# E-learning Strategy in the Elaboration of Courses

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**Abstract:** *E-learning is an approach to the design, development, and implementation of courses for students in Higher Education. Often in the e-learning concept emphasis is placed only on some components, depending on the experience of those involved in the reasoning. Course developers need to adopt an appropriate definition of this concept and then follow a well-thought-out strategy for implementing it. The e-learning strategy is not always made explicit in curriculum policy documents. It is assumed that academics implement one strategy or another implicitly as part of their professional competences, although this is neither obvious nor true. To ensure a quality process, the e-learning strategy must be explicitly included in the curriculum documents and discussed with those who will implement it. This article describes the strategy for developing and implementing a blended e-learning course. The stages of the strategy are listed, presented, and briefly exemplified. The importance of establishing the e-learning strategy and the awareness of the relevance of each its stage by all involved academics is emphasized.*

**Keywords:** Course design, E-learning strategy, Blended approach, Digital resources.

## 1. Introduction

The term e-learning was first mentioned in 1999, in a computer-based training lecture and referred to a strategy for acquiring knowledge and skills through digital channels like the Internet and other electronic media (Bouchrika, 2022). The concept was adopted very quickly by academics and is used worldwide since the beginning of the 21st century. There is no single definition of the concept of e-learning. Analysis of different resources – monographs, studies, manuals, articles – mainly in English, revealed the existence of a multitude of definitions for e-learning, with varying degrees of interference between them. Besides, the

concept of e-learning is often misunderstood in various contexts, for multiple reasons, because it refers to different constructs, and sometimes because it is interpreted by professionals from different domains.

The e-learning approach is employed intrinsically nowadays in the design of courses: traditional, blended, and online. This integration assumes the recognition and adoption of a relevant strategy, which should describe the goal of the e-courses, the desired results, and the way of achieving those results under the available institutional resources (Clarke, 2003). The analysis of the policy documents related to education at the governmental level revealed a vague reference to Information and Communication Technologies (ICT) concepts, and the terms e-learning and e-learning strategy are missing there (Ministerul Educației și Cercetării al Republicii Moldova, 2022). These terms are mentioned in some way in the strategic development documents of the universities with which we are affiliated.

The State Pedagogical University policy declared the following objectives (Universitatea Pedagogică de Stat "I. Creanga", 2021):

- Increasing the degree of use of ICT in the didactic process, including the use of educational platforms;
- Consolidation of the e-learning education system within the University through the development normative framework, the development of didactic support for the management of digital tools, creating the conditions for the provision of distance educational services, etc.;
- Implementation of e-courses, on the institution's MOODLE platforms, Google Classroom.

The Technical University of Moldova (TUM) laid out the following objectives (Universitatea Tehnică a Moldovei, 2021):

- Diversification and expansion of the educational offer that takes into account national and international trends (ICT, Industry 4.0, FinTech, smart technologies, green technologies, data science);
- Promoting the use of digital tools and resources in educational processes, the continuous development of e-learning and videoconferencing platforms, and the digital library "Online Lessons" (at least 2000 hours recorded every year);
- Reforming part-time education and introducing distance education by applying the experience of online education.

The translation into English of the mentioned objectives follows the original text in Romanian, without any editing. The terms used in this context denote that clarification and a more or less exhaustive description of their meaning in relation to the e-learning concept are needed. The majority of academics have a relatively low experience in the field of ICT and are not familiar with the subtleties of new e-terms; the incomplete or incorrect interpretations of the e-concept have as consequences serious mistakes and/or confusion when designing and implementing

e-courses. As the term *e-learning strategy* is absent from policy documents, this means that education stakeholders assume that academics should implement one or another strategy implicitly as part of their professional competences, although this is not a simple task under these conditions.

In this article, the authors briefly analyse the e-learning concept and describe the steps inherent in an e-learning strategy. The strategy is exemplified by the design and implementation of an e-course in the blended format at TUM.

