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Good Practice Report on Effective Online Teaching and Learning

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1 Introduction

The need for online teaching and learning has risen tremendously and unexpectedly in 2020 due to the global pandemic. Universities worldwide had to switch to online teaching, students worldwide had to move to online learning. The world of higher education has been changed dramatically. Lecturers had to adapt their courses and, thus, professional development towards methods of online teaching and learning has increased to a large extent.

Even after the pandemic will be overcome, online teaching and learning will continue to some extent, since both students and lecturers discovered the potential of the use of digital resources in higher education. These new competences can be used effectively to enhance the university-industry knowledge transfer as well.

This good practice report contains 8 examples of methods and tools for effective online teaching. The autors are lecturers at FH JOANNEUM University of Applied Sciences in Graz and lecturers of universities in Tomsk, Russia and Yerevan, Armenia.

2 Practical tips for remote teaching in higher education

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Abstract

The global pandemic crisis ignited in 2020, has forced educational delivery fully remote, impacting deeply the way we teach and learn. Higher education institutions, teachers, and students had to quickly respond, shifting almost overnight to online teaching. It is undeniable that this context presented a lot of challenges for all actors involved. Nonetheless, the online environment also presents interesting aspects for the learning process. After having experienced more than one year from the emergency scenario, much was experienced and learnt from undertaking lectures online. Spreading the learnings acquired in this journey might be useful to the teaching community and ultimately help with the aim of fostering a more meaningful and engaging teaching and learning in higher education. This paper is mostly drawn on my own teaching experience and learnings gathered in the academic year 2020/21 at university level, also supported by literature review and teaching didactics training received in the period. It compiles seven practical tips for conducting e-lectures that were applied in the teaching context and generated interesting results, like more active student's presence online asynchronously and synchronously.

Keywords: online teaching, e-lecture, active learning, higher education

Introduction

The journey into online teaching was enforced by the closure of universities in March 2020 (lockdown in Austria). The main aim during the lockdown was to provide the best experience possible in the online environment. Apart from having to dive into rapid learning of new tools and technologies, the need to assess different strategies in online teaching emerged and the questions like "how effective were my teaching approaches for the students" and "what I could be done to maximize their learning experience" needed to be deeply explored.

With a review of recent literature on the topics of online learning, online didactics, teachers and students' presence and engagement in teaching (Carrillo & Flores, 2020; Rapanta et al, 2020; Zhang et al, 2020; Koehler, 2014; Oztok, Zingaro, Brett, Hewitt, 2013; Garrison, 2009), together with the possibility to receive didactic training at the university and the own teaching experiences, some online practices were developed and applied. These strategies are part of the teaching experience on master level in a university of applied sciences, on business-related topics, in the academic year 2020/21.

The present contribution aims to offer some tips and suggestions on how teachers might approach asynchronous[1] or synchronous[2] online environments and structure their e-lectures in a way that enhances the experience for the students.

Seven practical tips for remote teaching

Create simplicity and consistency: Develop a simple, clear, and linear path of your online page course and build consistency within the modules. For example, having two readings followed by a quiz, one discussion, and one activity with the same deadline every week. Then every module, every week will have the same basic structure. This consistency and simplicity ensure that students dedicate more time to the questions and materials relevant to their intellectual growth, instead of wasting time asking where a reading is displayed or when is an activity deadline.

Justify your decisions: Go over the syllabus and let students know that there are reasons for the decisions you made, reflecting that you really care about the lecture. Explain why you chose a textbook or article, and justify your grading system. Clearly explains your standards and how they are important, intentional, fair, and achievable. You can do it via a pre-recorded video to be uploaded and assessed several times by the students. It can also be provided in an introductory synchronous session. Giving some room to raise opinions and take some joint decisions on the course, is very beneficial and increases the sense of belonging and having a voice to the students.

Build community with video introductions: The ability to identify with the group, communicate purposefully in a trusting environment, and develop inter-personal relationships is of great importance in any learning experience, but even more relevant in the online environment. Teachers and students' introduction videos can be a good strategy to initiate the sense of community in the lecture. One example is the "3 things about you" video, where students

[1] *Asynchronous learning the instructor and learners are not engaged at the same time. There is no real-time interaction with other people.*

[2] *Synchronous learning happens at the same time for the instructor and the learners. There is real-interaction with other people.*

introduce themselves sharing 3 things about them in a 2 min video. It brings a sense of cohesiveness to the group and starts interesting conversations between lecturer and students.

Foster collaborative learning: We have experienced the importance of collaboration in our lives, especially in challenging moments. Through interaction and collaboration, ideas are communicated and knowledge is constructed. The different online tools and learning management systems available allow us to consistently use forums, wikis, feedback tools, and digital forms of peer review and reflection that can be kept documented and accessible at one place (again simplicity and consistency). It also supports extending the conversation and learning after live interactions.

Ask questions with online quizzes or pools: The power of asking questions in the learning process is undeniable. In the online environment we can make use of digital tools to change the method of questioning and still get the results we aim for. The goal can be placing questions to get to know better the students, to assess previous knowledge on a topic, to check understanding after presenting a concept, or to present a leading question for discussion. We can always also use some interaction or even some gamification to serve our purpose.

Build your own digital library: There is so much information on the internet nowadays, that students might not be sure where to find good and reliable content. As instructors, we can curate relevant and quality content available online and create our own digital materials to make content online available to the students. From YouTube videos, experts talk, podcasts, web articles to open educational resources and MOOCs[3], there is an abundant availability of digital resources to enrich our courses. The selected material in your digital course library can be also labeled or classified e.g. mandatory, additional, inspirational, controversial. It is useful to have categories distributed in a way that makes sense to your course and context.

Provide weekly or module wrap-ups: Point out the highlights of the week, interesting insights from group discussions, results of quizzes, or the main takeaway from the content delivered. These wrap-ups or summaries can be done in form of audio, videos, or text. It is definitely a booster in the teacher´s presence in the online environment and also supports the cognitive learning of the students, bringing contextualization and a better understanding of the course content.

Conclusion

In traditional and remote teaching there is nothing such as one size fits all. The seven practices presented in this paper should be pedagogically aligned, considering the specific course objectives and teaching style. These practices were successfully applied in online lectures but some have been also integrated into face-to-face teaching, for example, using mobile devices or computers in the classroom for quizzes and gamification. They were also a subject of the author's experience at the master level on business-related subjects, but could be definitely transferred into undergraduate and school levels of teaching, in different subjects. On table 1, a compilation of supporting tools is provided.

[3] Massive Open Online Course

Table 1. Supporting tools for teaching and learning online

Collaboration boards	**Polls and Quizzes**	**Video and screen recording**
Google Jamboard	Mentimeter	Loom
Microsoft Whiteboard	Kahoot!	Clideo
Miro	FeedbackR	ScreencastOmatic
Padlet	Socrative	OBS studio
Mural	Google Forms	Camtasia

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3 Virtual project-based learning

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Abstract

In 2020 university lecturers in the whole world had to adapt their teaching to online education due to the pandemic. Teachers using the method of project-based learning were challenged to explore and develop a variety of new teaching and learning methods to translate their principles into a virtual environment. In addition, new digital tools had to be included in the teaching in order for a project-related course to be successful.

