brain, cranial nerves; structure of analyzers;

3) solve crossword puzzles in sections of the subject "Anatomy and human physiology";

4) conduct testing to test students' knowledge on the topics covered;

5) get acquainted with the animations on the subject "Human Anatomy and Physiology": the structure of the skeletal and muscular system; digestive system; voice apparatus; breathing process; respiratory movements; gas exchange in the lungs and tissues; selection process; the structure of the heart; circulatory scheme; the movement of blood through the vessels; brain; parts of the brain; structure of the eye skin receptors;

6) work with a glossary, study Latin terminology, perform practical and independent work.

The mobile application on the subject "Human Anatomy and Physiology" was developed in accordance with the qualification requirements of the study program "Human Anatomy and Physiology" of the TSPU named after Nizami, approved by the Order of the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan No. BD-5110400-2.06 dated 14.08.2020. for students of pedagogical universities of the direction of education "5110400-Biology". A certificate of official registration of the program for electronic computers No. DGU 11016 was received.

Brief information about the mobile application:

- programming language: Android Studio, Java;
- OS: FROM: Android;
- program size: 8.2 Mb. Fingure №2)

Fig.2. The main sections of mobile application "Human Anatomy and physiology"

Functionality of the electronic textbook on the subject "Human Anatomy and Physiology":

1) allows you to read and download the materials of 26 laboratory classes from 8 sections provided for by the program of the subject "Human Anatomy and Physiology", in electronic form in PDF format.

2) allows you to get acquainted with 3D video materials on the subject: the structure of the brain 3D; eye anatomy 3D; 3D excretory system; 3D respiratory system; circulatory system 3D; 3D muscular system; 3D digestive system; skeleton 3D; 3D cell structure; structure of the spinal cord and brain 3D; 3D ear structure; 3D heart structure; endocrine system 3D.

3) allows you to get acquainted with the glossary, study Latin terminology, perform practical and independent work.

The main goal of developing an electronic textbook and a mobile application on the subject "Human Anatomy and Physiology" is to improve knowledge about the main systematic groups of organs of the human body, their importance in human life, as well as about the factors leading to diseases and their prevention. As a result of using the electronic textbook and mobile application offered by us, students will successfully master the following knowledge: the structure and functioning of human organ systems and their types; the structure and functioning of the organs that make up the systems of the human body; the relationship of organs and commonality in their structure; physiological bases of functioning of organs; physiological basis of arousal; physiological basis of inhibition; regenerative functions of the body; organ diseases; impact on the body of environmental factors; protective properties of the organism against the influence of various factors.

The qualities of a teacher who knows how to use an electronic textbook and a mobile application	Application of visual methods	Application of visual methods
sets various types of educational tasks and organizes their solution (in an individual or group form); applies a special approach to learning in order to include all students in the educational process	When studying the topic "Structure of the skull", the teacher uses an electronic textbook, thereby increasing interest in the topic.  Formulates a problematic task: carefully read the text "Head Skeleton" and find sentences in it that contain biological errors. First write down the numbers of these sentences, and then formulate them correctly. 	creati vely relates to the lesson ; can formulate any problems

Table No. 1. The use of an electronic textbook when studying the topic "Structure of the skull"

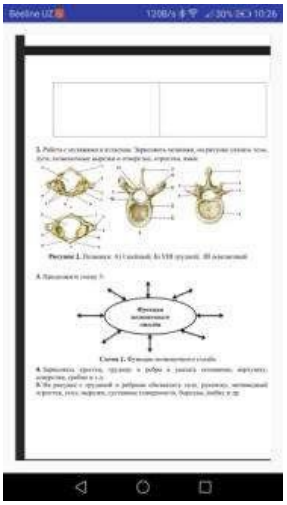
<table>
<tr><td>The qualities of a teacher who knows how to use an electronic textbook and a mobile application</td><td>Application of visual methods</td><td>Application of visual methods</td></tr>
<tr><td rowspan="2">implements problem-based learning using modern methods of assessment in the context of using visual teaching methods</td><td>During the laboratory work on the topic "Structure of the bones of the body", the teacher organizes a discussion on the topic being studied by developing the task "selection of the area" using the mobile application "Human Anatomy and Physiology".
  </td><td rowspan="2">possesses the ability to organize a discussion and communication skills</td></tr>
<tr><td>Students complete the task, actively participate in the discussion, thereby consolidating knowledge on the topic being studied and improving their skills in working with the mobile application.
   </td></tr>
</table>

Table No. 2. The use of a mobile application when studying the topic "Structure of the bones of the body"

<table>
<tr><th>The qualities of a teacher who knows how to use an electronic textbook and a mobile application</th><th>Application of visual methods</th><th>Application of visual methods</th></tr>
<tr><td rowspan="3">takes a specific approach to learning</td><td>When studying the topic "Structure of the heart", the teacher offers students an animation from an electronic textbook, which makes it possible to fully imagine the structure of the heart and the dynamics of its work.
 

