

NEW SOLUTION FOR HUMAN ANATOMY REMOTE TEACHING TO MEDICAL STUDENTS: AN IMPLEMENTATION OF A DEMO CLASS IN STUDY COURSE

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Abstract

In searching for new and fast solutions in response to the Covid-19 period, medical tutors transformed a lot of methods and materials into online formats and digital platforms. A special solution for Human Anatomy remote teaching was found in the organization of practical classes for all groups of students at the same time. Weekly “live” and all semesters demonstrations or Demo classes were started in the study course from 2020. The present study aimed to extract and summarize tutors’ general experience in the implementation of a Demo class in the Human Anatomy course. In the academic years 2020-2022, Zoom and Panopto platforms allowed the tutors to teach Demo classes remotely for the 1st year and the 2nd year students of the Faculty of Medicine. Over 2.5 years, there were organized 252 online anatomical Demo classes. Every Demo class (two academic hours in length) was related to the special anatomical topics and their contents. The data of this study were collected using open-ended questions to find out tutors’ experiences with the implementation of a Demo class in the study course. The answers were coded and analyzed using qualitative content analysis. Before every demonstration, most of the tutors studied, how to organize and deliver a class. During online sessions all students received information at the same time and could follow the tutors’ explanations of the topic step by step. At the end of each Demo class, tutors liked to get any feedback from students about the presented content and displayed several questions and answers in the “live” chat. All Demo classes were recorded by tutors and afterward reviewed, optimized, linked, uploaded onto e-studies and accessible to students or other tutors of the study course. This experience gives further development and next transformation of teaching methods in the study course with implemented Demo class.

Keywords: Human Anatomy, Demo class, remote teaching, tutors

1. INTRODUCTION

The COVID-19 pandemic made a lot of changes in the educational world and in higher education institutions with following different responses and performances that were related to the context of this unplanned situation [1]. Some institutions canceled or postponed lectures and practical classes but others continued delivering course content either via synchronous or asynchronous activities, or a combination of both [2]. The medical study process was not an exception and it included a forced transition of all courses to an online format. At the same time, a lot of different possibilities and activities for students were limited and/or unavailable [3]. In searching for new and fast solutions in response to the Covid-19 period, medical tutors transformed a lot of methods and materials into online formats and digital platforms. One of the general components of the basic studies, health sciences and a structural foundation for higher clinical courses is Human Anatomy [4].

At the Rīga Stradiņš University (RSU) students of the Faculty of Medicine have the Human Anatomy course the first and second semester of the 1st year, and in the first semester of the 2nd year, and general teaching includes lectures and practical classes. All students are organized into large or small groups that are guided by tutors. The pre-COVID era schedule of the course consisted of two academic hours of lectures and weekly three academic hours of practical class, including anatomical structures’ visualization and demonstration on cadavers, virtual dissection Anatomage Table 6.3 (Anatomage Inc., San Jose, CA, USA) and/or materials from our Laboratory of Anatomy. After the enforcement of the pandemic situation and the transition to remote work and study process, the Human Anatomy course also changed. It consisted of two academic hours of online or pre-recorded theoretical lectures and weekly two academic hours of online practical classes. Related to the pandemic situation, a special

solution for Human Anatomy remote teaching was found in the organization of practical classes for all groups of students at the same time at the Department of Morphology of RSU. Weekly “live” demonstrations or Demo classes for students of all semesters were started in the study course from March 2020.

The information was extremely unavailable on evidence regarding the use of Demo classes within the education of the Human Anatomy course in Latvia. To our knowledge, none have discussed the use of them in medical education in our country from a tutor’s point of view.

The present study aimed to extract and summarize tutors’ general experience in the implementation of a Demo class in the Human Anatomy course.

2. MATERIALS AND METHODS

2.1. Materials and design of Demo classes

In the academic years 2020-2022, Zoom (Zoom Video Communications, Inc.; versions 4.1.9 – 5.10.4) and Panopto (versions 7 – 11) platforms allowed the tutors to teach Demo classes remotely for the 1st year and the 2nd year students of the Faculty of Medicine. The online streaming was administered using Moodle (e-studies system of RSU) teaching and learning platform. Over 2.5 years period, there were organized 252 online anatomical Demo classes.

