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MODERN LEARNING TECHNOLOGIES IN GERMANY

T. I. Pantiuk*, A. V. Dynovych**

The article describes the terms definitions "learning technologies", "mixed learning", "online learning", "virtual learning", "extended learning"; the modern technologies influence on the classes conduct and the information assimilation by students are analyzed; programs used during the educational process in Germany are researched. It is determined that Germany is one of the leading countries in the implementation of innovative modern technologies in the educational process.

Technical capabilities in the field of e-learning are constantly expanding and adapting, and that fact can lead to new concepts of learning. Modern learning technologies constantly enrich students, but blind trust in technological process creates new problems. Despite modern issues, the pandemic, the significant increase in the number of immigrants, Germany remains a country that does not completely neglect conventional methods of education. New learning technologies are more likely to be seen as complementary to existing and proven learning methods. A wide selection of study methods, that can be individually combined to form a full study plan, is ideal for students of higher educational establishments. All in all, the goal of the learning process is to teach students as quickly and deeply as possible.

It is established that Germany is actively introducing elements of virtual reality and artificial intelligence into the educational process, as they are extremely interesting for today's youth. The possibilities of creating conditions for combining online and offline learning are being actively tested in order to achieve the highest results in training of highly qualified employees.

The development of learning environments and learning concepts with the digital educational media integration should solve educational problems with the help of using technical capabilities. The variety of software greatly facilitates communication and work with students, and therefore German lecturers actively use various applications and, as a result, involve students in active work and collaboration.

Keywords: *learning technologies, mixed learning, online learning, virtual learning, extended learning, offline learning.*

* Doctor of Sciences (Pedagogy), Professor
(Drohobych Ivan Franko State Pedagogical University)
pantyuk.tetiana@gmail.com

ORCID: 0000-0003-0672-9663

** Postgraduate Student
(Drohobych Ivan Franko State Pedagogical University)
anyash26@gmail.com

ORCID: 0000-0002-8678-3311

СУЧАСНІ ТЕХНОЛОГІЇ НАВЧАННЯ В НІМЕЧЧИНІ

Т. І. Пантюк, А. В. Динович

У статті охарактеризовано дефініції понять "технології навчання", "змішане навчання", "онлайн навчання", "віртуальне навчання", "розширене навчання"; проаналізовано вплив сучасних технологій на проведення занять та засвоєння інформації студентами; досліджено сучасні програми, які використовуються під час освітнього процесу в Німеччині. Визначено, що Німеччина входить до країн-лідерів по впровадженню інноваційних сучасних технологій в освітній процес.

Технічні можливості в області електронного навчання постійно розширюються та адаптуються, що може призвести до нових концепцій навчання. Сучасні технології навчання, безумовно, збагачують усіх учнів, але сліпа довіра до технічного прогресу породжує нові проблеми. Незважаючи на сучасні проблеми, пандемію, вагоме зростання кількості переселенців, Німеччина залишається тою країною, що не повністю нехтує звичайними методами навчання. Нові технології навчання, швидше за все, розглядаються як доповнення до існуючих і перевірених методів навчання. Широкий вибір методів навчання, які можна окремо об'єднати, щоб сформувавши повний план навчання, ідеально підходить для студентів вищих навчальних закладів. Зрештою, мета навчального процесу полягає в тому, щоб навчити учнів якомога швидше та глибше.

Встановлено, що Німеччина активно впроваджує елементи віртуальної реальності, штучного інтелекту в освітній процес, оскільки вони є надзвичайно цікавими для сучасної молоді. Активно тестуються можливості створення умов поєднання онлайн та офлайн навчання, щоб досягти найвищих результатів у підготовці висококваліфікованих співробітників.

Розробка навчальних середовищ і концепцій навчання з інтеграцією цифрових освітніх медіа полягає в розв'язанні освітніх проблем з використанням технічних можливостей. Різноманітність програмного забезпечення значно полегшує комунікацію та роботу зі студентами, а тому німецькі викладачі активно використовують різноманітні додатки та, як результат, залучують студентів до активної роботи й співпраці.

Ключові слова: технології навчання, змішане навчання, онлайн навчання, віртуальне навчання, розширене навчання, офлайн навчання.