This paper presents different approaches that have been developed on how to transfer project-based learning in an online environment, customised for the requirements of the target group and the given setting. It analyses them using the "Gold Standard PBL: Project Based Teaching Practices" by Buck Institute for Education. Best practice approaches derive from focused research as well as lessons learned from different education initiatives at the University of Applied Sciences FH JOANNEUM in Graz, Austria conducted in the period 2020-2021.

Keywords: project-based learning, virtual project-based learning, teaching practices, teaching method, best practice

Introduction

Project Based Learning (PBL) is an experiential teaching and learning methodology that connects content to real-world challenges prompting students to work on projects under real conditions over a period of time to acquire the knowledge and develop the skills required for their professional lives (Krajcik & Shin (2014) pp. 305–306, Buck Institute for Education (n.d.)). Students acquire the content knowledge in a thorough and sustained manner, as well as soft skills like critical thinking, creativity, working in a team and communication skills (Guo et al. (2020), pp. 3–4).

Social interaction and collaboration between students, teachers and external persons are inherent to PBL to achieve the best learning results (Krajcik & Shin (2014) p. 308, p. 314). But due to the pandemic situation in 2020, personal communication and exchange in the classroom were no longer possible and PBL courses in higher education had to be moved entirely online. Due to this change FH JOANNEUM in Graz, Austria, conducted education initiatives on how to transform PBL teaching into a virtual environment, based on the PBL teachings practices by the Buck Institute for Education. This paper summarizes the identified best practices.

Best teaching practices in virtual PBL

The figure below gives an overview of the seven teaching practices areas for virtual PBL. In the education initiatives it was found out that several of the best practices in online PBL courses are in line with the findings of Kumar et al. (2019).

Areas of PBL teaching practices in a virtual environment (Adapted from Buck Institute for Education (2019))

1. Design and plan
    a) In a virtual environment it is so much easier to pull the "real-world" into the classroom by using authentic materials that connect to practice and help students deliver a good quality in their project and even help to prepare them for future jobs.
    a) Various multimedia learning tools can be integrated into online teaching: From communication with experts to news articles to websites, radio show broadcasts, podcasts or videos, etc.

2. Align to standards
    b) When planning a project, it is important to refer to the course standards documents, like a module description or a syllabus and to think about what the students are required to learn during the project. There might not be differences between the standards in a traditional and an online course, but the necessity to transparently communicate the standards is higher in an entirely online environment.
    c) Students need to be informed about the logical workflow of the whole course already at the beginning. An overview sheet including all relevant dates like coaching sessions, presentations, or contribution of external persons, as well as due dates, when students need to hand in specific assignments helps to clarify expectations.

Build the culture

a) At the beginning of a virtual project course, teachers and students should invest some time to discuss and commonly define the desired communication and collaboration habits and practices, e.g., by creating a virtual pin board using Miro or other similar tools or a word-cloud in Mentimeter.
b) To involve everybody and give every student voice and vote, they can introduce themselves with a short video or audio presentation.
c) Once a positive culture is set, it needs to be sustained so students work together in healthy, high-functioning teams. A positive culture can be maintained by giving space for open discussions (platforms), team-activities (digital mind-maps) or quizzes.

3. Managing activities
    a) PBL methodology includes both individual and team activities that should be alternated. Lecturers might ask the students to present the developed products in teams in an online presentation. For the individual work, students might create a reflection on their individual learning journey in a digital storytelling activity like a 2-3 min podcast or video.
    b) Lecturers should schedule special sessions for communication and exchange among the different student teams. In this way, they can learn from each other, share experiences, give feedback, and provide ideas, on how to overcome hurdles.

4. Scaffold student learning
    a) In an online environment teachers can offer a bigger variety of learning opportunities to scaffold every student's learning. On the learning platform or a virtual pinboard, students can access at their own pace diverse learning material and everything that is needed to progress the project.
    b) Another chance to scaffold students learning is a guided reflection process on the development of the project as well as students' individual learning processes, with activities such as e-portfolios or individual e-journaling.

5. Assess student learning
    a) Assessment in a project-based course includes multiple dimensions which will not necessarily change in an online setting, but it gives the possibility to involve more persons in the assessment process. Not only the lecturers evaluate the students, but peers and external experts can contribute to the process.
    b) In the assessment process of an online project course, there are many strategies available like quizzes, presentations, concept mapping, and many more. In addition, feedback protocols should be included on a regular basis to encourage exchange between students and teachers (and maybe external experts).

6. Engage and coach
    a) Engaging students in their learning is an important and sometimes challenging task. To learn more about the strengths and areas where students need to grow, lecturers could do an anonymous self-assessment poll at the beginning of a course, for example with Mentimeter, and ask the students to estimate their level of knowledge

or skills in a specific topic on a scale from 1-5 and find out if a repetition of content is required.

b) Virtual celebrations and events are possible, too, and at the project kick-off, students get engaged when they are required to dive into the project environment by discussing the research question in a forum or creating a project artefact jointly.

Conclusion

Lecturers around the world have demonstrated successfully that quick changes in adapting their PBL teaching into an online environment are possible. To transform the best practices into recommendations additional worldwide implementation are needed. It would be interesting to gain further insights in how far the various best practices are perceived in distinctive cultures and in different study programs.

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4 Online Exams using Moodle at FH JOANNEUM

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Abstract

In this paper we want to give a short impression about online-exams before and during the COVID19 pandemic. At FH JOANNEUM, a separate server was used for online exams, which was only accessible using internal IP-addresses. Furthermore, to prevent students from cheating a user-account were put in place, which was banned to use other websites and programs but the exam. This method is called “Kiosk-mode”. Using this method 311 exams in winter-term 2019/20 were held.

On 13th of March 2020 Covid reached Austria and universities all over the country switched to distance learning. Soon the teachers asked for concepts to create online-exams. The internal exams-server was no longer a practical solution so we started to conduct exams on the main server (virtueller-campus) because its availability from any device also from external computers. In summer term 2020 988 exams were held. Due to the fast-increasing numbers of exams, the e-learning unit started to conduct monthly trainings to help teachers setting up their online exams. The trainings focused on questions types or online exams, didactical background and teachers could express their own questions. A range of videotutorials were also created to support teachers. To implement the Kiosk-mode on private devices from students we installed a plugin called “Safe Exam Browser” (SEB). After testing the system, we implemented it on the main server. During the winter term 1.368 exams were held.

Keywords: online-exam, Moodle, FH JOANNEUM, pandemic, digitalization

Introduction

Our department ZML-innovative learning scenarios took up work in 1998 at FH JOANNEUM. Since 2010 we use Moodle for e-learning purposes. When the e-learning platform launched, the system was mainly used for providing documents like presentations from teachers or further reading material for students regarding their classes. Only 4 study courses started the first term. Over the years more and more teachers started to use moodle to conclude e-learning within their didactical approach in class.

The department accompanied teachers and students from the beginning. Courses were built and trainings offered to ensure support for all regarding both didactical and technical questions when teachers working with Moodle. Soon the first online exams were held on Moodle. The advantages for teachers and students were obvious, such as time savings, shuffling of questions for all students taking the exam, and variety of question types.

Exams on Moodle

At first some teachers implemented their exams within their lecture classes. However, this was inadequate because the server was not established well enough to provide the required bandwidth to ensure that every exam was carried out without failures or system breakdowns.

Online exams before covid

Regarding more and more teachers inquiring proper conditions for exams. The e-learning unit established a server only for conducting exams. In 2012, this separate server was implemented for online examinations in order to guarantee technical stability during an online exam.

