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This book is the first reference dictionary on corporate learning in the Digital Age and unique among international specialized literature. The purpose of this reference dictionary is to establish a unified conceptual field for advanced corporate learning technologies and to help organize the conceptual and practical knowledge of those involved in development and implementation of the learning solutions that are relevant for this new age and economy. Our publication includes 58 dictionary entries and appendixes on more than 285 basic terms that describe specific aspects of corporate learning necessary for successful operation in the digital world.

This reference dictionary is intended for managers and specialists working in the field of corporate learning and talent development, corporate universities and training centers, providers of learning solutions, management, faculty of universities and business schools, and, in general, anyone interested in modern learning technologies.
A message to readers

We live in an era in which digital technologies are integrated into virtually all spheres of human life. This technological revolution is fundamentally changing business models and our approaches to management. First, professions are materially changing. While robotics and artificial intelligence will replace or augment many traditional jobs, roles such as data scientist, specialists in sales of complex products, engineers in robotics maintenance and biological engineers will be in high demand. Second, the new key competencies in companies are speed (time to decision, to product and to market) and flexibility (ability to adapt quickly). Third, experience is becoming more popular than ownership and companies are shifting from promoting their products to optimizing the customer experience. Finally, social networks and media are becoming the primary source of information for a new generation of consumers. All these drivers have a significant impact on how we manage talent.

The amount of available information is growing rapidly, as is ease of access to it. As a consequence, content becomes obsolete very quickly. In addition, it becomes increasingly challenging to find access to a desired target audience since there is much more choice and personalization of content based on the user’s needs and preferences. What do all these shifts in business and society generated by the digital revolution mean for corporate learning? First, businesses require not only skills development to solve current and future business problems but learning experiences for the rapid mastering of new skills and lifelong learning. These must be proactive (reducing time to competence), personalized (data-driven), utilize relevant technologies (digital) and, finally, be cost-efficient and transparent.

The focus of corporate learning functions in the digital world is shifting from portfolio management to educational experience management, from being a learning provider to becoming a learning enabler. Corporate universities can become one of the key drivers of digital business transformation if they establish a strategic partnership with the business and increasingly co-operate with management in identifying areas of strategic development. The extension of the learning and development (L&D) toolkit to provide organizational diagnostic services or the transformation of corporate universities into knowledge hubs is not possible without identifying the company’s development paths. Therefore, the L&D function should not only be a “partner to” but also be “inside” a company focusing on learning impact, the achievement of existing business objectives and personal career goals of the learner. Hence, corporate universities should ensure a seamless process of assessing learning effectiveness thereby connecting learning analytics with performance and talent management.

Corporate universities must prioritize proactive and rapid design and delivery of learning solutions for acquiring new skills and mastering new professions. And they must strengthen the culture of “a learning organization”, which is a key capability for a successful adaptation to the challenges of technology. They must also cultivate an educational ecosystem and the acceleration of its development in line with business strategy. The boundaries of corporate learning are expanding and beginning to follow the key directions of business development, namely suppliers and customers, new areas of business and potential employees. Thus the corporate university is now becoming a strategic marketing tool, especially for the companies that are moving towards platform-based business models. Given these social and technological changes, corporate learning has to embrace the informal learning that it has long ignored.

Dear colleagues!

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Sberbank Corporate University

Martin Moehrle
Associate Director,
Corporate services, EFMD

Dmitry Volkov
Director for Advanced Learning Technologies,
Sberbank Corporate University

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This implies the design of learning experiences that directly reflect the needs of learners and their work context. Digital-age learning also means a comprehensive digitalization of learning processes, which again requires shifts in the roles and qualifications of learning professionals. A basic prerequisite for an effective self-service learning marketplace, where employees can choose the most relevant solution, will be a distinctive learning culture. Corporate universities have a role to play in shaping habits of experimentation and feedback in a safe environment.

To summarize, the new model of corporate learning in the digital world implies the following transitions:

• from an educational services provider to a catalyst for the development of a new generation of executives, managers, employees and value chain partners
• from content development to content development and curation
• from the focus on quality content to focusing on customization of learning solutions to meet customers’ needs
• from combining in-class and distance learning to the combination of formal and informal learning (social, collaborative, experiential)
• from the standardization of training to the personalization of learning
• from the transfer of knowledge to the building and certification of skills

The digital revolution in corporate learning is leading to the emergence of new technologies, methods, models and concepts. The L&D professional language is being enriched with a multitude of new definitions and terms that often stem from other professions. We are witnessing an unprecedented acceleration of renewal in the field of corporate learning. But how can we understand this new language permeating the profession?

A first step has been the reference dictionary Corporate learning for the digital world, developed and published in late 2017 initially for a Russian readership by Sberbank Corporate University (the only Russian CLIP-accredited institution). The purpose of the dictionary is to establish a unified conceptual understanding of modern corporate learning technologies and to provide a concise overview of advanced approaches and methods. The pioneering nature of the dictionary meant it quickly earned popularity in the Russian L&D community and elsewhere, notably among the many hundreds of learning professionals who participated in the annual international conference “Beyond Just Learning”, which Sberbank CU and EFMD have been jointly organizing in Moscow since October 2016. Leading international experts, with whom the concept of this dictionary was discussed, encouraged us to consider publishing it for a global audience. Today we are happy to announce that EFMD and Sberbank CU published the first international edition of the dictionary in English.

This edition consists of 58 entries, including three appendices, recording more than 285 basic terms on special aspects of corporate learning in the digital world. Although these concepts (such as microlearning, e-textbook, flipped classroom, gamification, virtual simulation and so on) are already becoming mainstream, most of them were rather exotic just a few years ago. The book is also aimed at broadening conceptual and practical knowledge and stimulating innovative insights and actions by those involved in the design and delivery of new learning solutions.