Tutors were allocated to a topic/semester according to their knowledge, skills, digital experience and were classified as “senior” or “junior”, according to their professional experience. One regular or several tutors were involved in the presentations of all or selected, specific topics of the Demo classes. Tutoring activities were organized into 4 general topics: musculoskeletal system, internal organs, neuroanatomy and circulatory system.

In every week two academic hours Demo classes tutors were asked to carry out explanations and visualizations of the specific anatomic regions, contents, topography, structures and their relationships. All Demo classes were presented “live” using the screen and/or “share-screen” function on the digital platforms and based on such activities that were supplemented with PowerPoint slides, different digital tools, materials, virtual images, three-dimensional (3D) printed anatomical models, the anatomical applications and videos. Students, divided into semesters and faculties, followed to tutors’ different explanations of the topics on Zoom or Panopto platforms, and they were allowed to discuss and ask questions afterward. Before each Demo class and/or at the beginning of it, a file of the current topic (without voice guidance) was uploaded to the e-studies or sent to students to the Zoom general chat. Students who followed the online Demo class were able any time to perform their notes, additional information and study by using this material.

Tutors provided students with a structured interactive review, identification and anatomical relationships of the structures, included clinical cases and answered questions. All Demo classes were recorded, and our students were able to study the topics in their place and enjoy the ability to pause and/or view these videos multiple times. Students could access these recorded Demo classes through our e-studies.

2.2. Methods

Responses from 12 tutors of the Human Anatomy course were collected using open-ended questions to find out their experience with the implementation of a Demo class in the study course. The selection of tutors was based on voluntary invitation, where inclusion criteria were being a tutor of an online Demo class during the academic years period 2020-2022 and willingness to be interviewed. Every face-to-face interview was 15 minutes long, and it was conducted in an unoccupied classroom and individually. In the beginning, the questions mainly asked participants to express their observations about the activities with a Demo class regards to its implementation, usefulness and usability, problems and difficulties. Tutors also were asked to compare the strengths of the Demo class with other methods of remote anatomy teaching that they have access to, including video lectures and online practical classes in separate groups. Then there were collected tutors’ opinions and their perceptions on the impact of a Demo class in the education of the Human Anatomy course. Additionally, there also were asked

questions, such as “Could you describe this more?” or questions such as “Do you like anything else to add?” to improve the collection process of the data and to offer a discussion. The answers were coded manually and analyzed using qualitative content analysis [5], based on a six-phase framework guide [6]. According to some authors [7, 8], thematic analysis is a widely-used method of analysis in qualitative research, and it enables the researcher to generate simple themes within their dataset. Related to this and following studies of the codes, there were formulated 3 conceptual themes by considering similarities and differences among the emerged code labels. Every theme was categorized into three sub-themes (detected from analysis of open-ended responses and focusing on important elements). Below, we present these, as they refer to how tutors implement a Demo class and what is their experience in the Human Anatomy course for remote teaching to medical students.

3. RESULTS

The analysis of tutors’ interview data resulted in the detection of themes and sub-themes below that were analyzed further to describe the implementation of a Demo class in the Human Anatomy course under study. Based on responses, it was possible to group them and identify 3 main themes: (1) tutors’ experience with the implementation of a Demo class in the Human Anatomy course (open-ended question A); (2) the strengths of a Demo class in comparison with other methods of remote anatomy teaching (open-ended question B); (3) the impact of a Demo class on the teaching and development of the Human Anatomy course (open-ended question C). The grouping of responses into themes and sub-themes is summarized in Table 1. Subsequently, details of results found from the analysis of the interview data, are presented next in the following sections, supplemented with fragments from the tutors’ interviews.

Themes	Sub-themes	Adequate open-ended questions
1 - Experience with the implementation of a Demo class in the Human Anatomy course	Reasons for the Demo class’ implementation	Open-ended question A: how do you describe your experience with the implementation of a Demo class in the Human Anatomy course?
	Tools and materials for use	
	Challenges of tutors	
2 - The strengths of a Demo class in comparison with other methods of remote anatomy teaching	Suitability for remote course	Open-ended question B: what are the strengths of the tutors and students involved in the Demo classes in comparison with other remote anatomy teaching methods?
	Suitability for students	
	New knowledge and skills	
3 - The impact of a Demo class	Transformation of the teaching methods	Open-ended question C: what can be the impact of a Demo class on the teaching and development of the Human Anatomy course?
	More training for tutors	

on the teaching and
development of the Human Hybrid teaching
Anatomy course

Table 1. Themes and sub-themes from tutors' interview data

3.1. Theme 1: Tutors' experience with the implementation of a Demo class in the study course

The first question was for the tutors to share their experiences that promoted or might promote the implementation of a Demo class. The categorizing sub-themes of the participants' responses included: reasons for the Demo class' implementation, tools and materials for use and challenges of tutors.