This server could only be accessed from the internal network of the FH JOANNEUM and was therefore accepted by more and more teachers as the possibility of cheating was reduced. We developed and offered training courses for teachers to help them create a question bank for their exams.

From July 2019 until February 2020 43 on separate server examinations and 1 entrance examination for master's degree programs were conducted and fully supported by the team. 311 online exams were held without any support.

The e-learning unit provided various support possibilities like help and advice during preparing the online exam, support on site during the online exam, accessibility by phone during the exam and support when it comes to grading and downloading the results.

To prevent cheating during onlin exams, a special PC login was created. This enabled students to open only the exams-server website lab devices. Thus a kiosk mode was created.

Online exams during covid

Circumstances changed rather drastically when the corona pandemic spread. Teacher started again to hold online exams on the regular server and accompanied it with MS Teams since everybody was advised staying at home and working on the exams server was conflicted with its reachability inhouse only.

The e-learning unit started to offer its training about online exams monthly and recorded a series of video tutorials on how to create an online exam and proper questions for it.

The number of online exams went up very fast, the impressive number of 2.348 exams were held during 2020.

Regarding to this another urge rose. Teachers asked for better possibilities to overview and control their students during the actual online exam. Therefore, another kiosk mode had to be found for private computers.

The Safe Exam Browser developed by ETH Zurich was discovered and implemented to the Moodle system. The Safe exam browser enables Moodle to shut down other programs after entering an online exam. However, teachers could allow selected programs students would need for passing the online exam.

Feedback from teachers and students

A great number of teachers and students gave us personal feedback on online exams. On the pro side they mentioned the automated correction of questions, transparency, and fairness during the online exams and that a once created question bank may be saved and used for further online exams.

However, preparing online exams is more time consuming than offline exams. Also, the different devices used troubles both technical support and students and in consequence teachers.

Conclusion

Technical possibilities changed very fast in the recent one and a half years with the ongoing pandemic. Luckily the safe exam browser was evolved as well. This provides more security for teachers while an online exam is conducted. Possible cheating of students is reduced when SEB is in charge during an online exam.

Furthermore, students can work on their onlin exam without distractions. With the SEB enabled no desktop notification will pop up nor the students are able to switch programs. They can solely focus on the online exam.

Still the SEB faces some technical issues. Older devices, devices with virtual partitions running or linux systems are more likely to produce technical problems. Concerning to these problems students with such devices were not able to join online exams secured with SEB.

Digitalization has made fast progress due to the pandemic and its progress will continue to affect our daily lives more and more. Online exams will become a fixed part of studying in schools and universities.

And finally - online learning and teaching is a way to support our climate.

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5 Designing Online Exams between Multiple Choice and WebQuests

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Abstract

Online examination has revolutionized how examinations are being conducted. It has many advantages. Especially in the ongoing COVID crisis online examination ensured educational continuity, providing the students with the opportunity of taking an exam remotely in a secure home environment. Advantages also include that they are environment-friendly, economical, have a quick turnaround time, are easy to use and allow for auto grading. On the downside, professors and students often need to learn new technology and encounter infrastructural and technical barriers. Online exams are more susceptible to cheating, making it necessary to find save solutions like open-book formats necessary.

To counter some of the disadvantages the author suggests using interim and demo tests and to make sure students to have access to alternative technical equipment. Other suggestions relate to using exams, which include randomized tests, webcams, and a time limit. The paper at hand suggests the use of Moodle for setting up exams, following the suggestions above. Additionally, and alternatively, different examination methods, akin to in-class designs, but useable online are mentioned. The paper concludes with remarks on mixing and matching different examination methods.

Keywords: Didactics, Examination, Online, WebQuests

Introduction

COVID-19 has forced educators all over the world to rethink their pedagogical approaches due to changes in the modern teaching environments and – accordingly to redesign their examination strategies. Probably the most relevant question in the sudden shift from offline to online examinations was how to ensure that those students, who enrolled in the courses, are the same then those taking the exams. How can cheating be prevented (White, 2021)? Different solutions have been used to tackle this issue, including moving from exams to research papers (Mohamed, 2021), collaborating in setting up Moodle exams in safe browsing environments (Morris et al., 2021) or using devices such as smart phones to monitor the behavior of students (Tan & Poulsaeman 2021) to name just a few of the most prominent. An avid controversy surrounding the security of all forms of assessment and prevention of academic misconduct was started with very different results and solutions (White, 2021).

The present paper intends to assess the advantages and disadvantages of online examinations compared to classical offline exams and to describe an approach which makes use of the advantages, while trying to circumvent the disadvantages of online examination. It builds on the experience of the author and serves as a case study, which might be used by other educators, who struggle to adapt their teaching to the online environment.

Online examinations: advantages, disadvantages and strategies

Many authors discussed the advantages and disadvantages of online examinations, before (Sarrayrih and Ilyas, 2013) and during the Covid 19 pandemic (Bisht, Jasola and Bisht,2020; Krambia & Spanoudis, 2021). While there is a wide range of advantages and disadvantages discussed, some authors (Chicrumamilla, Sinde & Nguyen, 2020) found that students and teachers agree that it is easier to cheat in an online environment.

Advantages discussed in literature and experienced by the author include the fact that online exams are environment-friendly (no print-out, no need to travel to the university) and economical (they are easy to set-up, can be repeated on short notice, and allow for an at least partial automated feedback). Most important of all: They are possible to be conducted outside the universities, with each student sitting alone in front of their device, an essential asset in times of a pandemic.

On the downside professors and students need to learn new technology, such as new communication tools like MS Teams, Zoom or similar and learning management systems like Moodle, Canva or Blackboard. Often new, innovative teaching and examination solutions are needed, especially when teaching courses, which are less theoretical but more practical in nature (such as laboratories or communication courses). As anything freshly developed, these can easily cause unexpected problems. Students and teachers encounter infrastructural barriers, such as not owing the necessary devices (e.g. at the beginning of the pandemic it was very difficult to get a webcam, if you did not already own one) and find often shaky work-around. Online exams are susceptible to cheating, making it necessary to cope with the issue, for example, in the form of open-book exams or extreme time pressure.

To make use of the environment-friendly and economical aspects, the author has used open book test-batteries on Moodle, which presented single correct choice questions and open questions with a tight time limit. The open-book solution was born by necessity as, after checking all options, it became increasingly clear, that it is very difficult to prevent students from using additional material. This way, all students – no matter if they feel academic correctness to be important or not – have the same possibilities of using support material. Different question styles are important to allow for a healthy mix and prevent students from using strategic and rote learning methods. The integration of open questions also allows the teacher to get a better understanding of the actual capacity of students, even though it comes with the disadvantage ofthe need of individual grading effort (in contrast with automatic correction).

Several strategies have been applied to support the shift to online exams:

Using Interim- and demo tests preferably ungraded, is very important, as both, teachers and students are often not used to the new environment and technologies. It is important for the students to know what they will face in the exams and how exactly the questions will be formulated. If there is time pressure involved, it is even more relevant to be able to experience the setting in praxis. Also, students need to be able to have access to the exam, even if they don't have their own equipment available. For this purpose, seats have been prepared in the computer lab of the university.

Randomization of questions has been used to prevent students from easily exchanging the correct answers, which has – together with time pressure – worked well to prevent this way of cheating.

Webcams and student passes were used to check the identity of the students and to make sure that no one else was in the room.