Introduction of the issue. Learning technologies are an integral part of the educational process, as they are aimed at achieving the highest result in the highly qualified employees training. The technological approach contributes to the improvement of learning activities, its optimization, effectiveness, activity, interest in performing work and tasks, instrumentality, and intensity.

Germany is a high-tech country, so there is no doubt that teachers use only leading learning technologies. Technological progress supports not only the economy, but also the e-learning sector. Educational content is delivered in digital form, from video to learning management systems in all industries. More and more higher education institutions are showing great creativity in their efforts to offer fully immersive learning through virtual and augmented reality.

Current state of the issue. Ukrainian researchers and scientists V.Yu. Strelnikov, I.G. Britchenko, S.O. Sysoeva, T.I. Nosenko, and O.M. Markova actively deal with problems and topical issues in the field of learning technologies. Scientists are studying the evolution of computer technologies and their active use during the educational process. Svitlana Sysoeva describes interactive learning technologies for teachers of formal and informal education systems, gives examples of the case method use and presents a comparative analysis of the most common distance learning systems.

Thomas Köhler and Jorg Neumann [8] deal with topical issues of modern technologies among German scientists. Scholars focus their attention on the digital media integration in teaching and research, as well as their impact on the quality of education. They consider new

approaches: from the e-learning implementation to e-science.

Ulrich Dittler [5] tries to find the golden mean between online and offline learning, to determine the role of modern technologies in didactics, to compare the pros and cons of e-learning from the students' and teachers' point of view. Research scholars include empirical research findings, theoretical approaches, case studies, and reports on the implementation and integration of didactic and technological trends in teaching and research.

Claudia Bremer and Detlef Krömker [4] in their article "E-Learning zwischen Vision and Alltag: zum Stand der Dinge" examine learning environments development using the example of an ePortfolio solution for dual learning. According to the Design Based Research approach, the ePortfolio solution can be used to improve the training quality in commercial and technical professions and to improve the communication between students and lecturers. The purpose of research development is to strengthen the learning personality in the process of assimilation and reflexion of knowledge and skills. Moreover, ePortfolio development shows how qualitative methods of an agile software development approach (user stories, crowd testing) can be implemented to increase user acceptance.

We can define Hans-Peter Blossfeld [3], Wilfried Bos [3], Hans-Dieter Daniel [3], Bettina Hannover [3], Dieter Lenzen [3], Tina Seidel [3], Susanne Robra-Bissantz [10], Oliver J. Bott [10], Kevin Neu [10] and many others as there are lots of German scientists interested in the modern learning technologies implementation.

Aim of research is to investigate and to analyze the modern learning technologies in the German higher education system, to demonstrate their implementation during the educational process and evaluation of their effectiveness.

Results and discussion. The main goal of learning technologies is to provide students with educational material and

its active assimilation. Among the leading learning technologies characteristics, we highlight:

- systematicity (the interrelationship of educational material with the target workload of students);

- scientific significance (only scientifically based facts that are not open to doubt);

- reproducibility (specific actions algorithmizing that ensures the goal realization and technology easy reproduction by any subject of the educational process);

- efficiency (evaluation of the given goal by the obtained results);

- motivation (cognition construction as a system of cognitive tasks and problem situations aimed at forming internal motivations for learning and independence of students);

- informativeness;

- optimality (the didactic process optimization, its economy, the planned results achievement in the shortest possible time);

- compliance with the law (establishing the knowledge compliance about methods and means of teaching technology organization with the laws and regularities of the didactic process functioning) [1].

If we take a closer look at modern learning technologies, we will see that technological progress constantly affects the methods of presentation, assimilation, and knowledge testing. Students spend more and more time in front of a computer, tablet or phone. Moreover, global conditions and the Covid-19 pandemic have made adjustments to the learning process, and the world has immediately switched to accessible methods of transferring materials, even without the presence of a student in person.

Modern teachers of German universities actively implement blended learning, and therefore work on the electronic resources development and presenting materials methods. But they do not forget about face-to-face training, because only together this approach will be able to show significant results. If you

consider online and offline training separately, the results of online training will be significantly lower and often unprofitable.