In developing this reference dictionary, the authors used material from analytical reports and conferences by leading global associations in corporate learning, including those in which Sberbank CU is either an active participant or a member of governance such as EFMD, ATD, ECLF and GlobalCCU. Another important source of inspiration has been the success of 22 sessions of EduTech, a series of monthly methodological seminars organized by Sberbank CU since September 2016 (with up to 1,000 learning experts from the corporate world and academia attending in person or online).

In addition, the dictionary contains examples of methodological and technological learning innovations at Sberbank and some other top European companies with CLIP accreditation. Partnerships with EduTech companies were also very helpful in preparing the publication.

We hope that this international edition will be useful and relevant for the professional learning community around the world. Although many cases and examples in this dictionary come from Russia, we have tried to give a global, universal and impartial view of the subject.

Sberbank CU and EFMD is privileged to bring the work of so many professionals to you. We believe you will appreciate the depth and quality of this content – and we hope your work will benefit from the time you invest in this reference dictionary.
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Action learning

*Action learning, or learning by doing,* is a set of learning methods in which individual learners or small groups complete assignments and learn while developing solutions to real business problems and situations. The approach includes certain actions and reflections on their outcomes, which helps improve the decision-making process as well as the quality of decisions made by the team.

**Experience in action learning**

Action learning is an element of a broader set of technologies known as "experiential learning" (p. 86). The experience gained in action learning occupies an intermediate position between two other forms of experiential learning, on-the-job learning (p. 186) and business simulations/games (p. 33).

- Unlike the case of business simulations/games, experience in action learning is not artificially created by the game environment, but it is the outcome of real action in a real environment.
- In contrast to on-the-job learning, experience in action learning is gained from specific assignments included in the educational program rather than from the daily work of the employee. In that sense, it is formalized, which is not the case for the informal experience gained in the workplace.

**Types of actions in action learning**

Learning can be built around the following actions taken by groups or by individual participants:

- Working on specific business projects
- Performing assignments for personal development
- Working with mentees
- Conducting studies, including study in the field
- Expeditions and studying the world around you
- Acquiring experience in extreme situations
- Analyzing past actions, including errors
- Performing other similar actions

**Theory of action learning**

The theory of action learning was originally developed by Reg Revans over the years and published in 1982. He applied this method to support and improve organizational and business development, and problem solving. Revans proposed the following formula for action learning:

\[ L = P + Q, \]

where

- **L** means "learning", or understanding what was learned
- **P** means "programming," or knowledge transferred in the process of learning
- **Q** means “questioning”, the facilitator’s questions to the group to create an understanding of what has been seen, heard, and felt by the participants

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**Timeline**

- **1972**: Reg Revans, the author who first used the term "action learning."
- **1979**: The National Association of Secondary School Principals (NASSP) recommended the method for young Americans.
- **1979**: The Business School at Southern Methodist University in Houston opened the first action learning program.
- **1995**: Michael Marquardt, an American professor, founded the World Institute for Action Learning (WIAL).
In 2004, Michael Marquardt supplemented the Revans formula of action learning with one more element:

\[ L = P + Q + R, \]

where

\( R \) means "reflection," or an element that focuses on a person’s need to reflect on experience when considering current problems and desired goals; developing strategies, actions, or implementation plans; or when working to meet the individual milestones of implementation plans.

In the classical formula, all elements have equal weight. In the real practice of action learning, the model is modified depending on the focus on individual elements of the formula. Some or all of the elements of the action learning formula as well as the actions themselves can be transferred to an online format. In this case, the method is called action e-learning (AEL).

Five key components of action learning

- **Group**: a small team of managers (or other persons) who have voluntarily pledged to work together with a willingness to answer questions, discuss, give feedback, and share experience

- **Projects/tasks**: real problems in real time related to matters that are truly important for the organization and involve the need to take action with real, visible (and/or measurable) results. The problem should be important, critical, and usually complex

- **Client**: the real owner of the problem or someone who has a clearly recognized need to solve the problem

- **Consultant (mentor) of the group**: a person whose primary role is to help participants learn through their actions rather than through learning materials

- **Time frame**: tasks and problems are considered for a specific period of time. This necessarily generates a program approach to learning that has a specific beginning, intermediate stages, and completion

**Reginald Revans** (1907–2003) was a British academic who first used the method of action learning when he was teaching physics at Cambridge University. In the 1940s, he developed the method while working in the National Coal Council. Starting in 1965, he led an inter-university project in Belgium aimed at increasing the productivity of workers in coal mines. Thanks to Revans, Belgium demonstrated higher production growth rates than the USA, Germany, and Japan. He received the highest national award from the hands of the king of Belgium. In 1969, Revans became a Doctor of Science at the University of Bath. He wrote such books as Developing Effective Managers (1971), The Origins and Growth of Action Learning (1982), and ABC of Action Learning (1983).
Action learning modifications

In the classical Revans-Marquardt action learning formula \((L = P + Q + R)\), all elements have equal weight. In the real practice of action learning, the model is modified depending on the focus on individual elements of the formula (designated hereinafter by capital letters).