Time pressure was used in conjunction with the open book strategy to limit the time available to use different sources. Used this way, time pressure essentially limits the amount of information that can be found using the books.

The learning platform used for the describe online examination strategies wasMoodle. It allows rather easy set-up and randomization and providing a few demo-questions for a demo or interim exam was not very difficult.

Conclusion

In agreement with Wooten (2016) it can be concluded that "online testing did not impair students' learning, and if the testing environment is designed correctly, online testing may increase student learning." But no matter how much we try, any examination, which just build on a single method is prone to favor those who excel at it and will be disadvantageous for those who do not cope well. As such it is clearly recommended to mix in other assessment alternative, as in-class papers, web-quests or presentations of solutions, of course fitting the course objectives and methods of instruction. Even the good old in-class participation can work well in an online environment if good solutions can be found and agreed between students and teachers.

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6 Database Designing of Information System for Students' Project Activity Management

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Abstract

Project activity is a method developing students mobile and marketable personality. Including modern technologies into the design of project management activities is a promising approach and allows making the process interesting for the student. This article includes the designing of database of an information system accompanying the process of carrying out project activities by the students.

Keywords: database, information system, project activities, student activity management, elite engineering education.

Introduction

It is necessary to use innovative educational technology in the educational process of a university, permitting to form competitive, mobile, active and independent personality, demanded in the labor market. Project-based learning is one such technique that reveals the creative, design, and engineering skills of a student (Zamyatina (2013) p. 433-4380).

The purpose of project-based learning in TPU is motivation development and preparation for complex project engineering activities, ranging from basic to advanced level of design through the integration of learning outcomes for individual subjects/modules and formation of the basic knowledge and a set of skills required to solve engineering challenges.

The purpose of this paper is to design the database for the information system based on diagrams design , with the purpose of its further implementation as a working tool in the learning process at Tomsk Polytechnic University.

Requirements for organizing project activities

The main objective is the formation of common cultural competencies (CCC) for the Bachelor's degree during development of basic-level projects: ability to work with information, skills and readiness for written and oral communication, leadership skills development, ability to effectively work both individually and as a team member when performing various tasks, development of the ability to take initiative, and many others. Professional competencies (PC) begin to shape during the study of subjects included in carrying out basic-level projects (Zamyatina (2014) p.824-831). An important objective of the project activity basics is to strengthen the motivation of junior students to choose the profile/major within their stream of study.

Project-based learning is recommended for integration into all kinds of students' learning activities at the university. Design forms are determined by the content of the academic discipline/disciplines, the degree of students' preparedness and expected results/competencies.

IS structure and database design

We are going to create the development of an IS for TPU students' project work management and implement this system as an instrument of developing projects within the "Introduction to the project activity" course. This IS should include:

- Project design and the diary tools for project creation and automation of its development.
- Material of lectures for students to repeat, and also for them to have an opportunity to take the discipline course independently.
- Homework, which will simplify verification for teachers and partially automate the process of doing homework for a student.

Forms and reflection to collect information and feedback from students in order to make amendments to the syllabus.

We form a context diagram showing the whole system at the initial stage of creating a functional model. It is presented in Figure 1.

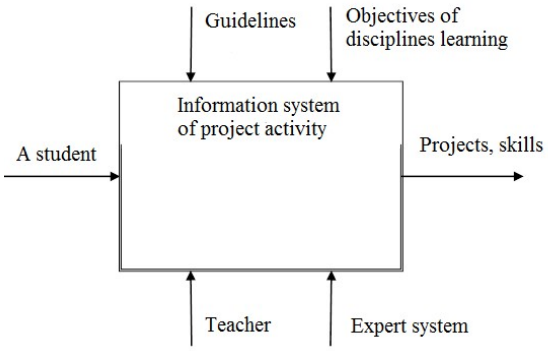

Fig. 1. Context diagram of the process model named "Information System project activity"

We carry out the construction of use case diagrams. Each use case defines a sequence of actions that must be performed by designed system by reacting the system with its interaction with the relevant actor. Use case diagram for the actor "Student", "A representative of a company", "A teacher" are shown in Figure 2,3,4.

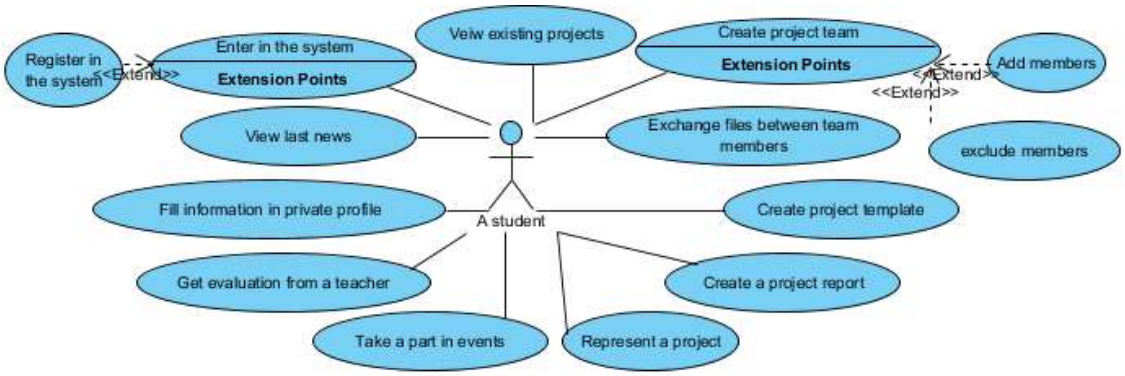

Fig. 2. Use case diagram for an actor "Student"

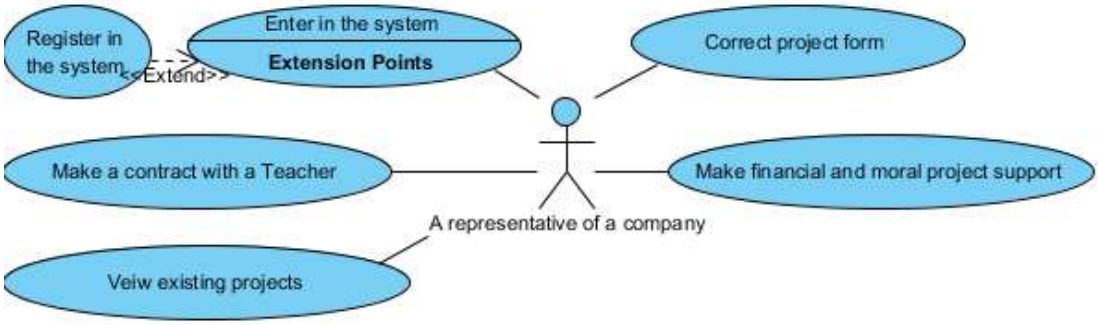

Fig. 3. Use case diagram for an actor "A representative of a company"