There are different forms and types of **learning** and **teaching** technologies. Teaching technologies are used during the educational process to make the presentation of new material easier and more interesting. They include different media tools integrated within Learning Management Systems and they

sometimes may be used independently, or without a lecturer's support.

Learning technologies are used to deliver all the necessary information while learning to make communication with lecturers and students better, they try to improve teaching and assessment processes.

German universities present various learning and teaching technologies. We offer to look closer at them in more detail in the table [11].

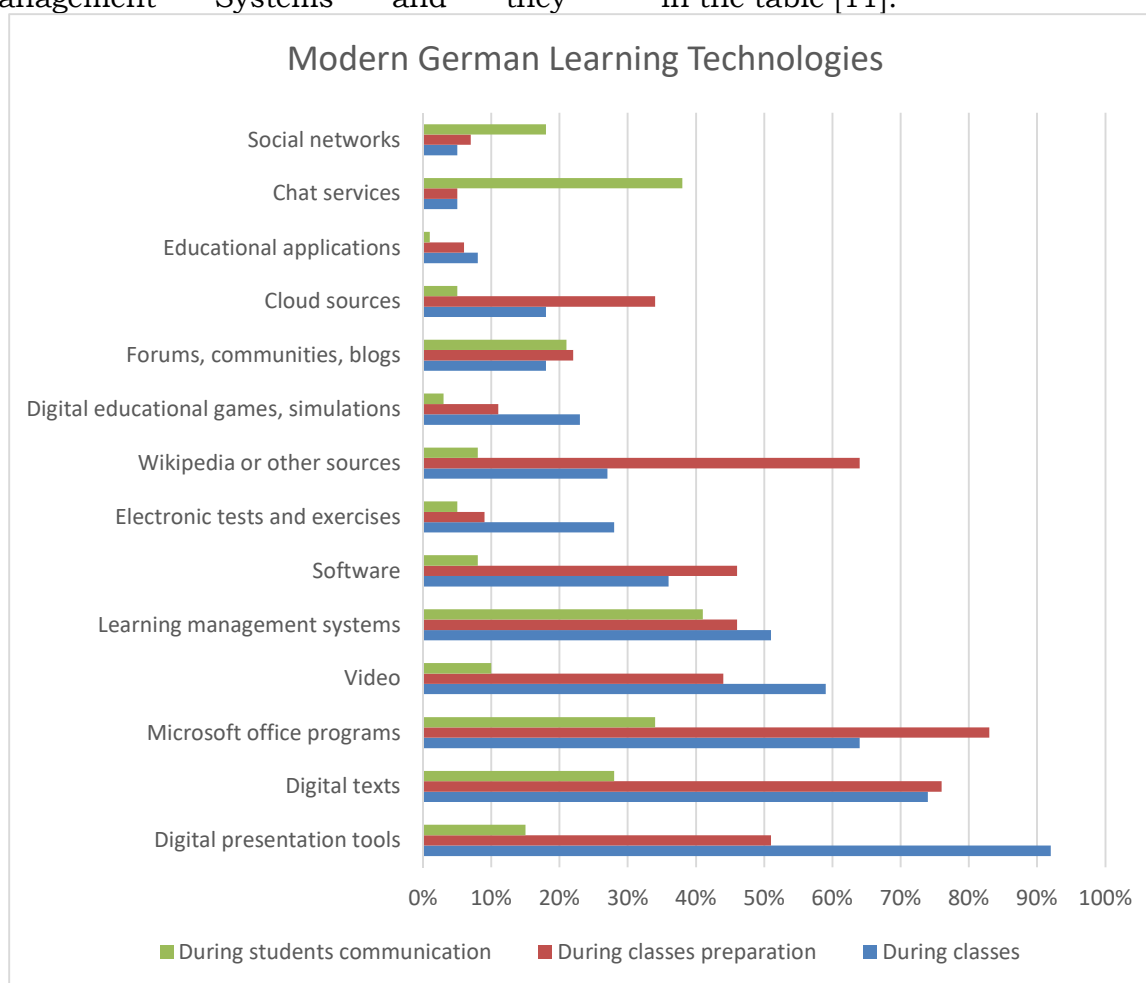


Fig. 1. Modern German Learning Technologies

It can be seen from the table that we have considered three types of technologies used in the educational process: 1) during communication with students, namely means of information transmission, additional resources; 2) during preparation for classes; 3) during classes: illustration and demonstration of new material, checking the quality of acquired knowledge assimilation.

