

APPLYING SLOODLE VIRTUAL ENVIRONMENT FOR MEDICAL COURSE PREPARATION

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Abstract: The paper provides a new approach of using Sloodle environment in medical education through SPINE – FUNCTION AND DEFORMITIES course preparation. Some steps of course design, such as preparation and creation of 3D vertebra models are briefly described.

Keywords: e-learning, Second Life, moodle, sloodle, medical education, spine.

1. INTRODUCTION

Everyday activities such as orthopedics prediction, prevention, diagnostic and therapeutic involve existence of available data on the patient's condition, experience of the physicians and available resources (instruments, devices, fixators, implants, software, etc.) in order to be successful.

However physician is often not able to carry out these activities in the best possible way because the lack of information required for decision-making and/or planning the surgery.

Problem can be overcome by introducing course within Sloodle (Simulation-Linked Object Oriented Dynamic Learning Environment) environment [1], a software package which connects the web-based environment of Moodle [2] with the three-dimensional virtual world of Second Life [3]. It can be said that Sloodle connects Moodle system with Second Life virtual world into one Internet based three-dimensional tool for learning. Second Life comprehensive capabilities can significantly improve online courses of Moodle. Using Sloodle the world of Second Life can be used as alternative, three-dimensional Moodle client, which makes classic websites much more interesting [4].

Sloodle provides complete suite of tools that make the management of educational activities in Second Life much easier. Educators can use Sloodle to deliver educational materials or to collect feedback and assignment related to Second Life activities [5].

Sloodle provides two categories of tools:

- Educational tools:
 - Tools that allow users to work with Moodle

activities in Second Life such as: Chat, Quiz, Choice, Glossary, Blog, etc.

- Second Life specific tools, such as Sloodle Presenter which presents set of tools for creating mixed media Second Life presentations, Prim Drop tool for distribution and collection of Second Life objects.
- Enrollment tools: tools that checks users access permission for a virtual classroom, help in the registration process on Moodle site and enrollment in the appropriate Moodle course.

Regarding the above mentioned educational possibilities of Sloodle, it has been noticed the possibility of its application for the creation of the course for training of medical professionals who deal with pre-clinical and clinical practice in the field of orthopedics, concerning the spine and its deformity.

2. RELATED WORK

There are a large number of researches dealing with use of Second Life in education, but just few are treating the spine.

At the University of Auckland in [6] Second Life is used to simulate the emergency room where small teams of students can learn about appropriate ways to diagnose and treat patients whose condition requires urgent intervention. This project is presented to students in the third or fourth year of study.

The purpose of using Second Life at this university refers to the acquisition of skills of students in diagnostics, in situations that are simulated adequately and where students have to react in real-time. The advantage can be seen in reducing costs in the sense that students do not

need to travel to different locations. In addition, Second Life provides predefined cases, which in practice are not always available, as well as the collaboration of participants in problem solving, diagnosis and determining treatment. Image 1 shows an example of using Second Life in this university, where vital signs of patients can be seen.



Image 1: View of the vital signs of the patient [6]

Similarly, in [7] is shown an example of Second Life application in medicine education. A pioneer in the use of virtual environments for learning medicine is Ann Myers Medical Center. The center now includes a number of students, animators who invest time in the development of virtual scenarios.

Currently, the center has emphasis on the medical history of patients, examinations, and the specific situation in which students train. Image 2 provides an overview of part of the virtual training.



Image 2: Showing part of the virtual training [7]

According to [8], these application examples are categorized in the top 10 of the cases. Some of the most interesting are related to neurology shown in image 3, as well as the virtual space for people with disabilities shown in image 4.



Figure 3: Examples of virtual possibilities of Second Life (neurology) [8]



Image 4: Showing examples of virtual possibilities of Second Life (part for disabled people) [8]

There have been a small number of descriptive case-studies published on the use of Sloodle,

In [9] is shown Sloodle application, its main features, but it is presented in the manner of use of the above mentioned solutions in the areas of algorithms and programming. In contrast to this research, this paper describes Sloodle application in the field of medicine. Regardless of where the field is applied, it is necessary to use Sloodle in accordance with technological, didactic-pedagogical and social critical Training, as outlined in [10].

Although there are a large number of published research relating to the use of Second Life in medicine, few of them relates to the use Sloodle in medicine, and the authors did not find any work that would thereby related to orthopedics. The paper presents a new approach to application Sloodle environment that combining Moodle and Second Life allows users to systematically go through the area that is treated, in this case the functions and deformities of the spine.

3. OVERVIEW OF THE COURSE STRUCTURE

The course “Spine – functions and deformities” (image 5) has been created for the purpose of training medical staff

in pre-clinical and clinical practice. The topics are designed to systematically guide users through specific topics. Firstly, users are introduced to Second Life virtual world, secondly they recall their knowledge of the detailed structure of the spinal column, and finally through series of activities are focused on the different spinal deformities from which the emphasis is on scoliosis, kyphosis and lordosis.