3.1.1. Sub-theme 1: Reasons for the Demo class' implementation

As remote education was applied during the pandemic, the start of a Demo class was urgently needed to support, compensate and continue the teaching/learning process. The new type of solution was not being used before at the departmental level and thus took the initiative to motivate tutors to start to implement it in the course and use the Demo class as evident from the comments below:

"During the pandemic situation, all the courses were realized via online and an e-studies platform, and now we could use it much more effectively with an implementation of a Demo class."

"We started to incorporated online teaching and started to use some new activities."

It can be seen from the quotes above that the Demo class was a new initiative at the Department of Morphology. This scenario was started its weekly use by our tutors. Furthermore, it could be derived from the analysis of the tutors' interview data that it was a regular and mandatory option. This was made visible by the following:

"Covering a semester's content of the course with regular Demo class for all students at the same time was a useful thing, and we could continue some of our teaching/learning activities online."

"It's a way of reaching out to a lot of students, and we also realized that it's one possibility as most young people would like to continue their regular studies."

The tutors also noticed that students find the motivation to use the e-studies more intensive and connect to the Demo class. Another reason for using a Demo class was the fact that the tutors were unfamiliar with other fast solutions for remote teaching:

"Tutors and students used an e-studies platform before, and now it offered to upload prepared links and connect to remote Demo class via Zoom or Panopto."

"We have just started using the Demo class, and we've just really begun to use Zoom, Panopto and our e-studies. There were so many things that we're not using until the pandemic situation."

3.1.2. Sub-theme 2: Tools and materials for use

Various tools and materials were offered to be used by the tutors to facilitate their remote Demo class. Before every demonstration, most of the tutors studied, how to organize and deliver a class. This type of activity was revealed in the comments below:

"I need to plan my activities for a better explanation of the topic and visualization of the anatomical structures online."

"Because of a collectively shared and presented materials in the class, a new possibility of going over the topics covered the course via online, made our job more intensive and included a lot of preparatory works, and there some very good ideas came out that."

During "live" sessions all students received information at the same time and could follow the tutors' explanations of the topic step by step. Tutors used different materials and digital tools (PowerPoint

presentations, apps, digital images, videos and models) improving anatomical structures teaching online. This was made transparent by the following:

“I used a lot of PowerPoint presentations and plastic anatomical models in my teaching, and the students liked that because they could always find these materials in the e-studies or see the location of structures if they haven’t understood.”

“There were also very good links to the videos on the Internet, that tutors and students could access if they liked to add additional sources and information.”

At the end of each Demo class, tutors liked to get any feedback from students about the presented content and displayed several questions and answers in the “live” chat. All Demo classes were recorded by tutors and afterward reviewed, optimized, linked, uploaded onto e-studies and accessible to students or other tutors of the study course. The fragments of the tutor’s responses below present it all:

“In addition, we have our time for students before, during and after Demo class ... and have a chat for the discussion of anatomical topic and questions.”

“We recorded our Demo classes and uploaded the links of these in the e-studies, and next time there will be new records anyway.”

On average, the tutors collectively recorded more than 375 hours of Demo classes during the studied period. It was important to note that just some records have been “lost” due to any technical problems at the beginning of the implementation of a Demo class, and all of them were replaced by repeated/updated records and uploaded again in the e-studies.

3.1.3. Sub-theme 3: Challenges of tutors

Although it transpired from the tutors’ interview data that the use of a Demo class for remote teaching was still a challenge. The tutors’ interview data revealed how there were a few useful things to be learned. More than one-half of the tutors reported that they experienced a lot of technical difficulties. Some of the comments referring to this view were as follows:

“I didn’t have deep knowledge and needed more training in some technical things like the use, tools and possibilities of the Zoom and Panopto platforms.”