## 2. E-learning Definitions

There are many definitions of e-learning: provided by the developers of technologies and they stress the role of the technology; offered by organizations and governments which emphasize the role of policies in the field of ICT; provided by academic institutions with a focus on the educational aspect. An international project (Sangrà et al., 2012) carried out a research study under the auspices of the Open University of Catalonia, Spain, with the participation of worldwide experts, having the aim to identify and adopt a unique definition for e-learning. According to this study, the e-learning definitions collected from specialized literature can be grouped into four categories: 1) focused on technologies; 2) based on learning content delivery systems; 3) communication-oriented; 4) based on the educational paradigm.

E-learning definitions focused on technologies. These come mostly from private companies and emphasize the technological aspects of the e-learning concept, the other characteristics being considered secondary. These definitions describe the term e-learning as a use of technology for learning. Examples (Sangrà et al., 2012):

"E-learning is the use of technology to deliver learning and training programs".

"E-learning is to take a course online using a modem, wireless, or cable connection to access academic course material from a computer, phone, or handheld device".

E-learning definitions based on content delivery systems. In these definitions the concept of e-learning is represented as a means of accessing knowledge (through learning, teaching or training). The focus of these definitions lies in the accessibility of resources, but not in the achievement of results. Example (Sangrà et al., 2012):

"E-learning is the delivery of education (all activities relevant to teaching, and learning) through various electronic media".

E-learning definitions based on Communication. In these definitions it is considered that e-learning is a tool for communication, interaction, collaboration; other characteristics of the concept are secondary. Examples:

"E-learning (sometimes called web-based training) is anywhere, any-time instruction delivered over the Internet or a corporate Intranet to browser-equipped learners".

E-learning definitions based on the educational paradigm. These definitions interpret the concept of *e-learning as a new way of learning or as an improvement of an existing educational paradigm*. Most of the authors of these e-learning concept definitions are from the academic field. Examples (Sangrà et al., 2012):

"E-learning refers to educational processes that utilise ICT to mediate synchronous as well as asynchronous learning and teaching activities".

"E-learning is defined as ICT used to support students in improving the learning process".

The definition reached by the authors (Sangrà et al., 2012) following a systematic analysis and research methodology:

"E-learning is an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning."

This definition embraces all the mentioned characteristics, but the phrasing is not final. The general conclusion of the study (Sangrà et al., 2012): „E-learning is part of a new dynamic, which characterizes educational systems at the beginning of the 21$^{st}$ century, resulting from the merging of different disciplines, such as computer sciences, communication technologies and pedagogy, given that all definitions contain features from more than one discipline". Consequently, the concept of e-learning will continue to evolve for a long time. In today's world, learning needs change very quickly, and the concept and functions of the e-learning concept must be adapted continuously to these needs.

Researcher Kennet Fee (Fee, 2009), who carried out an extensive analysis of the e-learning concept, reached a similar definition:

"E-learning is an approach to learning and development: a collection of learning methods combined with the use of digital technologies, which provide, distribute and enhance the learning process."

From these definitions, it is concluded that the e-learning concept has four components:
1) learning content, 2) technology, 3) learning design, and 4) communication.

All these components are interrelated and should be interpreted holistically in an integrated approach. For instance, the content of any course is important, but it would be wrong to put it in the first place. Adherents of technological definitions often underestimate the learning process, interpreting it as the manipulation of content. Sometimes, ICT providers emphasize the primacy of content to flatter buyers and promote their technologies. They consider learning as a process of transmission of knowledge from sender/teacher to receiver/student. In their

reasoning, e-learning is just the combination of technology and content, and many actors in the field of education have the same opinion. The educational policy documents mentioned in the introduction are in line with this statement.