<table>
<thead>
<tr>
<th>Project-based learning</th>
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<tbody>
<tr>
<td>This model is focused on the ROI of learning (business model)</td>
</tr>
<tr>
<td>• Formula: (L = P + q + R)</td>
</tr>
<tr>
<td>• Facilitation focus: business knowledge</td>
</tr>
<tr>
<td>• Questions ((q)): about the project and initial identification of effectiveness criteria</td>
</tr>
<tr>
<td>• Projects: based on SMART (specific, measurable, achievable, results-focused, time-bound) technology, maximizing the impact of business, and including other persons outside the group in the project</td>
</tr>
<tr>
<td>• Action: critical for achieving measurable results; projects require support of senior management</td>
</tr>
<tr>
<td>• Programming ((P)): extremely important; must be relevant to the projects and may be given by external providers to generate new ideas and insights</td>
</tr>
<tr>
<td>• Reflection ((R)): not so important and may not be included</td>
</tr>
<tr>
<td>• Learning ((L)): not so important and may not be included</td>
</tr>
<tr>
<td>• Client: actually owns the project and can define the required ROI</td>
</tr>
<tr>
<td>• Potential problems in use: facilitation may come in the form of directives; questions ((Q)) may already imply an answer; focus on ROI may distract from other elements of knowledge acquisition (reflection and learning); actions are often taken very quickly (resulting in only one answer instead of exploring multiple options)</td>
</tr>
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<tr>
<th>Personal development programs</th>
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<tbody>
<tr>
<td>The model is focused on personal and individual characteristics</td>
</tr>
<tr>
<td>• Formula: (L = P + q + R)</td>
</tr>
<tr>
<td>• Facilitation focus: consulting skills</td>
</tr>
<tr>
<td>• Questions ((q)): about individual behavior</td>
</tr>
<tr>
<td>• Projects: more individualized regarding participants rather than to the learning group and the organization as a whole</td>
</tr>
<tr>
<td>• Actions: related to personal issues, including communication with other people</td>
</tr>
<tr>
<td>• Programming ((P)): minimal</td>
</tr>
<tr>
<td>• Reflection ((R)): significant individual reflection is essential</td>
</tr>
<tr>
<td>• Learning ((L)): may not occur</td>
</tr>
<tr>
<td>• Client: the client role is usually absent (group participants are usually their own clients)</td>
</tr>
<tr>
<td>• Potential problems in use: focusing exclusively on soft skills may result in individual coaching and therapy and possible overload of the group mentor; excessive reliance on questioning may hinder the practical help available from other group participants; projects/tasks usually consider personal questions, and, as a result, opportunities for business development may be lost; such programs seldom make a strategic contribution to the business development of companies</td>
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<table>
<thead>
<tr>
<th>Question-based model</th>
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<tbody>
<tr>
<td>The model is focused on questioning</td>
</tr>
<tr>
<td>• Formula: (L = P + q + R)</td>
</tr>
<tr>
<td>• Facilitation focus: formulating original questions and applying effective questioning techniques</td>
</tr>
<tr>
<td>• Questions ((q)): designing questions is a key element of the process; dialog is stimulated.</td>
</tr>
<tr>
<td>• Projects/assignments: may be about both personal and organizational issues, but they are rarely significant in terms of scope and complexity</td>
</tr>
<tr>
<td>• Actions: taken outside the program</td>
</tr>
<tr>
<td>• Programming ((P)): minimal</td>
</tr>
<tr>
<td>• Reflection ((R)): may not occur</td>
</tr>
<tr>
<td>• Learning ((L)): may not occur</td>
</tr>
<tr>
<td>• Client: may not be explicitly involved</td>
</tr>
<tr>
<td>• Potential problems in use: focusing only on questions hinders help from other participants of the group or the use of relevant knowledge; there is the possibility of questions being asked for the sake of asking; projects may not be related to the learning program (their characteristics become clear only after the completion of the program)</td>
</tr>
<tr>
<td>• The model is effective for problem solving during strategic or moderated sessions</td>
</tr>
</tbody>
</table>
### Critical reflection model

- The model is focused on critical reflection
  - Formula: \( L = P + q + R \)
  - Facilitation focus: developing critical reflection skills among the participants of the group
  - Questions (q): stimulate personal reflection on challenges, implicit assumptions, and practices
  - Projects/assignments: project focus is secondary to reflection
  - Action: relevant to the individual rather than to the group or organization; often, the action is aimed at overcoming the self and studying the world.
  - Programming (P): little used
  - Reflection (R): integral and critical
  - Learning (L): may not be articulated
  - Client: may be identified or not
  - Potential problems in use: focus on very soft skills; questions are limited primarily to facilitating the discussion; the results of projects are secondary to the clarification of personal questions
  - The model is effective for developing the skills of emotional intelligence, empathy, leadership qualities, overcoming and understanding oneself, and **error-based learning**. As program formats, this model may use **learning expeditions** and **extreme training**.

### Action research model

- The model is focused on identifying or creating programmed knowledge through research
  - Formula: \( L = P + q + R \)
  - Facilitation focus: on effective implementation of research methodology in the actions of participants
  - Questions (q): are relevant to methodologies and are clarified in the course of the research
  - Projects/assignments: with focus on key research question arising from the problem posed for the group
  - Action: conducting studies and surveys, including field research
  - Programming (P): focus on research methodology, derived from research results
  - Reflection (R): a part of the research process; analysis and generalization of results
  - Learning (L): is articulated after each cycle of the research process
  - Client: may not play an important role
  - Potential problems in use: danger that facilitation may turn into "scientific supervision" without any relation to practice; questions are often related only to the research methodology; project results may be secondary to the importance of correctly using the methodology.