“We didn’t have any difficulties with remote Demo class, except when some of our computers, cameras and microphones were not working or when we’ve got unexpected Internet interruptions.”

In the beginning, preparation time for teaching online was longer than for face-to-face. It was also an example of the activities in that tutors had an opportunity to present the materials that they created every week. The tutors described strategies such as self-instruction, use of anatomical and 3D printed models, videos and apps performing skilled activities in this area for teaching, revision, consolidation and an assessment of anatomical knowledge. Representative comments about it were as follows:

“We went through difficulties in the first weeks and the first year together. Later on, as we experienced and used the e-studies more and led the Demo classes, we were acquainted with the largest part of possibilities and resources, prepared and uploaded a lot of materials, etc.”

“I think we’re doing a lot as well, but there was still much that could be done to prepare new materials and improve our teaching with Demo class.”

3.2. The strengths of a Demo class in comparison with other methods of remote anatomy teaching

A few potential successes were emerging from the tutors’ interview data, and the various dimensions of this theme were further identified. The sub-themes also included suitability for the remote course, suitability for students, new knowledge and skills.

3.2.1. Sub-theme 1: Suitability for remote course

The tutors numbered and described the methods used to perform remote teaching of Human Anatomy. Thus, the use of the e-studies, Zoom and Panopto platforms as the main means of communicating and presenting topics and academic tasks in remote teaching stood out:

“They are mainly from our methods because, as we all already had the access to our accounts to the e-studies and communication platforms, and then we started to use their offered tools more intensive.”

“We used digital methods in which we included online materials that we needed to teach our students in the Human Anatomy course.”

At the same time, tutors understood that Demo class allowed for teachers-students common activities during the remote teaching and learning process:

“Regular studies and common meetings every week, being able to access different materials, resources, questions and answers, motivated more to realize the course in this way together with other methods.”

“The main advantage was that this model of Demo class was accessed every week and afterward through the records via e-studies, and it also offered all materials with their explanations that students could get from any other time and place.”

3.2.2. Sub-theme 2: Suitability for students

Some key points were raised regarding the attendance of the students in online practical classes. Our tutors believed that poor attendance by the students of the Zoom classes will interfere with their teaching. Part of the students was only motivated to do well when a task counted for marks. In this case, the time spent in the Demo classes was sufficient, making teaching and learning more progressive. This assumption was borne out in the fragments from the tutors' interview data below:

“The fact that students organized themselves in their way, regularly participated in the Demo class, paid attention on topics and were not distracted by other things, this made teaching more qualitative.”

“More explanations and revisions of the topics with complicated anatomical structures were given by the tutors in Demo class. If something was not understood, it was explained again, and then students got the answers and more understanding.”

Regular weekly attendance of the students with their registration and some benefits at the end of the course was a great motivation to learn online. It was presented by some of our tutors following quotes:

“We asked our students to come to regular Demo class and get some benefits, and I think that was really successful and very good.”

“I enjoyed interacting with the students, and it was really hard to do that just in Zoom classes.”

The instant feedback provided by tutors for all students together was found to be another motivating factor for students to participate in the Demo class as substantiated below:

“This pandemic has forced tutors to do our activities better, and I was always trying to figure out ways to change and/or improve them after feedback from the students.”

“Providing the opportunity to ask questions and get answers, partly or completely gave to the tutors an understanding about the level of students' knowledge and competences.”

3.2.3. Sub-theme 3: New knowledge and skills

According to the challenges caused by the COVID-19 pandemic, our tutors distinguished digital, social and emotional skills as highly valuable not only for remote teaching/learning but also for the future. Since the Demo class was novel and supplemented traditional class but not substituted it, then some tutors believed that it had the potential to integrate a new type of knowledge and skills. Anatomists, therefore, flagged this as a major strength and indicated that often tutors wanted to include various materials to avoid the students getting nonactive in the Demo class. The existing level of knowledge and skills of our tutors were identified, used and/or improved collaboratively through the realization and management of the Demo class, including access to technologies and regular training, communication and experience with other tutors and students. Creativity was very important to tutors' activities and their success, and it motivated our students to keep their attention and enthusiasm in the online study process:

“Developing Human Anatomy course online demanded additional and different activities than traditional classes. The need to find new and innovative ways to deliver the course, its contents and interact effectively with the students, required new knowledge and skills of the tutors and students.”