Social networks (18%), chat services (38%), cloud resources (35%) and learning management systems (41%) are actively used for productive communication with students, in particular, it can be a student's personal office on the official platform of the university with his unique access key [11].

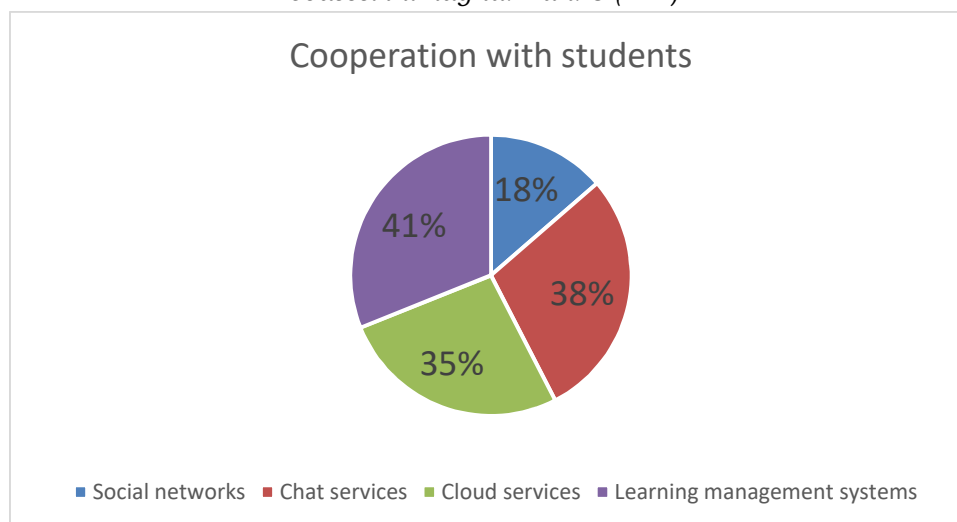


Fig. 2. Technologies that are used to communicate with students

During classes preparation teachers and students actively use digital presentation tools (51%), digital texts (76%): as a rule, the text of lectures,

which students work out independently, Microsoft Office programs (83%), videos (44%), Wikipedia and other sources of information (64%) [11].

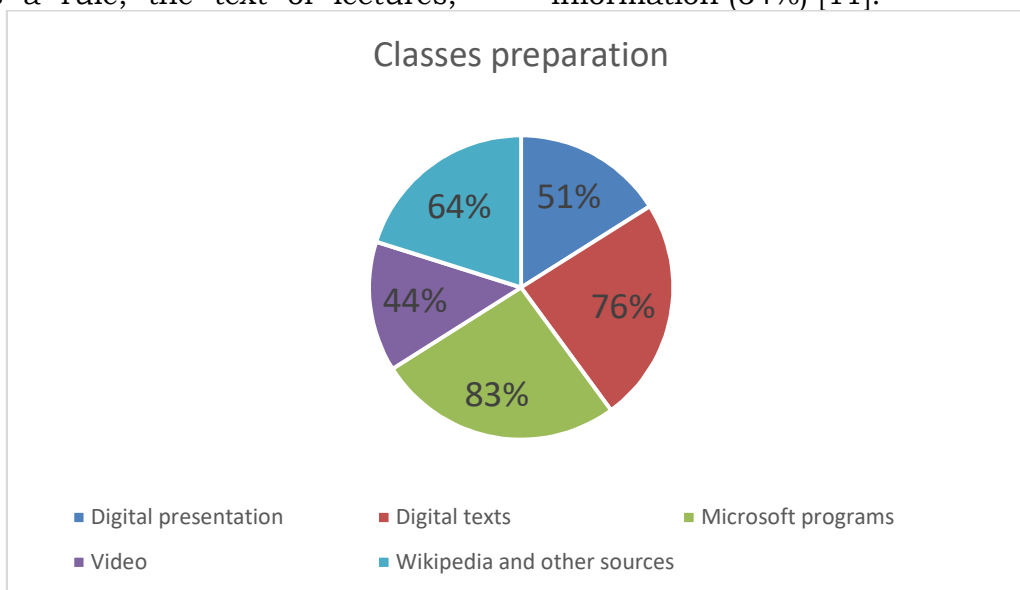


Fig. 3. Technologies that are used for classes preparation

Digital presentation tools (92%), videos (59%), electronic tests and exercises (28%), forums, communities, and blogs (18%) are used face-to-face during classes. They are quite popular

among students of all ages. However, they bring an entertaining character to the educational process for the majority of students [11].