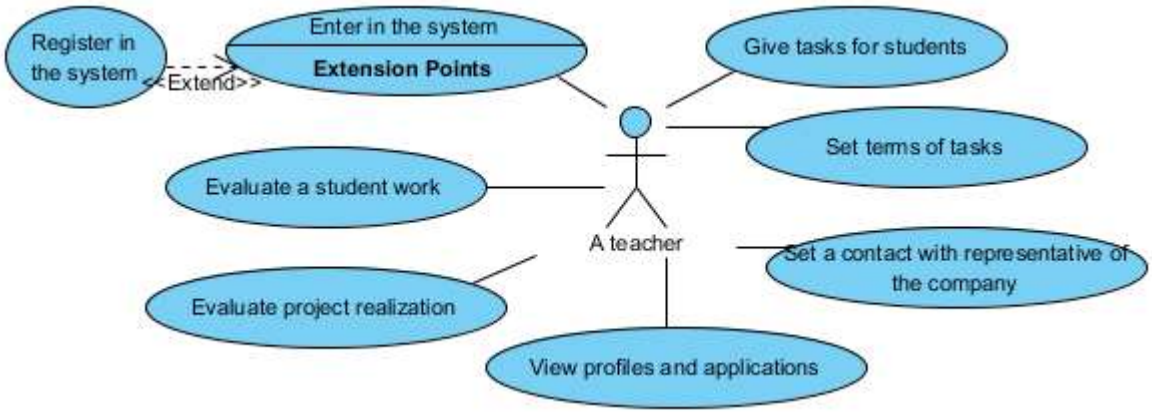

Fig. 4. Use case diagram for an actor "A teacher"

The main objective of the projected database: addition, edition and store information about the student project. We can underline the following objects and their attributes in the project:

- Name of the project.
- Timing of the project (project start date and end date of the project).
- Project Status (current stage of the project: model development, purchasing of equipment, models assembly, etc.).
- Relevance of the project (the text, including the rationale for the project).
- Project aim.
- Target Group (categories of people who might be interested in this project).
- Work plan of the project (main project activities, the timing of activities and responsible for the conduct).
- Project SWOT-analysis (strengths and weaknesses of the project).
- Risks of the project (name of risk, probability of occurrence, impact, prevention of risk).
- Project partners (names of organizations, institutions, representatives of organizations name and contact information).
- Teacher (name, position, scientific degree, academic title, contact information).
- Key project staff (name performers, the group number, contact details).
- Expected results (quantitative, qualitative results).
- Further development of the project (description of the possibilities of using the results of the project in the future).
- Project budget (name of the unit of goods, services, quantity, price).

Status of the project will allow to monitor the level of readiness of the project to the project participants, representatives and teachers.

Defining responsible for individual activities will allow the teacher to evaluate not only the whole project, but also the degree of participation of each representative of project team.

Analysis of the above-defined objects and attributes allows you to emphasize the essence of the projected database and build its Infological model.

ER-diagram of infological model can be represented as follows (Figure 5).

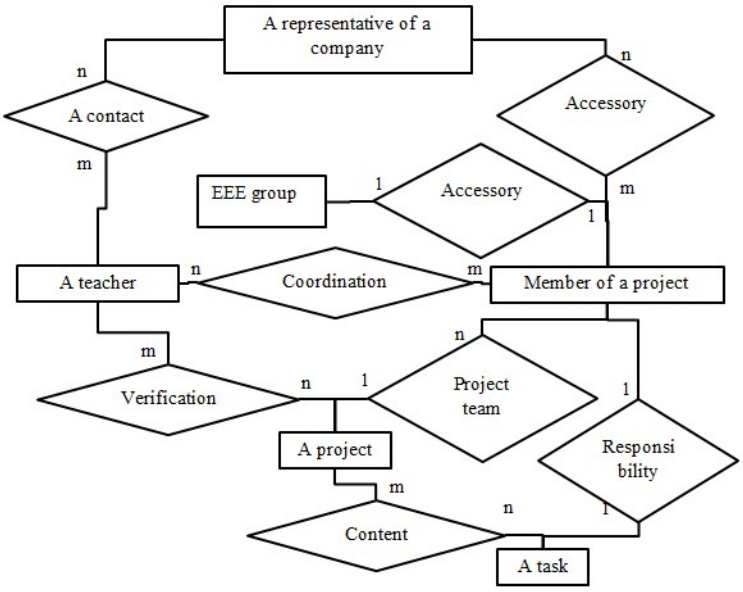

Fig 5. ER-diagram of infological model

Conclusion

The following results were obtained in accordance with the tasks:

1) Determine the expected results and the requirements for the project activities organization of students at the university. Project activities are focused on the formation of common cultural competencies (CCC) on an undergraduate education. For senior students the focus has shifted more towards the formation of professional competence (PC).

2) The tasks are formulated to be tackled by the projected IS. This system will make the process of learning the discipline of "Introduction to the project activity" holistic, create a system, uniting in software to work on a project with the basics in theory, to acquaint the student with the tools of project management activities within the discipline, which will facilitate the process for the implementation of projects in the subject area, make it possible to pass an independent course "Introduction to the project activity" for all.

3) Context diagram, use case diagram is built. Infological system model is designed and described, based on sequence diagrams. The result was the creation of the previous stages datalogical model implemented realization of the model in a relational DBMS MS Access.

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7 Miro as a tool for teamwork online curriculum development.

Daria Popenko

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Abstract

This paper presents the authors experience in using Miro.com for organization of curriculum development by group of teachers. Description of board lining, simultaneous and self working sessions in Miro.com. The experience shows advantages of the tool and options to use its strengths even in offline process of curriculum developmrnt.

Keywords: miro, curriculum development, online education, online team work.

Introduction

Necessity to develop new education programs during lockdown period inspired to search for new online tools for provide support for this process. The author examiner some web services for organizing meetings, structuring and storage of information. Among them: Google jamboard, Zoom, Big blue button, Google disk. In the paper our goal is to structure experience of curriculum development of a short training course on engineering pedagogy by a team of 8 teachers using Miro.com service. This service is a real time white board imitation. Free version includes unlimited team members, 3 editable boards, premade templates, core integrations, basic attention management.

The training course consists of 7 workshops and comprehensively covers all necessary softskills of modern teachers. The development process was divided into several stages:

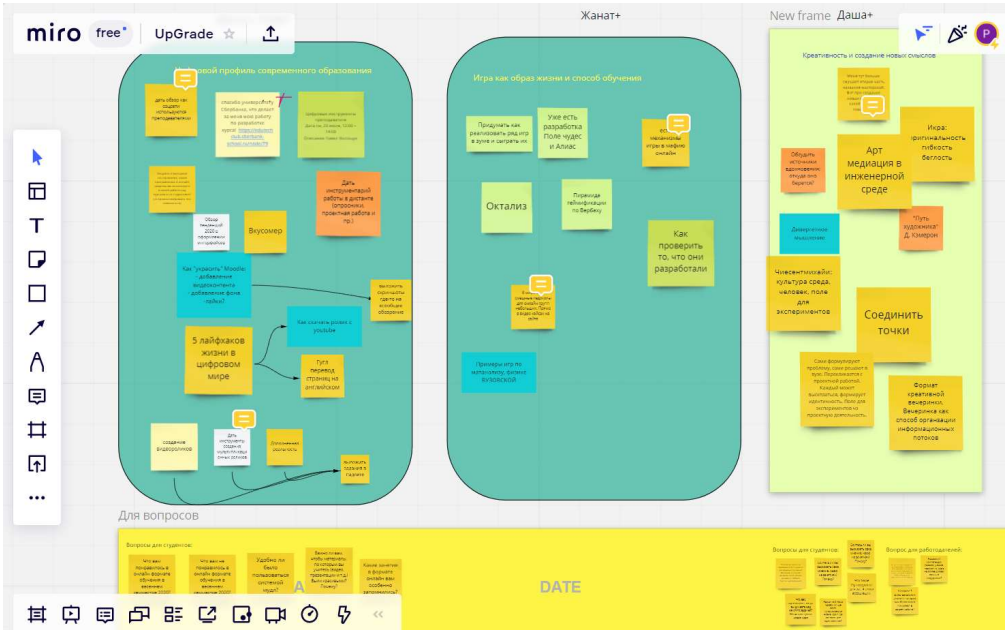
1) Brainstorming of training course consent and defining of workshops.
2) Working on content of each workshop.
3) Review of developed workshops.