### Programmed learning model

- The model is focused on programming knowledge
  - Formula: \( L = P + q + R \)
  - Facilitation focus: providing programming knowledge in response to the requests of participants
  - Questions (q): to determine the type of programming knowledge
  - Projects/assignments: define what programming knowledge is required
  - Action: cases are often used, but they generate little real action
  - Programming (P): main focus; is provided by experts, may not rely on the experience of participants
  - Reflection (R): "true stories" can improve the understanding of programming
  - Learning (L): is clearly defined
  - Client: if he/she is defined, may be invited for teaching "P"
  - Potential problems in use: the mentor plays the role of instructor rather than that of facilitator; questions are often formal; project results are often not related to the program content; learning is aimed at acquisition of knowledge rather than its application; reflection often may not occur
  - The model is effective for compulsory learning and/or for topics unrelated to the day-to-day work of learners.
## Example of usage

<table>
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<th>Personal development programs</th>
<th>Critical reflection model</th>
<th>Action research model</th>
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<tr>
<td>In 2015–2016, Sberbank CU used the model of project-based learning to implement talent pool development programs, in which more than 50% of the learning time was allocated to project-based activities. The model proved to be the most effective for groups that are not homogeneous in terms of initial knowledge level</td>
<td>Mentoring III is a personal development program designed by Sberbank CU for senior management in which the participants work with their mentees (action) and analyze these actions together with their coach (reflection)</td>
<td>In Sberbank CU, the elements of this model are used in the Leader Team, a program for the executive teams of functional units and regional banks of Sberbank, which includes an extreme training session on team interaction skills followed by a deep reflection</td>
<td>Design Thinking Program of Sberbank CU. At the beginning of the program for studying the methodology of design thinking for a particular product (e.g., insurance products for young people), the participants are split into small groups to conduct a field study in the form of interviews with the customers of a Sberbank branch in accordance with preformulated research surveys. During the reflection at the end of the study, the groups prepare empathy maps</td>
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An action learning program can, and occasionally does, combine several modifications within one program.
Adaptive learning

Adaptive learning is the dynamic, data-driven approach of an individual learning path (p. 193) that takes into account the preparation, abilities, goals, motivation, and other characteristics of the learner. The implementation of adaptive learning makes it possible to achieve the required learning outcomes in a shorter time by recommending content that is the most relevant and optimal in terms of its level of difficulty for each learner.

The main principle of adaptive learning is that learners learning with different levels of experience, knowledge, skills and habits achieve the common learning outcomes defined in the educational program by going through their individual paths.

Elements of adaptive learning systems

Adaptive learning can be implemented on e-learning platforms that use varying basic systems and elements for adaptive learning.

For example, Knewton, the best known adaptive learning platform, includes the following main systems.

Data collection engine

Collects and processes tremendous amounts of data on the knowledge and skills of the learner

- **Adaptive ontology** that displays the relationships between separate concepts, which are then integrated into the required taxonomies, objectives, and algorithms of learners’ interactions

- **Model calculation tools** that process data in real time and simultaneously analyze them for future use

Output system

Transforms data and generates outputs based on all collected data

- **Psychometric tools** that evaluate the knowledge and skills of the learner, content parameters, learning effectiveness, etc. With each new level, the information about the learner becomes more accurate

- **Learning strategy tools** that evaluate learners’ sensitivity to changes in teaching, assessment, pace of learning, etc.

- **Feedback tools** that combine all data and transmit them back to data collection system

Personalization system (p. 193)

Leverages the power of the entire system to find the best learning strategy for each learner

- **Recommendation engines** that provide the learners with ranked suggestions on what the learner should do next by balancing the goals of learning, the strengths and weaknesses of the learner, her involvement, etc.

- **Predictive analytics engines** that predict such metrics as the extent and likelihood of achieving the goals set by the instructor (e.g., what is the probability that the learner will pass the future test with a 70% grade), expected assessment, knowledge and skills, etc.

- **Unified learning history tools**: a personal learner account that comprises the entire learning experience mastered in various programs in a variety of formats

Burrhus Frederic Skinner (1904–1990) was an American psychologist, inventor, author, and professor at Harvard University. He founded a school of experimental research psychology. Skinner developed a philosophical concept that was later called "radical behaviorism." He described his ideas of creating the ideal human society in the utopian novel Walden Two (1948) and analyzed human behavior in Verbal Behavior (1957) [130—hereinafter, a reference to the source. See References, p. 244]. In 2002, Skinner was named the most influential psychologist of the 20th century [70].
Methods for supporting adaptive learning

- Recommending learning objects on the basis of own and other people’s learning history, personal interest, desired performance
- Adaptation to the individual knowledge and skills profile
- Adaptation to the individual desired career path or individual development plan

Development of adaptive learning through the game design, ALGAE model

Game design became relevant in connection with growing interest in massive open online courses (MOOCs) (p. 161) and their use of Virtual reality VR (p. 217) and Augmented reality AR (p. 23)

The ALGAE (Adaptive Learning GAme dEsign) model was created to support the development of adaptive learning through the design of serious games (p. 33) that reinforce the development of skills and knowledge assessment.

Implementation of ALGAE: The case of Slippery Rock Falls, a multiplayer educational roleplaying game.

- Although the game has many characters, the protagonist is the player. To maintain interest in the game, the conflict should escalate with each new assignment right up to the end.
- In the game plot, the conflict is shown in the form of assignments, quests, and puzzles; while solving them, the player is immersed in the story, fights and ultimately wins

**Skinner teaching machine**

In his experiments with pigeons, the psychologist came up with the idea to create a box-like mechanical device that would "feed" questions to learners. The device was created in 1954. Correct answers were rewarded with new academic material, while wrong ones led to repetition of the old question, which motivated learners to quickly adapt and learn how to answer correctly.

**Benjamin Bloom, an educational psychologist,** in his article "The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring" [53] described a phenomenon known as two sigmas (two standard deviations of learner performance), which means that the average learner tutored one-to-one with an individual program was above 98% of the learners in the control group taught with standard methods.
Adaptive learning

- To succeed, the players are forced to make repeated attempts despite previous failures. An additional test for the motivation of participants is created by the awareness that their successes or failures are observed by other players. If the battle has an ultimate goal, and it is possible to emerge victorious, the players will try new tactics for adapting to the changing demands of the team game.