The course is set within Moodle platform of e-lab system which belongs to Faculty of technical science Cacak, University of Kragujevac [11]

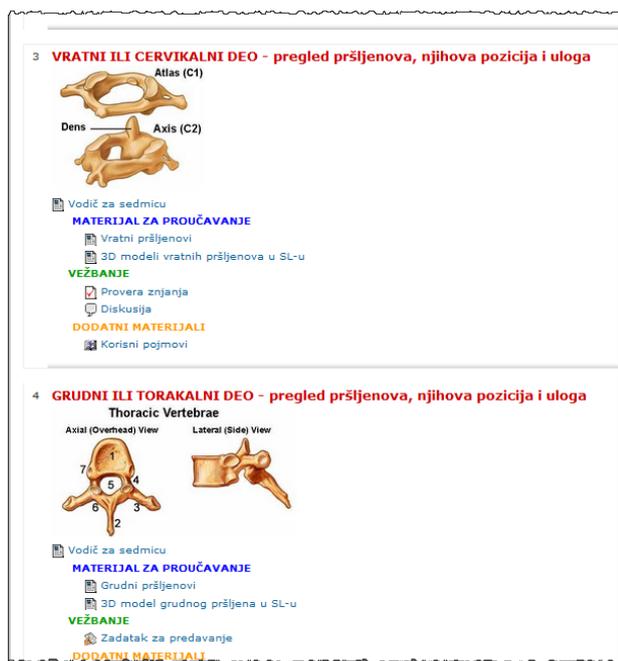


Image 5: Course “Spine – functions and deformities”

Second Life Island *College of Scripting, Music, and Science, Horsa* [12] is chosen to be the starting point for the course, noting that purchasing or renting a land is planned for further course maintenance.

Within the “Spine – functions and deformities” course, the following topics are created:

- Second Life – introducing to virtual world
- Spine column – basic concepts
- Cervical vertebrae – review of their position and role
- Thoracic vertebrae – review of their position and role
- Lumbar vertebrae – review of their position and role
- Sacrum and Coccyx – review of their position and role
- Scoliosis – diagnosis, types, treatment
- Kiphosis – diagnosis, types, treatment
- Lordosis – diagnosis, types, treatment
- Comprehensive self evaluation

With the assumptions that medical staffs are not familiar with virtual worlds, first topic of the course gives basic guidelines for existence in Second Life. If the user is already familiar with the virtual world he/she can skip first topic. Users have to create avatars (a virtual

representation of themselves) and to acquire appropriate skills necessary to navigate through Second Life.

After successful accommodation to virtual world, user can access specific topics related to spinal column. User is expected to link his avatar to his Moodle account. This process is called "avatar authentication" or "avatar registration". There are different ways of doing this. In this course it is used Moodle tool "RegEnrol Booth".

Each topic is organized in three sections: *learning materials*, *practice* and *additional materials*. Through *learning materials* users will renew their knowledge in the relevant field. Within these materials, beside text and video media, there are links to Second Life locations where 3D models of particular vertebrae (image 7), as well as 3D models of different spine deformities (in later topics) are placed.

Models are developed in CATIA software. Unlike most of other common models that can be created and easily imported to Second Life, models such vertebrae, consist of large number of areas which when uploading can lead to huge number of triangles and vertices in Second Life which cannot be linked in one model. This issue is resolved by introducing program Blender. When the model is inserted in program, through series of steps its number of triangles and vertices were reduced (image 6).

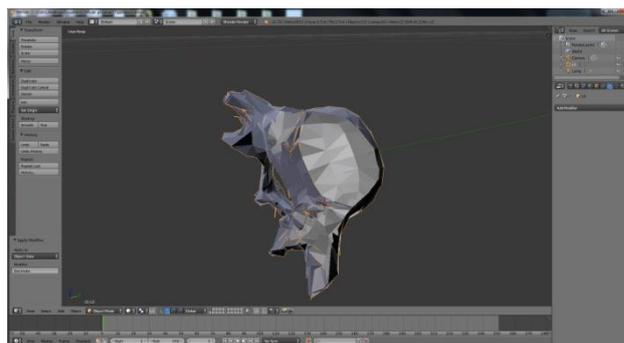


Image 6: Vertebrae model in Blender program

Process of uploading edited vertebrae model to Second Life than is same as any other object (image 7).



Image 7: Uploading vertebrae model from Blender to Second Life

Also, using Linden Scripting Language, which is Second Life programming language, models were given appropriate name (such, lumbar vertebrae – L5, etc), and they can be rotated and moved, which additionally enhance visualization.