This interpretation represents a suitable formula for making the content available electronically, including online, but learning requires much more. The information available in the electronic version is not knowledge; moreover, the content does not lead to the development of skills necessary for an individual to be employed. It is not enough to simply make the content available digitally to achieve learning results. It is necessary to understand how people learn and how the learning process should be directed as effectively as possible to achieve the learning outcomes. An effective learning process is a combination of technology, meaningful content, and effective learning design, accompanied by an effective communication process between the subjects involved in this process. These components complement each other and must be carefully combined: the learning design must make the most of the content, and the technology must support both the content and the learning design, as well as the communication if performance results are to be achieved.

## 3. E-learning Strategy Concept

The e-learning strategy represents guidelines for effectively designing, facilitating, and delivering an e-learning program. The reason for an e-learning strategy is to define the goals for the e-learning program (course) and then logically explain how the institution or faculty proves that the goals have been met. The e-learning strategy is a plan in the form of an educational policy document or a guide, which should describe the goal of the e-courses, the desired results, and the way of achieving those results under the available institutional resources. Teaching and learning within an e-learning approach is challenging, even for experienced teachers. It is crucial that the university stakeholders and the course developers have a deep understanding of the e-learning approach in order to design a strategy and implement it in courses. In this section, we will describe shortly the essential steps for an e-learning strategy (Moore, 2007).

The elaboration of an e-course should begin with a needs analysis that means research and answering the questions: Why do the students need this teaching? What intends the teacher achieve with this e-learning course? What challenge is this e-learning course going to overcome? How will the teachers know if they reached the declared objectives? Very often, the university board decides to implement e-learning because other universities are doing it. Besides, they expect things to just get done by delegating responsibilities to the academic staff. Needs assessment before designing the e-course is often regarded as a waste of time and e-course development is considered the task of teachers as part of their workload. Starting an e-learning course development based on such assumptions may end in a weak result.

The needs analysis may include a simple interview/discussion with students and may imply data collection methods that concern past teaching, past results and desired results, and knowledge of the current students. The analysis should grasp the technology component: which facilities the university may provide? What is the digital literacy level of the staff involved in the elaboration delivery of the courses? The answers to these questions will prevent the staff from deploying forcefully e-learning for solving a problem that is not achievable or is not suitable to solve by this approach. The results of this analysis become a basis for the course design plan and for embodying the expected students' achievements. It will also show gaps in current teaching and will demand changes in teaching & learning approaches.

The next step relates to getting and analysing information about students and is called target-group analysis. Developing e-courses without understanding the students' needs, their knowledge level, and the place of the course in the study program may end in providing too much, too little, or simply, the completely wrong content. It is often the case that e-courses are too difficult, or too easy, or completely irrelevant to the curriculum and labour market needs. Course developers often treat their students with a one-size-fits-all approach in order to deliver the content quickly. But this means indifference to the digital capabilities of the students, to their knowledge; to how they will use the knowledge received from the course. If the course developers will first know the students and will find out what they already know and need to know, they will be able to craft more useful content in a relevant format.

Consecutively, the teachers have to define the competences that the learners should develop by the end of the course. Student competences might be described as knowledge, professional skills, or employment skills in their areas of subject matter expertise. These are skills all students will develop to varying levels during studying the course. The teacher will define the learning outcomes in order to assess the competences' levels students develop. Course designers have the task to ask questions and identify both the desirable and undesirable results of the course. They should define circa 4 – 5 course learning outcomes, depending on the course workload, and should ensure that the content fits these learning outcomes. It is a challenge to create relevant learning outcomes. First of all, they should respect the SMART criteria: specific, measurable, achievable, relevant, and time-attainable (Williamson, 2020). Secondly, the course designer should align the teaching and learning activities and assessments to reflect the scope of learning outcomes. This approach is known as constructive alignment and was developed by John Biggs (Biggs, 1996). A constructive alignment is an approach to learning, teaching, and course design that views learners as fundamental in constructing their own learning, rather than learning being primarily the transfer of knowledge from the teacher to the student (Biggs & Tang, 2011). The 'constructive' part of the model often gets overlooked. The intention of students regarding their learning approach is hidden under the question "will this be assessed?" The students' strategy is to

focus on assessment rather than the safer strategy of engaging in learning. The constructive alignment approach forces them to engage with all concepts and content to succeed, in order to achieve the intended learning outcomes. Shortly, constructive alignment requires the teacher to plan learning activities to enable students to develop the skills and knowledge that contribute to the achievement of the intended learning outcomes; to design assessment tasks that can measure the attainment of the learning outcomes; to elaborate content (topics, resources, materials) that supports the learning activities.