Brainstorming of training course consent and defining of workshops.

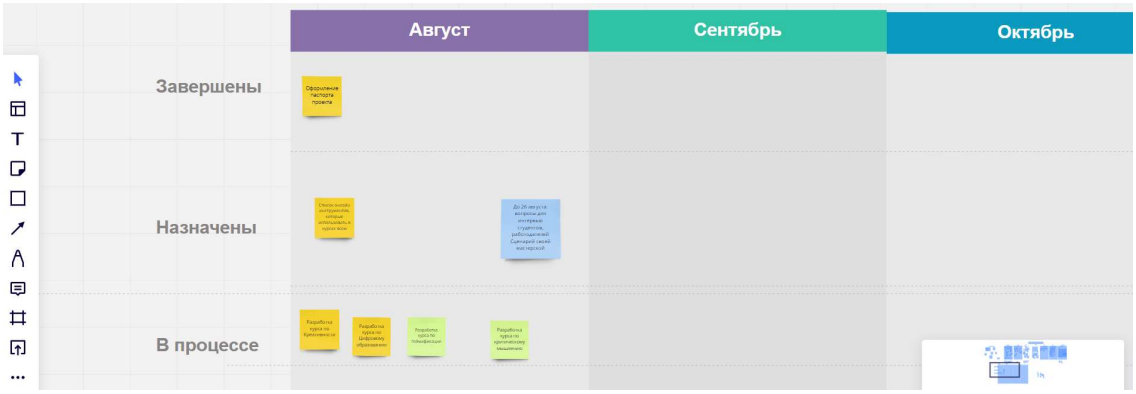
As a communication service Zoom was used. On the Miro board a frame (space to place stickers, pictures, graffiti) “Course concept” was created. Brainstorming leader wrote team ideas on stickers. During all the curriculum design process each team member could add any idea to the frame.

Working on content of each workshop.

For next meeting frames for each workshop were created. Ideas that belonged to a specific workshop were transferred from “Course concept” frame to workshop’s frame. At the second online meeting for 20 minutes team members wrote their ideas for any workshop on stickers. After this stage owner of each workshop announced ideas and decided on the workshop scenario.



We used a board ruling as in SCRAM with lines: finished, assigned, in process. Each team member chose a color of stickers and used it.



Review of developed workshops.

During next stage of curriculum development authors send workshop scenarios to coordinator. Scenarios were placed in google docs and team members had option to comment on each other scenarios for a week. After revision, scenarios were approved.

Implementation of online services for curriculum development allowed to keep communication between team members and keep track of all ideas. Our team made conclusion that such web services are useful and can increase efficiency even with offline working methods.

8 Improvement of the teaching technology of special disciplines in the conditions of the education internationalization

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Abstract

The educational process is constantly evolving and improving in all directions and phases. This is especially true for special courses of technical and technological universities, which, by definition, should reflect the latest achievements in engineering. Despite the huge number of methods and didactic ways of implementing special disciplines at the final stage of preparation of both bachelors and masters, there is no optimal, in all respects, suitable trajectory of the educational process at a technical university that could meet the needs of society and the requirements of leading corporations.

Last events like Covid lockdown and passing to on-line teaching format make abovementioned educational problems more complex, confusing and intractable. In the presented paper, the possible ways to improve the efficiency of the educational process in the preparation of specialists in the electric power industry are proposed and discussed. Many years of experience in teaching and the search for optimal solutions for highly effective teaching of a complex of special courses are summarized.

Key words: blended learning, special disciplines, learning efficiency, teaching improvement, non-traditional approach.

Introduction

One of the problems facing teachers who implement the educational process in special disciplines for foreign students in English is the achievement of an effective learning outcome in a relatively short time. The task is complicated by the different level of basic training received at various universities in the world, forms of education, as well as in some cases, cultural and religious traditions. In the presented article, one of the possible ways to improve the overall efficiency of the educational process at a technical university are considered, based on the generalization of the experience of teaching the discipline "High Voltage Engineering" for foreign students of the Master's degree in the direction of "Electrical Power Engineering and Electrical Engineering". The possible solution of educational problem is proposed. Approach of teaching process improvement based on so-called “united cycle” is discussed. Results of common efficiency offered way are considered. Application of blended learning technologies are analyzed.

The need to modify the content and teaching methods in special courses is dictated by ever-growing demands for the qualification of specialists in Electrical and Electrical Power Engineering, which does not always meet the present-day industrial needs. This fact is a problem faced by almost all of the leading technical universities in the world. Due to joined forces of the teaching community, a new academic discipline has been created, known as Engineering Pedagogy. The principles of this discipline, formulated in 1972 by one of its founders, a professor

at the Austrian Technical University in Klagenfurt, remain highly relevant for the entire university community [1-4]. It is necessary to bring into practice a so-called advanced training of specialists, which implies significant changes at all the teaching levels in special disciplines. The span of more than 12 years of my experience in teaching a number of special disciplines under the Master's Program of the High Voltage Power Engineering Course, as well as the 15 years of my involvement in the academic courses extended to foreign students by the National Research Tomsk Polytechnic University (TPU), makes it possible to form a clear vision of the problems facing the academic process in this particular area. Based on my experience and research of educational practices, I would like to propose some ways to effectively overcome methodology issues encountered by students and teachers worldwide.

In my capacity as a regular supervisor of Master's theses, normally no less than three or four per year, I have had to act as the leader of a team conducting research in the area of creating new methods and means of monitoring the condition of high-voltage equipment. Accounting for the fact that the courses I teach form a basis for students' preparatory work on their Master's theses, I have, in fact, supervised some groups of undergraduates throughout the entire period of their magistracy. Comprehensive and multifaceted training and its analysis over a course of many years, as well as subsequent planning and organizing the educational process involved, have led to the realization of a need to develop and test a new concept of teaching academic disciplines in a full-time Master's program as aimed at reaching a highly professional level of competence for the program's graduates. All of the techniques and methods developed for overcoming the problem situations that tend to arise in the process of education and Master's thesis preparation are intended to be used for a development of methods and educational techniques in the disciplines of my teaching practice.

The **conceptual core** of the educational product in question is a method of synthesis involving all types and forms of teaching special disciplines. As shown by research carried out by the author of this project, an effective technique is provided by a "single-cycle technique". This signifies combining practical training with laboratory work, and subsequently with lectures. In practical classes, students solve problems aimed at developing their ability to calculate such parameters that are fundamental for their training profile, such as electrical strength and insulating structure lifetime. Seminars in the form of tests and conferences are also anticipated. Laboratory work is carried out using actual high-voltage equipment with a voltage level of 10–100 kV. The task of such activities is to acquire the skills of high-voltage measurements in real-life conditions, while testing the electrical strength of various types of high-voltage insulation. The concept of the above educational technique consists in combining two or three types of classes, which is then carried further on to combine 2-3 of the related disciplines in a separate profile.