Image 8: Overview of fifth lumbar vertebrae in SL

Practice section contains tests and practical tasks that help users to test their knowledge. *Additional materials* contain useful links, terms and other assistance to the appropriate topic.

Within each topic following Sloodle tools are used:

- WebIntercom which connects chat in Second Life to Moodle chatroom, thus allowing users who are in Second Life to communicate with those who are in Moodle, which is useful for those users who do not have access to Second Life at that moment. Given that WebIntercom-chat is synchronous activity, users can have chat sessions where they can discuss on particular issue.

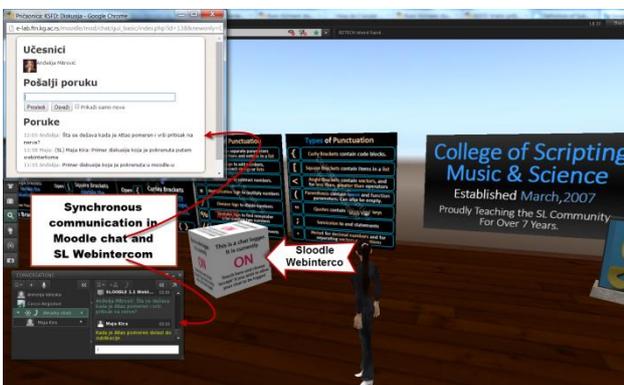


Image 9: Application of Webintercom tool

- MetaGloss is also one of useful Sloodle tool, which allows access to Moodle glossary. Each topic has glossary which contains terms used in that topic.

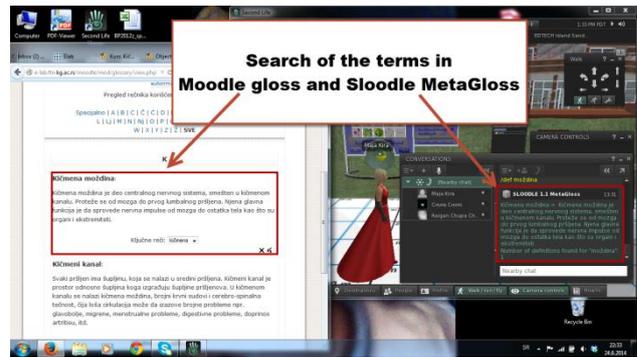


Image 10: Application of MetaGloss tool

- Quiz is Sloodle tool used for testing. Quiz can be accessed from Second Life or Moodle. Sloodle Quiz Chair is used for this purpose. Once the quiz is done in Second Life, the score can be seen by clicking on the quiz below (or even to re-attempt to give answers in Moodle instead of Second Life).

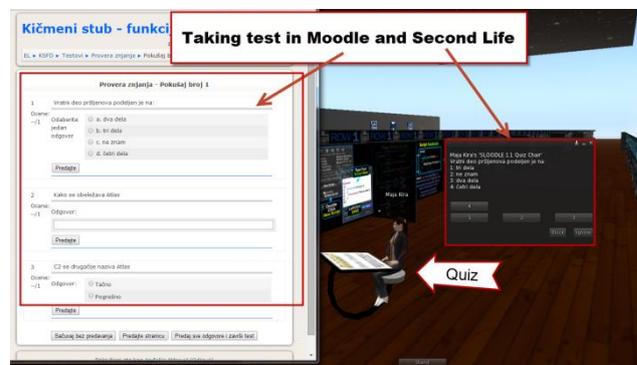


Image 11: Example of questions in Moodle and Second Life

It should be noted that it is planned to use some more Sloodle tools, which requires ownership or renting land, as envisaged in the near future. One such tool is Sloodle Presenter. Using this tool, participants will be able to view presentations and videos that are related to the spinal cord in Second Life, which were previously posted on Moodle.



Image 12: Preview of Sloodle Presenter

5. CONCLUSION

Over the last few years, there has been growing interest in the medical and public health communities in using virtual environments for education, and training. According to Sloodle potential for better understanding and visualization of three-dimensional models of the spine and vertebrae by interns who work in the field of pre-clinical practice “*Spine – functions and deformities*” course is designed.

In this paper we provided the following:

- Gave some basic description of Sloodle tool and its applications
- Referred to some related work of virtual environment application in medicine education and training.
- Described “Spine – functions and deformities” course designed and implementation by using appropriate Sloodle tools.
- Described implementation of complex 3D vertebrae models to Second Life. The process required several steps.
- Use Linden Scripting Language to give name and appropriate actions to model, such rotation and movement which would help users to better understand 3D models.

The importance of proposed approach is reflected in innovation of existing course in this area, as well as enabling users to practice and review cases that are currently not available in real world practice. Future work will be related to application of implemented solution and its evaluation.

ACKNOWLEDGMENT

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