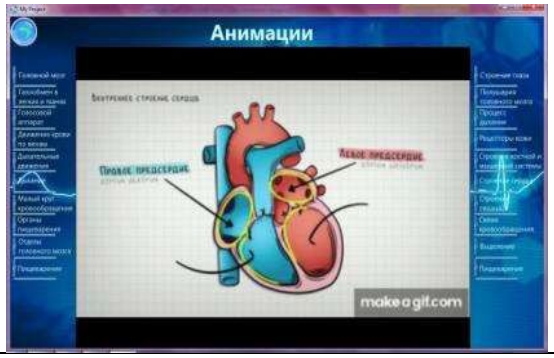
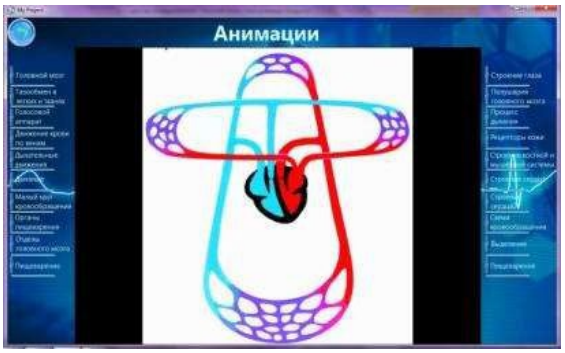
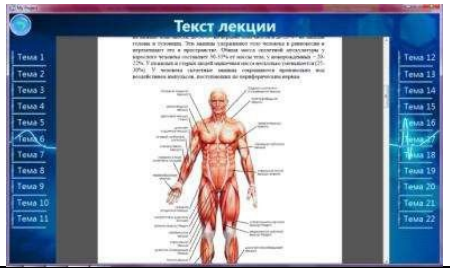
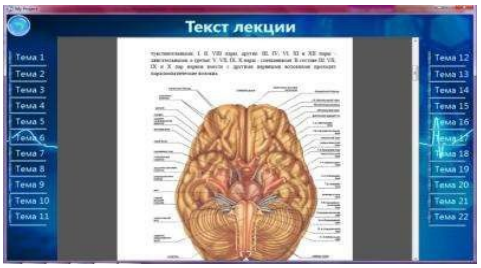
 
</td><td rowspan="3">has the ability to implement the didactic principle of visibility in a large volume</td></tr>
<tr><td>Such an approach to teaching will help to significantly improve the educational process, hone the skills of students working with an electronic textbook.
 
</td></tr>
</table>

Table No. 3. The use of animation in an electronic textbook when studying the topic "Structure of the heart"

<table>
<tr><td>The qualities of a teacher who knows how to use an electronic textbook and a mobile application</td><td>Application of visual methods</td><td>Application of visual methods</td></tr>
<tr><td rowspan="3">uses information and communication technologies in the form of presentations, audio and video</td><td>When studying the topic "Structure of the respiratory organs", the teacher uses a multimedia presentation, supplementing it with a video and 3D video "Structure of the respiratory organs" mp4
 
</td><td rowspan="3">possesses presentation skills and abilities</td></tr>
<tr><td>.
 
</td></tr>
<tr><td>When organizing such a lesson, the teacher, giving the opportunity to see the educational material, contributes to its better perception, while each student is involved in vigorous activity.
 
</td></tr>
</table>

Table No.4. Application of multimedia presentation "Structure of the respiratory organs", supplementing it with a video and 3D-video "Structure of the respiratory organs" mp4.

<table>
<tr><th>The qualities of a teacher who knows how to use an electronic textbook and a mobile application</th><th>Application of visual methods</th><th>Application of visual methods</th></tr>
<tr><td rowspan="2">develops students' cognitive activity, independence, initiative and creativity</td><td>When studying the topic "Muscular system" one of the methods of interactive technology is used - brainstorming. In the process of work, students can demonstrate their competence and think about a possible solution to the problem, at the same time they learn to express thoughts and analyze briefly and clearly.
 
</td><td rowspan="2">has the ability to answer unplanned questions</td></tr>
<tr><td>hen studying the topic: "Craniocerebral nerves" using the case study technology, the teacher organizes the activities of mini-groups to solve the case:
 

• unites students into mini-groups;
• acquaints (reminds) with the rules of work in groups, with the memo of the discussion participant;
• explains the instructions for group work on the analysis and solution of a practical situation;
• introduces the technique of evaluation and selection of the most acceptable idea;
• invites discussion and agreement on the various views members of the group about the situation, the problem and how to solve it.</td></tr>
</table>

Table No5. The use of an electronic textbook when studying the topic "Muscular system"

DISCUSSION AND CONCLUSION

Teaching the subject "Human Anatomy and Physiology" requires the use of a whole range of different teaching methods and technologies, in particular visual teaching methods. I would like to note that conducting classes using visual teaching methods, namely electronic teaching aids and mobile applications that help to increase the cognitive activity of students, is very important today. As a result of the successful application of the electronic textbook and mobile application on human anatomy and physiology, students will acquire the following knowledge: the structure and functioning of the human organ system and their types; the structure and functioning of the organs that make up the systems of the human body; the relationship of organs and commonality in their structure; physiological bases of functioning of organs; physiological basis of arousal; physiological basis of inhibition; regenerative functions of the body; organ diseases; impact on the body of environmental factors; protective properties of the organism against the influence of various factors.

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