- In education, changing the conditions for winning or the rules of the game may be considered unfair, but in games players look for ways to turn problems or vulnerabilities of game design to their strategic advantage.

- An assessment structure developed by George Miller is used to evaluate the actions, behavior, skills, and knowledge demonstrated by learners during the game.

<table>
<thead>
<tr>
<th>Assessment levels</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knows</td>
<td>Knows as</td>
</tr>
</tbody>
</table>

- Used built-in voice tool to communicate with a partner
- Used avatar and camera control keys to see what is needed to take action
- Used avatar control keys to get the required information or select actions
- Communicated important information to a partner in order to help them
- Asked questions to eliminate misunderstandings or confusion while completing the assignment
- If necessary, repeated the information to make sure that the partner understood the message
- Gave constructive feedback on team actions to improve actions
- Worked in a team to complete the assignment

After completion, fill in the self-assessment column. The team can use the column to discuss the quality of its actions.

Assessment scale
1 = bad
2 = satisfactory
3 = good
4 = very good
5 = excellent

2012
Adaptive learning was implemented by the World School Council, London, in several types of educational systems, such as adaptive hypermedia, intelligent tutoring systems, computerized adaptive testing, and computer-based pedagogical agents. The same year, the method was first used by the University of Colorado.

2014
In his publication "A Study of Adaptive Learning for Educational Game Design," Edward Lavieri presented the results of multi-year research in this area. The ALGAE (Adaptive Learning Game Design) model, was developed on the basis of these learning strategies and adaptive models.

2015
The US Army and the government of the United States started using adaptive learning.

2017
Systems such as Knewton have a wide range of features, such as sophisticated skill development tracking, instant feedback, personalized hints, and an interface resembling a computer game that was not available to Skinner’s Harvard students.
Adaptivity implementation in educational companies [131]

Individual educational paths in adaptive learning:

Risk Management program at the School of Risk Management of Sberbank CU case study.
Adaptive testing

Adaptive testing is a technology for learner assessment in which each subsequent question is selected automatically based on answers to previous questions and a certain predefined level of difficulty. The main difference between adaptive testing and classical tests is the dynamic, rather than static, determination of questions for the test taker. Each learner has an individual path when taking such tests. The next question is selected based on the personal characteristics of each individual learner rather than on general rules. It is similar to an oral exam, in which the instructor asks a series of questions to determine the knowledge level of the learner.

Benefits of adaptive testing

**Accuracy**
The ability to assess the level of each learner with a minimal error

**Quality**
Measurement is focused on the learner knowledge level, not simply on assessing their average level

**Reliability**
The impact of additional factors (loss of interest, distraction, fatigue, anxiety) on tests results are reduced since the test takers spend less time and effort on questions that do not correspond to their level of preparation (too easy or too difficult)

**Engagement**
Test takers are calmer and more motivated (they are given assignments that they can handle and find interesting; as a result, they are more focused on successful completion and are confident that they can do it)

Adaptive testing is the most effective while addressing the following tasks:

- Learner self-assessment
- Quick and reliable measurement of corporate learning results
- Prediction of learning outcomes through pretesting
- Pretesting to identify gaps to adjust the course program
- Pretesting to divide learners into groups by their level of preparation

Adaptive testing is not possible or less effective in the following cases:

- the total number of questions is not enough for a correct distribution on the topics and levels of complexity
- there is no possibility to determine questions level of complexity (the expert distribution is not correct and there is no possibility to check the distribution during the pilot with the group of participants)
- the expected number of personalized test questions does not correspond to the minimum required value for reliable learners’ knowledge level determination
- tests include open-ended questions that are not possible to assess by the automated system

Methodological aspects of the development and implementation of adaptive testing [100]

Test question development

**Question bank**
All questions that will be included in the individual list of questions for each test taker.
The following formula is recommended to determine the minimum size of the question bank.

**Question bank = 15 x number of topics**
(topical blocks of the test).

For example, if the questions for the test are divided into 3–5 topics, the recommended size of the question bank is 45–75 questions.

**Number of questions in an individual test**
The number of questions in an individual test is determined by the total number of questions to be asked of the test taker. The following formula is recommended to determine the optimal number of test questions.

**Total number of questions = 5 x number of topics**
(topical blocks of the test).

Thus, in the final test, each test taker is asked to complete no less than 5 questions on each topic.

For example, if the questions for the test are divided into 4 topics, the recommended length of the test will be 20 questions. Otherwise, the adaptive algorithm may not have enough questions to determine the level of knowledge of the topic.
Types of questions

- Single choice questions
- Multiple choice question
- Matching/ordering
- Fill in the blank questions (where the answer is a number, word, or unambiguous phrase that can be checked automatically)

Variability of test answers:

- To enable automatic checking of answers to tests, each question must have at least one option for a correct answer. If a question contains exactly one answer option, and this option is correct, such question is defined as a closed-ended.
- A question may have any number of correct answers greater than one. If a question has more than one possible answer, and only one is correct, this question is defined as a single choice question. If a question has more than one correct answer, such question is defined as a multiple choice question.
- All answer choices may also be correct simultaneously. In other words, there are no incorrect answer choices.

Difficulty levels

The questions in the question bank are ranked based on the difficulty levels that are common for all topics. The number of levels must be at least 3, and the optimal number ranges from 5 to 10. The availability of numerous difficulty levels (e.g., 10) will allow for a more accurate distribution of questions across the difficulty scale after the start of testing and ensure higher accuracy in the final assessment of the knowledge level.

It is recommended that the questions within each topic (topical block) include various difficulty levels, as this directly affects the variability of the test and the adaptive capabilities of the technology. Within each topic, it is better to distribute the questions in groups of at least three questions for each level. The greater the number of questions for one difficulty level, the greater the variability of the test, which is important for repeated testing or testing people who could help each other.