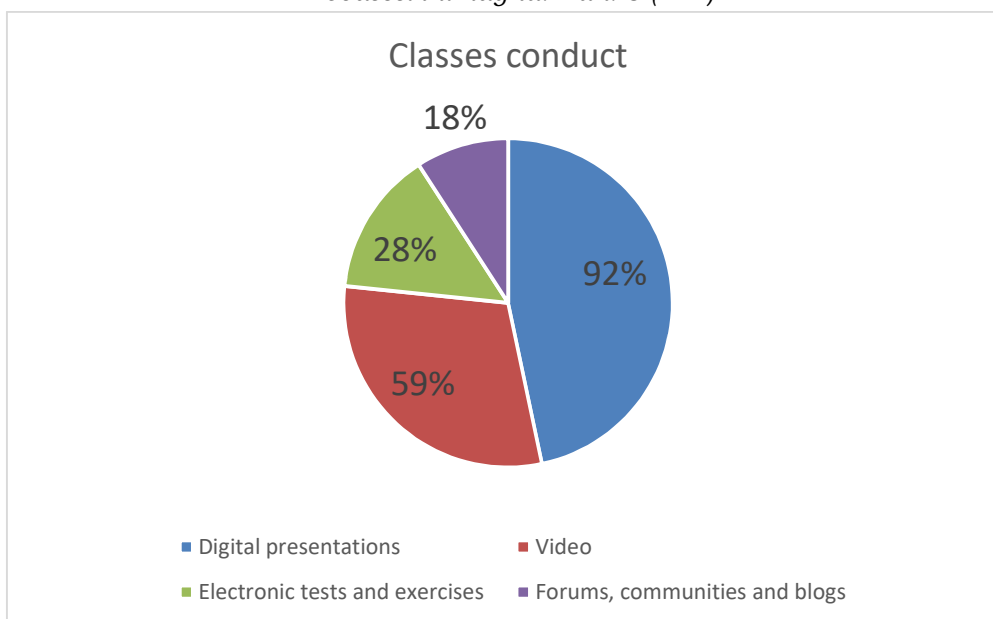


Fig. 4. Technologies that are used for classes conduct

In today's environment, everyone learns individually: while some students do best with information in a text form, others need visual materials to learn. Some people better perceive information in parts. Modern learning technologies represent a new learning model that covers different aspects of learning: on the one hand, everyone can learn at their own pace, but on the other hand, students are exposed to methods that force them to look at the material from a new perspective. Certainly, if e-learning concepts are combined with face-to-face learning (for example: blended learning), students can delve deeper into the material. In addition, e-learning technologies are flexible in terms of time, which makes them especially valuable.

More and more higher education institutions are using learning technologies that reflect the trends of the time. Informal and mobile learning take the first place, where the main attention is paid to practice. There are almost no signs of traditional learning strategies in mobile learning, as new technologies are mainly used. Performance maintenance plays an important role in the way that this training method can be used in specific situations. There is also a lot of work going on in applications and artificial intelligence to extend these

learning technologies and make them fit for the future [9].

In standard software development for learning or teaching material, the student plays a leading role in defining the requirements and can indicate, from his own perspective, what features need to be implemented for successful collaboration. Assumptions about the implementation of a program for a target group are often based on marketing analysis, psychological research or highly subjective experiences and expectations. Learning applications supported by software are often created based on observations and analyzes made in the context of learning and teaching.