“By combining different digital tools that tutors used for their remote teaching, they delivered the best quality online teaching of Human Anatomy and new experience for their students in Demo class.”

Step by step our students also showed that they got new experiences and skills while attending online classes. Some of the students have shown that the lack of face-to-face interaction with tutors and classmates was also considered a challenge for them. Students showed their communications with tutors and asked questions to clear their difficulties during online Demo classes.

3.3. The impact of a Demo class on the teaching and development of the Human Anatomy course

The last question sought the tutors' individual opinions on the impact of a Demo class on the teaching and development of the Human Anatomy course. The sub-themes within this category included the transformation of teaching methods, more training for tutors and hybrid teaching.

3.3.1. Sub-theme 1: Transformation of teaching methods

The tutors believed that a new solution or the Demo class will make remote teaching and students' learning easier, will serve as an additional and alternative method of teaching anatomy and could be better like a special learning environment for medical students. Our tutors transformed traditional methods and implemented teaching online a Demo class using one or more platforms. The majority of the tutors showed that they used Panopto in their online Demo class teaching process at the beginning. Afterward, some tutors started to use Zoom, because for more than 300 students there were a lot of technical problems with the Panopto platform online. Furthermore, tutors believed that the traditional method of teaching was a better method for an effective study process. At the same time, they also got more chances to learn a lot of details about online teaching of Human Anatomy, as mentioned in the following:

“When responding to a pandemic, in a short time we had to learn, train and do online teaching, and at first, we used the closest possibilities for engaging our students in Demo class and for creation of new materials, adding 3D models, virtual images, etc.”

“I aimed to provide the teaching Human Anatomy for the students in their medical education but I was good only partly at digital tools and technologies. I trained a lot by learning and using them, and this process will be continued.”

3.3.2. Sub-theme 2: More training for tutors

The tutors' interview data underlined the fact that there were opportunities for the training to enable the remote classes to be in a better position to use the system effectively. It was a common trend for the tutors to appeal for training opportunities so that they become competent users of digital platforms and tools. Generally, the tutors expressed very high satisfaction with the Demo classes, Zoom and Panopto platforms. This may be partly a result of the training conducted at the beginning of the Covid-19 period and regular improvement of the digital skills every semester for all the tutors who used these platforms:

“We (tutors) have had to come up with new, creative solutions and more training during remote teaching but results were successful with the possibilities available during this time.”

“Training was often based on motivation, repeating and our common teamwork, and during remote Demo class every tutor showed not only these results but also new personal performances and level.”

Tutors showed adaption themselves to online teaching but agreed that preparation for online Demo classes required more time in comparison with traditional practical classes. At the same time, tutors agreed to make the Demo classes every week.

3.3.3. Hybrid teaching

Our tutors used online teaching from March 2020, and some online possibilities will continue like hybrid teaching in the nearest future. Some data from responses highlighted that more than half of the tutors

agreed that online teaching was very effective during the pandemic crisis and time of limitations but there must be a traditional on-site teaching process with communications and access for students to real materials and cadavers. Tutors' responses showed that this new solution was useful as a teaching method during the pandemic situation and until 2022 when remote work was detected depending on the level restrictions:

"We couldn't compare distance practical classes and traditional classes. We remotely provided some activities and teaching but it couldn't substitute our face-to-face education, cadavers' dissections and work with students and materials."

"Lack of communication and limited access to real anatomical materials with no opportunity to observe the practical class, in remote education could be present only for the pandemic period or shortly after it."

The majority of tutors acknowledged a Demo class as a good supplementary and alternative anatomy teaching tool. Furthermore, there is a need to promote the practice of it and experience in hybrid teaching.

4. DISCUSSION

Under the complete lockdown of the COVID-19 pandemic [9] and the influence of various factors, medical education was changed at different levels. Prabhat et al. [10] defined that Human Anatomy is a three-dimensional (3D) subject requiring an understanding of the relationships between structures, often achieved by studying cadaveric material and models. Several authors [11, 12] explained that deep knowledge of anatomy is essential for all physicians, regardless of their specialty. Byrnes et al. [13] mentioned that anatomists now required valid and easy-to-use communication tools to facilitate remote teaching, learning and scientific activities. The pandemic situation was an accelerator for the better adoption of digital technologies and their innovations in the study course. Some authors [14, 15] underline that the identification of the educational strategies, their adaptations in health professions curricula and teaching behaviors can be tested through research. Based on our findings, delivery of the online Demo classes of Human Anatomy, including its content, was a major challenge for our tutors at the beginning of Covid-19, and afterward, anatomists planned and adapted to the new environment and teaching model, possibilities, options and different teaching techniques. This experience gives further development and next transformation of teaching methods in the study course with implemented Demo class.