Distribution options

Equal distribution
It is recommended to have at least 10 questions for each difficulty level.

Pyramid
The number of questions can be adjusted to form a "pyramid"—when there are fewer difficult questions than easy ones (as the test takers reach the difficult questions much less frequently). The following ratio is recommended in this case: at least 6 questions of the highest difficulty levels (9–10), at least 8 questions of the medium difficulty levels (7–8), and at least 10 questions of the lowest difficulty levels (1–6).

Automatic distribution
The questions can be automatically distributed by difficulty level. This is possible by conducting initial testing (on a sample of test takers), where the difficulty level of questions is determined based on the answers of the test takers. The questions with the highest number of correct answers are considered to be the easiest, and the questions with the lowest number of correct answers are considered to be the most difficult.

Testing paths

Testing paths allow the determination of the most likely paths in taking the test in different contexts. For example, in the context of transitioning between difficulty levels, they help to identify the questions that make the greatest impact on the testing process (test takers will "most likely answer correctly" an X level difficulty question at step N or, on the contrary, will experience problems with a question of this difficulty level).
Adaptive testing

Results of adaptive testing and their interpretation

<table>
<thead>
<tr>
<th>Results as the average number of correct answers</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results as the average difficulty level of questions answered by the test taker during the test</td>
<td>Level of knowledge</td>
</tr>
<tr>
<td>Group combined results</td>
<td>Distribution of scores in the group</td>
</tr>
<tr>
<td>Combined results of the level of correct answers given by the group to questions from the question bank</td>
<td>Difficulty of questions</td>
</tr>
<tr>
<td>Combined results of the level of correct answers given by the group to questions on specific topics from the question bank</td>
<td>Difficulty of topics</td>
</tr>
<tr>
<td>Distribution of answers given by the group to the questions by corresponding variants</td>
<td>Most common errors</td>
</tr>
<tr>
<td>Total paths of test takers with transitions between questions and difficulty levels</td>
<td>Testing paths</td>
</tr>
</tbody>
</table>

These results are useful primarily for improving the quality of materials and building an individual learning path (p. 193). The customer can personalize the syllabus for each group of learners based on the knowledge gaps identified during testing.

The learners can also conduct a self-assessment and fill in the identified gaps (by moving gradually from easy to difficult questions).

Correcting an adaptive test based on analytics

Frequency analysis of results
Makes it possible to adjust the distribution of questions by difficulty levels after analyzing the distribution of answers given by test takers (to identify abnormally difficult or easy questions at specific difficulty levels and recommend transferring these questions to another difficulty level)

Forecast of learning outcomes (p. 150)
The statistical analysis of the results of an adaptive test is based on the number of attempts to pass the test and the average result achieved during all attempts

Adaptive testing elaboration tools

<table>
<thead>
<tr>
<th>Qualtrics</th>
<th>Google Forms</th>
<th>Typeform</th>
<th>Doodle</th>
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</thead>
<tbody>
<tr>
<td>• Possibility to specify the logic of the survey</td>
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<td>• Meeting planner tool</td>
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<td>• User-friendly</td>
<td>• Wide functionality</td>
<td>• Required to compare the answers</td>
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Typeform

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Artificial intelligence in learning

Artificial intelligence (AI) is the science and technology of creating intelligent machines, especially intelligent computer programs. Another property of intelligent systems is to perform creative functions that are traditionally considered the prerogative of humans. AI is associated with the similar task of using computers to understand human intelligence, but it is not necessarily limited to biologically plausible methods.

Areas for using AI in education [109]

Knowledge presentation
Addressing tasks related to the presentation and formalization of knowledge in the AI system's memory

<table>
<thead>
<tr>
<th>Knowledge manipulation</th>
<th>Communication</th>
<th>Perception</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Creating methods for plausible and reliable output based on existing knowledge</td>
<td>• Speech understanding and synthesis</td>
<td>• Developing methods for representing visual scenes in a textual description and methods of reverse transition</td>
<td>• Methods of moving from a known solution of specific problems (examples) to solving similar and general problems, are being designed to develop the learning ability of AI systems</td>
</tr>
<tr>
<td>• Development of methods for augmenting knowledge based on an incomplete description</td>
<td>• Recognition and synthesis of coherent texts in natural language</td>
<td>• Developing methods for representation of information on visual images in the knowledge base</td>
<td>• In addition, these efforts include the design of methods for recreating the conditions of the tasks of describing or monitoring a problem situation</td>
</tr>
<tr>
<td>• Building logical structures that, on the one hand, rely on knowledge and, on the other, recreate human reasoning characteristics</td>
<td>• Theory and models of communication between humans and nonhumans, in particular AI systems</td>
<td>• Creating tools for generating visual elements based on internal representations in AI systems</td>
<td>• Search for methods of breaking down an initial task into smaller parts that are already known to the AI system</td>
</tr>
</tbody>
</table>

Behavior
Developing behavioral procedures for interaction with the environment as well as with other AI systems and people

Chat bots [36]

Programs developed by humans and for humans based on machine learning and neural networks for a specific set of goals. At this stage, the development and full-fledged functioning of chat bots require significant human intervention (both for framework development and for direct specification of certain behavior patterns, such as answers to specific questions, etc.)