The next steps involve both didactic and technological components as it regards elaboration of the course content itself in tight connection with the available technology. The course developer should answer the questions: Which hardware and software, a network connection is available for teachers and for students? Which Learning Management System does the university provide? Are there required applications to be installed for the elaboration of digital resources? Are they relevant to the intended course structure and content? What kind of communication system will the university provide for the students? Does the university have enough bandwidth to run the courses? Also, at this stage, the developer should decide which e-learning model (Fee, 2009) to implement: full online courses, blended learning courses, informal learning, e-performance support; or traditional face-to-face digitally enriched courses.

Then, the proper course elaboration follows. It comprises several steps: a) course scenario with the learning outcomes, content main topics, learning activities, formative assessment tasks, and final summative tasks; b) elaboration and/or identification and updating relevant digital resources: graphics, photos; videos and/or audios, simulations and models et al.; c) assembling these materials in the course authoring tool; d) reviewing the course: checking if the designed course fulfils the constructive alignment approach; the quality of media; text style, typos and grammatical errors, software glitches; e) test the course with a few potential participants, and check if all the functionalities are working properly (course accessibility and navigation, accessibility of resources, technical issues et al.).

The last step in the e-learning strategy is the course evaluation, after running the course with students. This step will determine how effective the course was. This will help the academic staff to figure out what was right and what should be improved in the future. There are different models to determine if this has been achieved. One model is Kirkpatrick's Four Levels of Evaluation (MindTools, 2022). It includes four metrics:

- **Reaction to learning.** It measures the level of satisfaction, interest, and engagement of students;
- **Knowledge** that measures what knowledge, skills, attitudes, confidence, or commitment was acquired by participants;
- **Behaviour change**. It measures if the students can use their newly acquired skills in future labour;

- **Results and impact**. It measures if the declared learning outcomes were achieved as a result of the teaching & learning experience and whether further course improvement is needed.

A more exhaustive evaluation of the e-courses tackles the perspectives of the different stakeholders such as all internal actors within an institution as well as external stakeholders (Ubachs & Henderikx, 2022).

These are the main steps that are required in an e-learning strategy for the elaboration of an e-course. The faculty from our universities may study the e-learning strategy from the articles or different sessions of training that are organized mainly within projects. Universities do not have a special e-learning strategy document, like guidelines for the academic staff involved in the elaboration of e-courses. It is assumed that academics implement one strategy or another implicitly as part of their professional competences, although this is neither obvious nor true. To ensure a quality process, the e-learning strategy must be explicitly included in the curriculum documents and discussed with those who will implement it.

## 4. Implementation of E-learning Strategy: Case Study

Before the pandemic period, the e-learning approach was like a free choice both for universities, as entities, and for faculties within each institution. The need to implement e-learning at scale challenged, first and foremost, the teachers. The methodology document adopted by the Ministry of Education, Culture, and Research delegated the responsibilities for the identification of adequate solutions and their deployment to the decision-makers of universities with the successive transmission of the duties to academic staff (Holotescu, 2020). Each university adopted different approaches according to its experience, technologies, and needs. We present, as a case study, the transposing of the described e-learning strategy to the elaboration of the e-course *Computer Networks*. This course is compulsory in several study programs for Bachelor students at the Technical University of Moldova. Students learn about network topologies, physical devices, security issues, layered abstractions**,** routing algorithms and routing protocols**.** By the end of the course, the learners got insights into the inner functioning of a computer network; what is the TCP/IP (Transmission Control Protocol/Internet Protocol) model, how routing algorithms and routing protocols act. Students get the chance to build simple local area networks and get a functional knowledge of IP addressing schemes, and basic network security, and are able to perform basic configurations for routers and switches. Upon successful completion of the course, students earn a Networking Academy badge.