Vital steps are important for preparing the tutors and students for their work with the technologies and digital platforms, according to the current needs. Related to this, Santos, Barreira & Saad [16] report that a lot of new technologies were created during that time, and those already been developed started to be more and better explored. Yaggie [17] agrees that teaching the Human Anatomy course is physically demanding. Challenges, opportunities and development of the updated educational resources, opened for anatomists some new ways the use technologies and improved collaboration between staff, students and different educational units of the University. In addition, our team of the Information Technology (IT) service organized multiple training sessions for tutors every week or month for the effective use of the virtual platforms and e-learning system in the distant teaching process. The teaching of the Human Anatomy was not only an individual process of every tutor but rather "participation is teaching". Step by step tutors developed their knowledge and skills through IT specialists' guidelines and then practice, teaching and repetition. As the result of our experience, we learned the transformative potential of those practical Demo classes and, doubtless, they will be implemented in the Human Anatomy course for any period.

Attardi, Mintz & Rogers [18] note that the perspectives of online teachers are crucial to the successful implementation of online education. Darras et al. [19] already mentioned that educators need to find new ways to teach anatomy in a way that is clinically relevant and sustainable. Ferrel & Ryan [20] underline that in the future it will be important to study the extent to which the pandemic changes currently being introduced in response to COVID-19 impact medical education overall.

While every tutor has an individual story of how COVID-19 has impacted their teaching, there is no question that the impacts of the pandemic crisis and transition to remote teaching will be felt on a great level challenges. Yoo et al. [21] indicated that anatomy education has been presented with various platforms and with multiple opinions regarding the conducting of online classes. Mbagwu et al. [22] already mentioned some challenges that were presented during the remote study process in the heat of the pandemic and were recommended for the development and implementation of an actual and sustainable online education model in anatomical sciences.

In our Human Anatomy course, traditional classes with their contents and materials included several specific aspects. Transitions of them to the new format presented some difficulties. Findings by Bauler, Lesciotto & Lackey-Cornelison [23] showed that there exist special factors that impact the difficulty and speed of the transition, including the delivery format of the prior content, availability of pre-existing electronic materials and the technique previously used. For many of our tutors, this transition involved significantly more things than moving the content of the practical classes or lectures to an online system. As seen in studies by Fine et al. [24] and Shi [25], long periods spent in front of a computer screen, whilst attending online activities for virtual teaching have a detrimental impact on tutors' and students' health, increasing levels of stress and anxiety. Böckers et al. [26] marked that in the past, anatomists had already developed and implemented innovative digital teaching methods. Besides this, Demo classes helped to prepare and develop tutors and students' continuous teaching/learning of Human Anatomy in the study process. In the future, this feedback from tutors' will be utilized to review and create online Demo classes more qualitative, attractive, interesting and engaging.

Many universities have had to change their educational processes because of the pandemic. In this scenario, the tutors and students were dependent on digital teaching and learning completely. Different digital possibilities and new tools started to be more popular in modern anatomy education. During the Covid-19 pandemic, a lot of video platforms and virtual materials were used by tutors and students to practice remote teaching/learning and social distancing [27, 28]. Based on the results of the study by Iwanga et al. [29], it is difficult to compare traditional teaching methods with online under equal conditions. Wickramasinghe, Thompson & Xiao [30] state that anatomy education, either virtual or classical, requires training and time. Our newly designed Demo classes of the online sessions were effective and enhanced the performance of tutors and students in active teaching and learning. Now anatomists are playing a general role in the development of this solution of digital education and adding it to hybrid teaching for the next several years.

5. CONCLUSIONS

Based on our findings, delivery of the online Human Anatomy Demo class with its content was a major challenge for our tutors at the beginning of Covid-19, and afterward, they planned and adapted to the new teaching model, productive environment, possibilities, options and different teaching techniques. This experience gives further development and next transformation of teaching methods in the study course with implemented Demo class.

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