Messaging-as-an-interface

Chat bot distribution and use have resulted in messaging-as-an-interface, a new paradigm of user interaction. Because of the instant messengers audience, chat bots have provided a rich environment for development. In the near future, chat bots will become increasingly important. For example, they might replace traditional search engines and social networks. The advantages of bots will be their user-friendliness, response speed, and customizability. The use of bots greatly facilitates interaction with a service by providing a universal interface [107].
Messenger apps are ahead of social networks [46]
Active users of apps in the four major social networks and messengers

Technology access and customization

Today you need only some basic language processing technology to create a commercial chat bot (e.g., to reduce the load on human online consultants when handling the most frequently asked questions).
There are a sufficient number of frameworks and APIs that can be used to create chat bots. In addition, a language processing framework for a commercial chat bot can be created independently on the basis of various open-source software libraries.
Thus, chat bots are becoming one of the most effective and efficient tools for native (p. 177) and other forms of adaptive learning (p. 13) due to the relatively low cost of development and implementation.
The accumulation of behavior data combined with the self-learning of AIs will eventually make it possible to address psychological training tasks, coaching, etc., which used to be considered purely human activities. This will likely result in the emergence of "learning companions" which will teach human individuals throughout their lives. They will be hosted in the cloud and available on every device, as well as in offline mode. Instead of teaching all subjects, these programs will turn to experts in specific areas when needed.

Al in learning

**Automated monitoring**
Most schools and universities combine Al with big data (p. 131) to monitor the attendance of (in-class and distance) classes and completion of assignments by learners

**Moderation of group learning**
In group learning, Al is used to select groups of learners with similar knowledge levels, analyze discussions between people, and identify when participants deviate from the topic

**Intelligent learning systems**
Programs that simulate the behavior of the instructor. They can check learners' knowledge by analyzing their responses, provide feedback, and prepare personalized learning plans
Functions of chat bots in learning

**Administrative support of instructors**
Chat bots answer typical questions of each learner in real time and without limitations, thereby freeing up instructors’ time for activities that require more expertise.

**Engaging learners in learning activities**
More complex intelligent algorithms (chat bots) can motivate learners to learn. Such systems compare statistical models of behaviors with the knowledge base and propose individual scenarios in real time. For example, Differ, a Norwegian bot, sends useful articles to learners or invites them to participate in discussions.

**Feedback**
Collecting information and performing algorithmic analysis of learner behavior to build individual learning paths (p. 193).

**Using knowledge**
Robotic mentorship. Algorithms for distribution and monitoring of practical assignment completion, informational follow-up, including step-by-step hints, leading questions, etc., and outcome assessment.

**Developing critical thinking**
Systems for analyzing text for factual and logical errors with robotic output of recommendations.

**Robotic teaching**
Bots can present knowledge on a particular subject in a structured way and answer learners’ questions. By accumulating data, the system can learn and expand its functionality both in the subject area and in terms of communication.

**Robotic testing**
All sorts of automated systems for checking learning outcomes based on a set of parameters (including adaptive ones).

Examples of learning algorithm implementation

**Coursera, edX, and Udacity**
Among other things, AI can evaluate tests and essays.

**Carnegie Speech and Duolingo**
These learning programs use natural language processing to identify errors in people’s pronunciation and correct them.

**Knewton**
This program takes into account the specifics associated with training each learner and develops a personalized learning plan for them.

**AutoTutor**
This system teaches computer literacy, physics, and critical thinking by communicating with learners in natural language.

**SHERLOCK**
A system for training US Air Force pilots (helps find problems in the electrical equipment of the aircraft).

**Yemelya**
This example of the digital tutor is offered on the Russian market. It can be controlled remotely, has a voice-user interface and a video camera. It helps teach a child good manners and rules of conduct, reads, sings, plays music, leads educational games, teaches geography and mental arithmetic, etc.

Examples of leading vendors of chat bots

- Nuance
- next IT
- KORE
- inbenta
- creative virtual
- NANO REP
- msg.ai
- GO
- MindMeld
- pypestream
Augmented reality, AR

Augmented reality (AR), or extended reality, is a physical environment with direct or indirect real-time augmentation of the physical world with digital data by using digital devices and their software. It is a form of mixed reality (MR), or hybrid reality (HR) (p. 168), which is defined as the result of combining the real and virtual worlds to create new environments and visualizations, where physical and digital objects coexist and interact in real time.

It is created by the introduction of the sensory data to the field of perception to augment information about the environment and improve the perception of information.

The fundamental difference between VR (p. 217) and AR is that VR builds a new artificial world, while AR only introduces individual artificial elements to the perception of the physical world.

The term "augmented reality" is often used in a broader context to include the concept of augmented virtuality (p. 25) as well.

The use of augmented reality in learning

<table>
<thead>
<tr>
<th>QR codes: Inserting QR codes with links to multimedia content helps to make printed training materials dynamic</th>
<th>Designing and prototyping: Creating virtual objects embedded in the real environment</th>
<th>Interactive instruction manuals: When a smartphone is pointed at the instruction manual of the equipment, the screen displays dynamic video information</th>
<th>Online advice: a remote operator can see through the eyes of a worker wearing AR glasses and give advice (e.g., on how to operate equipment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explaining the world around us: When a device is pointed at a real object (e.g., the starry sky), it provides additional textual and graphical information about the object (e.g., about constellations)</td>
<td>Viewing a video showing virtual objects embedded in physical reality</td>
<td>Information output (dictionaries, reference books, reports, dashboards, articles, graphics) and arrangement of information for convenient review</td>
<td>Collaborative spaces for collaborative remote solution of common problems</td>
</tr>
</tbody>
</table>

1981 Steve Mann, a professor at the University of Toronto, created the first version of EyeTap, a device in the form of goggles that makes it possible to capture the scene available to the eye, process it with a computer, and then send it to the eye. The device consisted of a computer placed in a backpack and connected to a camera with a viewfinder attached to a helmet

1990 Tom Preston Caudell proposed the term "augmented reality" for the first time, emphasizing that in this case virtual reality supports physical reality and plays an auxiliary role

1992 Louis Rosenberg developed the world’s first functioning augmented reality system for the US Air Force. The headset was called “virtual fixtures”

1993 William Ford Gibson, a science fiction author, published his novel “Virtual Light” where he described a world of augmented reality for the first time

1994 Denso Wave, a Japanese company, presented the QR code, the first consumer application of augmented reality
Legally-binding use of augmented reality and augmented virtuality required by law

The technology of augmented reality is widely used to train specialists in industries associated with high risk: drivers and train engineers, transport traffic controllers, etc.