The process is described as follows: Having completed all the measurements provisioned by the laboratory work plan of around 2-3 hours and having discussed all the results, the teacher and students return to discussing the tasks given at the beginning of the class, as well as the problems encountered while completing the tasks. After measurements have been taken, completion of more involved tasks than those encountered initially does not tend to cause problems. Such a positive effect has always been observed when teaching classes according to the above synthetic techniques. The class ends by work on calculations, followed by preparation and defense of the students' work reports. The total span of time is 4 hours. The results of

analysis based on intermediate and final control points have fully confirmed the high prospects of the above approach.

Lecture and defense activities included in this scheme as seminar-conferences at diverse stages of the entire course will largely increase the effectiveness of the academic process.

In the process of teaching the developed courses, all kinds of problem situations associated with a "negative effect of knowledge polarity" and with a difference in the training levels of students after combining assignments from various special courses is aimed at increasing the overall efficiency of educational activities for all types and categories of graduate students, and, eventually, at increasing the level of professional competencies of graduates and their relevance at the labor market.

The methods of "**symbiosis of one-profile disciplines**" or "**technology of erasing formal barriers**" are synonymous definitions of a recently proposed technique for teaching professional disciplines. The essence of the suggested approach to an academic process is that a number of special courses being the basic ones in the curriculum for a profile are taught by one and the same teacher having all the necessary qualifications. In the process of teaching courses and giving classes of various types, particularly laboratory works and seminars, tasks issued in a certain discipline are continued and subjected to intermediate certification and control in other disciplines.

Our methodological novelty lies in the organic integration of all relevant types and forms of classes into a single cycle under the courses being developed. We are talking about the synthesis of forms and methods of teaching, when a block of classes dedicated to a specific area is presented in the course of a single class lasting 4-6 hours (possibly more, 1-2 days). Our research has shown this approach to be undoubtedly effective and promising.

It should be noted in conclusion that the methods and techniques of Engineering Pedagogy presented above require high qualifications of a teacher, who should be able to provide several special disciplines with a complete and simultaneous arrangement of all relevant types of classes (lecture, practice, seminar, laboratory work) at an appropriate academic level. Only in this case is it possible to implement all of the suggested learning techniques.

Conclusion

Research conducted by the author of the project confirms the effectiveness of the above approach to an academic process: the blending of boundaries between different courses has a positive effect. The author of the project has been involved for about 20 years in teaching a complex of integrated disciplines that constitute the training profile of High Voltage Engineering. The list of these runs as follows: High Voltage Engineering (general course), Breakdown Physics in Condensed Matter, High Voltage Electrical Equipment Insulation (including graduation papers), Lightning Protection.

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9 Creative Efficiency in Online Learning Environment

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Abstract

Competent communication/dialogue with the audience, collaborative teaching, willingness to actively listen to students – here are the ingredients that help the teacher make the audience a more dynamic, interesting and disciplined environment with new opportunities of self-expression and creativity where the student can feel comfortable to fail and face his own mistakes. This may well become a place where the student is ready to take the responsibility and accomplish even more for his own benefit and for that of the whole group. These realities that are typical of active teaching increase their vitality emphatically in an online setting. However, effective communication can be disrupted if one fails to take into account a very important requirement – the academic content must acquire a new packaging in an online auditorium. The content should not be simply transferred to a virtual dimension. Rather, it should be adjusted to new conditions, e. g. through the visualization of the main sections of the academic material.

Keywords: creative effieciency, visualizing, communication, video

Introduction

Having a class online and having an online class are two distinct things. This was made clear towards the end of the first stage of Covid lockdown when teachers came to realize that they should not simply transfer the content to a virtual classroom. Rather, they should adjust it to a newly created environment. This takes huge technical and creative efforts starting from creating a literate communication environment to finding ways to re-format the educational elements and serve them in an attractive way.

The virtual class environment takes much more energy to “digest” the information through the screen than in a real-life setting. This point forces us to re-format the academic content taking into consideration the fact that the audience receives the information indirectly, through the screen, rather than in a traditional setting.

Number one task of any teacher in a virtual class is to visualize the material as much as possible leaving very little information to be conveyed verbally. The student should feel your “tough” presence and stay “awake” throughout all the stages of the lesson.

«In the end, it’s about making active choices to increase interaction with students» (Willermark (2021)). For instance, through the application of the “flipped classroom” you enable the students to discover the material themselves. Afterwards, you can make a quiz using polleverywhere.com competitions and test it in the classroom giving the student a chance to “fight” with the newly acquired knowledge. This is followed by a discussion. Meanwhile, in order to present the new task a second time, the teacher can make a short video by recording himself/herself in the laboratories, for instance.

It should be stated, that a video is one of the best online tools which can make it possible to attract a large number of students. Video making, certainly, is a real challenge for both the teacher and the learner. The knowledge of one's own expertise does not necessarily guarantee his/her knowledge of how to explain and present it to others in a most effective way. This universal truth is further enhanced the moment one is forced to present an address in a visual-auditory format since we attempt to create a somewhat competent communication environment when speaking to a camera. And it's not only about a competent and literate speech. To bring home the message in a visual-auditory product, one should follow the rules set by the screen language. But this is another story.

It goes without saying that all these questions can be answered orally, as well. However, by visualizing the task we are able to achieve the maximum involvement of the students. «Thus, the first step to make learning possible is to ensure the concentration of attention» (Khachatryan (2020) p. 10):

There are a number of other elements which can help achieve creative efficiency in a classroom – competent dialogue/communication with students, collaborative teaching and the necessity to actively listen to students throughout all the stages of interaction. The first step towards efficiency is the competent conversation with the student. He/she should feel that you know why you are actually in the classroom and what you are going to say afterwards.

Collaborative active teaching is a method which enables students to have their visible involvement through the participation in the process of elaborating, transferring and enhancing the necessary knowledge and skills. When students are provided with an opportunity to actively engage in the material they are learning, they become more willing to learn by trying to invest their whole potential. «…active T&L offers a perfect opportunity for changing academic T&L: updating programme and course building concepts, teaching methods and past attitudes» («Innovative and technology-enhanced teaching and learning» (2021) p. 18): Active learning also makes it possible to accomplish another goal in the classroom – to consistently create an environment to fight mistakes and failures.

Listening to students throughout all the stages of communication is a top priority. Take interest in everything that excites or worries them. The teacher must listen to the students attentively regardless of the content and remember the details that are directly or indirectly related to the lesson.

Conclusion

Effective communication in online learning environment is a new challenge. Therefore, using this combination of strategic teaching tools and attaching importance to the packaging adjusted to "emergencies", we offer various learning styles. Besides, we make the lesson a more dynamic, interesting and disciplined environment, where the student does not get easily distracted, is quite conscious of his own rights and duties, does not avoid acting and making mistakes and is ready to accomplish more for his own benefit and for that of the whole group.

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10 Biographies

Lígia Franco Pasqualin

Lígia Franco Pasqualin is a lecturer and project manager in the Institute of International Management at FH JOANNEUM - University of Applied Sciences in Graz. Along with an MBA, Lígia holds a Master degree in International Management, and a bachelor degree in Social Communications. She is responsible for acquisition and coordination of EU-funded projects and her research interests focuses on Innovation in Higher Education, Entrepreneurship and International Strategy. Her teaching experience includes facilitating project lectures with regional and international companies, coordinating and delivering courses on Master level in the topics of Strategy, Business Development and Innovation. Besides academia, she has worked in the advertising business for 8 years in Brazil, where she originally comes from. Altogether accumulating more than 18 years working experience.