Sometimes we can observe deficiencies in the communication and material perception by the student, which must be compensated by a software or media application, or the ability to optimize the learning process, which is perceived with the help of a computer application. In any case, the goal of developing these innovations is the student himself, as it is about his learning process, his learning progress, his skills and their optimization. No doubt, it is necessary to clearly formulate the requirements for the future product when developing educational environments. University frameworks, different teaching

commitments and the heterogeneous demands of study groups are variable requirements that are difficult to understand during initial analysis. That is why various factors that are generalized for all participants of the educational process are taken into account.

The research approach to the development of educational media pursues two main goals:

1) learning environments are completely designed by the example of rapid prototyping. We mean prototypes that are developed in short cycles, and then their use is analyzed. Further developments are carried out in the redesign stage and analyzed again until the finished program is created;

2) theories must be formed to solve practical problems of teaching and learning. The mechanisms, methods, processes, and intermediate outcomes used are documented and described, resulting in theories or 'prototheories' of learning [4].

The classic software development process assumes that the requirements for the particular program are known before the development begins. The designed product is developed in accordance with the contractual agreement between the customer and the executor. Insights and learning processes of those participating in the project can only be considered in absentia, when explaining, since individual stages are considered equally passed. Problems often arise during the software implementation because the formal, cultural, institutional, and personal aspects of the application environment have not been taken into account. We understand that the user does not like the software or cannot work with it productively [4].

It should not be forgotten that every technological innovation serves only as a tool – neither an application nor a computer program can replace the will and interest in learning. However, there are good reasons why learning technologies are so successful and productive.

New concepts are based on scientific findings that are the result of research into cognitive processes. Psychologists constantly offer new ideas about the complex processes that occur during learning. This is also where the field of learning analytics comes in, which evaluates important learning-related data. The data is used to tailor courses to individual learning needs and thus offer learners an optimized outcome. This is why e-learning courses are so successful: they take into account the individual needs of students. If such a course is also combined with offline activities, the result is mastery of the complete training program.

Learning technologies require adaptation and this is a well-known fact. Despite technological advances, if you reproduce certain information with a given structure, the result of the information absorbing remains the same whether it is an app, a website or a podcast. Educational content often falls by the wayside because it is not adapted to new technologies, and this in no way contributes to a better learning outcome. Moreover, if the application or website is not equipped with optimal usability, the learning process is not guaranteed in any way. Therefore, when using new learning technologies, a holistic approach that takes into account all factors is necessary. A gamification application that allows for playful learning through quizzes and fun questions can only work properly if usability is taken into account and individual learning units are presented in such a way that they form a logical thread. The same applies to learning with the help of augmented or virtual reality: on the one hand, so-called "immersive" learning depends on the functionality of the software, but the content of the course must still be logical and structured in order to have a positive impact on the students.

For many students, the transition to new learning technologies can be a daunting task. Therefore, it is advisable to stick to the blended learning concept for a certain period and only slowly shift

the focus to the e-learning component. Face-to-face activities should never completely disappear from the curriculum, but they can be kept to a minimum.

Conclusions and research perspectives. We see that higher educational establishments in Germany use or try to use advanced modern technologies to improve the material study, student evaluation, various types of events and, above all, independent development and self-improvement. It's a well-known fact that the modernity and professionalism of the university depends on its prestige and the reputation comes from the feedback of students.

It goes without saying that the use of modern applications, the introduction of online elements for better material learning will also be useful for Ukrainian higher education establishments. We note a significant growth level in success and establishing communication with students thanks to modern technologies.

The introduction of modern learning technologies in Ukraine will improve the awareness level of students in key areas of their course, especially considering the today's conditions. We see the need to

increase the use of cloud services, educational applications, social networks, learning management systems, and that is why it is necessary to start working on software that will correspond to the specialization of a higher educational establishment.

New learning technologies help to make higher education and professional development courses more interesting and individual. However, new forms of education should not be considered as the final answer to all questions. As always, the human factor cannot be neglected here, because all in all, every e-learning course is about imparting knowledge. And it is possible only under the condition of observing certain basic rules and relying on scientific principles when creating an electronic training course. Modern learning technologies are a great complement to traditional learning concepts and they are constantly changing. Therefore, it is more important that you are always up to date and constantly expand your knowledge with new research and discoveries. This is the only way to create web-based courses and learning programs that students can truly benefit from.

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