The needs analysis was partially determined by external factors and specifics of the course. Finding a solution to switch to distance learning, at least during certain periods of the semester, required the implementation of an e-learning strategy. But this was not the only reason. The explanation of network concepts

and the realization of practical laboratory work in this course require the use of simulations and models that are possible through software applications that emulate the functioning of real networks.

The best e-learning model, in this case, was the blended learning approach (Dumbraveanu & Peca, 2022). Blended learning combines classroom and virtual teaching & learning methods to provide the best learning experience to the students. The collected and the elaborated digital resources – lectures, additional readings, laboratory assignments, and assessment tasks were assembled in an e-course hosted on the MOODLE Learning Management System. This e-course can be equally well used in an online guided format and in a traditional face-to-face format as a reinforcement strategy. The flipped learning strategy in a sandwich mode was also used, taking into account the initial knowledge level of the students, their learning habits and their understanding of the network concepts. The blended model suits most of the students' needs and the teachers' philosophy. The lectures were delivered online in the form of recorded videos, supplemented by additional digital resources structured in topics. Learning activities for each topic were provided to ensure the students' knowledge development, in the form of quizzes, mini-research tasks, and group discussions of tasks and possible solutions to lab problems. The laboratory works were performed in a face-to-face environment using the special software Cisco Packet Tracer for the simulation of the network configuration and tasks. This software allowed students to design models of virtual networks according to the lab requirements, visualize the graphical representations of these networks, monitor the transfer of data through networks, describe and save the outputs, collaborate with their classmates, ask questions, discuss algorithms for solving constraint problems settled as learning and assessment tasks.

The teacher recorded a series of videos, with a total duration of 48 hours, divided into two categories – lectures and laboratories – associated with course outcomes. The explained theory was followed by concrete examples, which simulate the functioning of devices in a real environment. The students were presented with how to efficiently use the software in which they can create and simulate the activity of computer networks. The teacher explained in videos everything the learner needs to understand when working with networks, from setting up switches and routers, by configuring their interfaces and assigning IP addresses, to setting up virtual local area networks. The Technical University of Moldova published in an electronic format 3520 lectures that include 1000 hours of recorded videos delivered by 1345 university staff to 9560 students. The information about these courses is available on the website https://lectii.utm.md/. The course *Computer Networks* is among the top courses by popularity and quality. It was evaluated by a university board that had used an internal quality guide.

The e-learning approach and the e-learning strategy is the biggest challenge for teachers: it requires changes in the learning process and determines the efficiency of educational endeavours. The changes relate to technology, communication, delivery systems, and educational paradigms. The way of

combining these components enveloped by teacher philosophy in a concrete learning environment results in various e-learning models. The authors described the implementation of an e-learning model for developing engineering students' competences.

## Conclusions

The e-learning strategy represents guidelines for effectively designing, facilitating, and delivering e-courses. It is crucial that the university stakeholders and the course developers have a deep understanding of the e-learning approach in order to design a strategy and implement it in the e-courses. The university e-learning strategy should be documented and available to everyone involved. An e-learning strategy states the purposes and describes the path the academics will take to meet them; it also provides a framework for decision-making at the university and faculty levels.

The e-learning strategy changes many components of the learning process and determines the efficiency of educational endeavours. The components comprise technology, communication, delivery systems, and educational paradigms. The way of combining these components enveloped by the teacher's philosophy in a concrete learning environment represents the implementation of the e-learning strategy. The authors described concisely the meaning of the e-learning concept and the steps that the e-learning strategy implies. The implementation of these concepts was exemplified on the basis of the elaboration and delivery of the course *Computer Networks*, aimed at developing engineering students' competences.

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