Clarissa Maierhofer

Clarissa Maierhofer is a researcher and project manager at the Institute of International Management at FH JOANNEUM Graz – University of Applied Sciences. In addition to a diploma in International Management & Applied Business Languages (FH), she holds a master's degree in Business Education and Development and a project management qualification (IPMA). With several years of work experience in international corporations and longer stays in different countries (Germany, Spain, Egypt, UAE) Clarissa Maierhofer has a solid intercultural practical background. She gained research experience in various EU-funded multinational projects especially in the areas of internationalisation of business strategies, entrepreneurship, entrepreneurship education and competence-oriented education, where her current research interests lie. She is a lecturer in project-based courses such as "Project: International Business Modelling & Community Work" in the 6th semester of the Bachelor's programme "Management of International Business Processes".

Christina Mossböck

Christina Mossböck is heading the ZML E-Learning Service (ELSe) and is responsible for training, documentation and technical support for all degree programmes using the Moodle platform. She trains the participants and tutors of national and international projects in using the Moodle platform and introduces them to their online activities using the online socialisation principles by Gilly Salmon. She also provides and maintains all the required courses.

Erika Pernold

Erika Pernold supports the Social Work degree programme in using the learning platform (helpdesk, training and documentation) and online lectures. Since 2013 she has focused on teaching and learning videos and supports lecturers in the production and use of such materials. She works in the E-Learning Service, where she is responsible for documentations, online

tutorials and supports teachers around video production. She supports students and teaching staff in a range of activities in the field of e-learning.

As a certified e-moderator (Gilly Salmon), Erika Pernold supports participants of courses such as Continuing Education in University Didactics in their learning processes in the virtual learning environment.

Rupert Beinhauer

Born 1970, Rupert Beinhauer holds a doctor degree in Psychology at the Karl-Franzens University Graz (Austria). He is currently senior lecturer and research and development manager at the department of International Management at FH JOANNEUM (University of Applied Sciences in Graz/Austria) and works as a part-time freelance lecturer and trainer, developing workshops and seminars. Working in international educational projects since fivteen years, he has extensive project management experience and is involved in several international projects, providing scientific input and project coordination in a number of multinational research teams.

Fields of interest: intercultural communication; project management; test & questionnaire construction and validation; statistics and methodology; workshop, seminar and curriculum development; blended learning approaches. At the moment he is mainly working at topics concerning cross cultural teaching and quality in higher education.

Zamyatina Oxana

After receiving basic education at TPU (Bachelor's Degree with honors, Master's Degree with honors), she had postgraduate study and got PhD Degree from Higher Attestation Commission of the Ministry of Education of Russian Federation.

O.M. Zamyatina's working experience has entirely been connected with the field of education and TPU. Occupying different positions in the university (started as technician she continued as an assistant lecturer, a lecture, a deputy dean of Faculty of Automation and Computer Engineering, later the head of the Elite Education Department), she made a significant contribution to TPU development since she was directly involved in modernization of the elite technical education system for students.

In addition, received grants for the organization of 7 (seven) summer and winter specialized schools for training TPU students in European engineering universities: 2015, Polytechnic University of Catalonia / Universitat Politècnica de Catalunya, Barcelona (Spain, UPC University grant) 2014 , New University of Lisbon / Universidade Nova de Lisboa, (Portugal, UNL University grant) 2013-2014, Technische Universität Dresden (Germany, DAAD Scholarship / Grant of the German Academic Exchange Service); 2013, Technical University of Munich / Technische Universität München (Germany, TUD University grant).

Has a rich experience of international internships in leading European universities: in 2014, "Development of educational programs based on a competence-based approach and analysis of the needs of stakeholders", Karl-Franzens-Universität Graz University of Graz / Karl-Franzens-Universität Graz (Austria); in 2013, "CRM and ERP Systems", New University of Lisbon /

Universidade Nova de Lisboa, (Portugal); in 2012, "Machine Learning", Dresden Technical University / Technische Universität Dresden (Germany); in 2008, “Modeling and Optimization of Business Processes” and in 2007, “Engineering Education: Program Development, Teaching Materials and Evaluation”, Universitat Politècnica de Catalunya, Barcelona (Spain).

By decision of the Academic Council of the university was awarded in 2016 with Medal "120 years of TPU" and diploma "For significant contribution to the development and improvement of educational, scientific, innovative and other activities of TPU" and in 2011 her name was included into the Gallery of Honor of Tomsk Polytechnic University for making a great contribution to the development of TPU.

Moreover, O.M. Zamyatina was the winner of regional and all-Russian contests encouraging scientists and education leaders where she got.

At present occupies the position of Rector of Tomsk Regional Teachers Professional Re-training Institute (TOIPKRO).

Popenko Daria

Received specialist degree in financial economics in 2009 in TPU. After graduation worked as financial consultant at Contec service and Siemens EP. In 2012 Daria re-qualified to education field and started working as expert in TPU. She focused on facilitation, infographics, information visualization, project activities. Was assistant coordinator of 2 Tempus projects and more then 10 social education projects. At present occupies the position of expert at Tomsk Regional Teachers Professional Re-training Institute (TOIPKRO).

Polina I. Mozgaleva

Polina I. Mozgaleva graduated Tomsk Polytechnic University in 2009 as a specialist in IT. She also has a Master degree in Engineering pedagogy. After graduation she worked as an expert in Department of Elite Engineering Education TPU. Her ain specialization was engineering creativity development and project activities. In 2015 she became a vice rector of Tomsk Regional Teachers Professional Re-training Institute (TOIPKRO). Since 2019 she works as a director of Kvantorium Children Technopark.

Alexey V. Mytnikov

Alexey V. Mytnikov was born on 2 June 1966. He received the M.S. degree in Electrical Engineering from Tomsk Polytechnic University in 1988. He received the Ph.D. degree in 2001. He is an Associate Professor of Power Engineering Institute, Tomsk Polytechnic University (Tomsk, Russia). His research interests focus on power transformer diagnostics, high voltage technologies and engineering pedagogics. Also, he provides f**ull range of special courses** for bachelor and master teaching specialization “High Voltage Power Engineering”, including lectures, practices and workshops. New technology of winding condition control, which is based on the nanosecond probing impulses, is the result of his experimental work. New diagnostic complex has been designed and engineered. Simulations are a useful tool but as Hippocratos

once said: “Clever man is not who knows a lot, but whose knowledge is useful”. I follow this motto now.

Associate Professor Alexey V. Mytnikov published more than 70 scientific articles.

Nane Vardanyan

Nane Vardanyan is an Associate Professor at Yerevan State University (Armenia), Journalism Department, Chair of Printed and Broadcast Media. She has been teaching there since 2001. She received Ph.D. degree in 2006. Nane Vardanyan has got more than 20 years of experience in the fields of Radio, Television and Magazine. Topics of interests are: First Person Journalism, Style Revolution in Media and Comfortable Communication, Photography - another destination in professional searching… The knowledge and experience she tries to transfer are based on the saying by Dalai Lama: “Know the rules well, so you can break them effectively.” The issues of T@L have been always within the scope of her interests as well. Literate communication with the audience, active collaborative learning, willingness to actively listen to the student: here are the main issues she has on her mind before and after entering the classroom every day.