In some cases, learning with the use of augmented reality and augmented virtuality is the only feasible way of learning and can in such cases be legally established as compulsory.

For example, the Federal Aviation Rules of the Russian Federation (FAP-128, clause 5.84) require civil aviation pilots to undergo training twice a year on an aircraft simulator with simulations of various emergencies. Similar compulsory rules are in place in other ICAO member states.

The global market for aviation simulators and services in simulation training is estimated to be greater than $6 billion a year [37].

Augmented reality is widely used in the most advanced armies of the world to teach the tactics of joint operations between units.

During exercises, opposing parties use standard military weapons loaded with blank cartridges. Sensors installed on the weapons and participants in the exercises identify the participants who would have been killed or wounded if the bullets were real and take the would-be casualties out of the game.

The best-known system is MILES, developed in the US, and there are similar systems by Rheinmetall, SAAB, RUAG, and in the Novosibirsk Instrument-Making Plant.

Other uses of AR — a few examples:

AR & VR in the car
An AR device that projects various features of the driver’s mobile phone onto the inner side of the windshield of the car, such as navigation, mail, news, messenger, weather, Skype, etc.

Reducing the downtime of self-service systems
When pointed at an object (e.g., a car engine), mobile phones or augmented reality helmets can provide step-by-step demonstrations of how to change the oil, windshield washer fluid, battery, etc.
Augmented virtuality, AV

Augmented virtuality (AV), or extended virtuality, is a virtual environment that includes physical objects from the real world.

It is a part of mixed reality (MR), or hybrid reality (HR) (p. 187), which makes it possible to manipulate physical objects and observe them in a virtual environment, where physical and digital objects coexist and interact in real time.

The term "augmented virtuality" is rarely used at this point; people often speak of augmented reality (p. 23) even when virtuality prevails. The fact is that at the current level of technology it is difficult to clearly define what part of the virtuality continuum (p. 168) we are actually dealing with in each specific case, while historically the technology of mixed reality develops by augmentation of previously-existing physical reality. However, with the development of VR technology in terms of the tools for simulating sensation and the extent of their direct and productive interaction with a human brain that perceives virtuality as a full-fledged alternative to physical reality, the spread of augmented virtuality, both as a technology and an approach, will prevail [57].
Blended learning

*Blended learning* is the combination of traditional forms of classroom learning with elements of *e-learning* (p. 81), which uses special information technologies such as computer graphics, audio and video, interactive elements, etc. The blended learning process is a sequence of phases of traditional learning and e-learning that alternate over time.

---

**Blended learning integration models**

**Face-to-face driver**
The material is transmitted from the instructor to learners in face-to-face class activities. Electronic resources are used only for consolidating and deepening knowledge.

**Online driver**
The learner watches webinars, solves online tasks, takes online tests—that is, assimilates the material remotely. But if necessary, they can meet with the instructor and consult on unclear matters.

**Flex model**
The main part of the program is presented online. The instructor acts as a coordinator, tracking topics that are hard to understand so they can be discussed in class in groups or individually.

**Rotation model**
Classroom and online education are alternated: first learners assimilate the material on their own through the Internet, then together with the instructor in the classroom.

**Self-blend**
The learners go through the program in the standard way. But if certain subjects arouse increased interest, it is possible to take additional online classes.

**Online lab**
Learners do experiments and solve problems in special programs and on special websites but within the educational institution and under the supervision of the instructor.
Blended learning is the core of the global transformation of general and corporate education

The typical process of the penetration of blended learning into educational institutions is illustrated by the story of Aaron Sams and Jonathan Bergmann, the authors of the flipped classroom concept (p. 95).

Successful experiments by individual enthusiasts with interactive formats immediately attracted the attention of the administrations of educational institutions, primarily for economical reasons—that is, the obviously lower cost of remote learning in relation to traditional formats with comparable results.

In the university educational process, the first types of work to be optimized were the most inefficient and at the same time the tasks least liked by instructors:

- face-to-face consultations where learners often ask questions they have not tried to solve themselves (methods of tracking an independent learner’s work in modern blended learning systems allow instructors to answer questions only from those learners who have worked well independently)
- checking tests (in blended learning, tests can be automatically checked by testing systems) [34]

The systematic effects of the widespread introduction of blended learning

In the organization of the educational process
The flexibility of blended learning forms will allow the learner to take more responsibility for learning outcomes while encouraging the independent choice of both individual steps and the entire course strategy. Fixed classes/groups of students assembled by age will become a thing of the past.

In methodology and didactics
Blended learning will enable a more precise selection of learning methods for each learner which will ultimately lead to the complete individualization of curricula. The wide variety of forms and methods of blended learning will create unique combinations and new techniques with quick assessment of their effectiveness.

In information technologies
Blended learning, along with the digitization of educational materials, stimulates the development of large databases available through cloud technology.

In the economy of education
Reduced cost of learning as a result of digitilazing materials and their ease of delivery to the learner.

The University of Illinois introduced the first e-learning system, PLATO (Programmed Logic for Automated Teaching Operations, a software algorithm for automated teaching operations)
Various corporations created new forms of on-the-job training for employees: in addition to classroom activities, learners are prompted to complete homework using computers. Methods such as technology-mediated instruction, computer-assisted learning, and combined or hybrid learning began to appear.
Stanford University implemented an interactive TV network: the first experience in using the learning capabilities of television. A live lecture was broadcasted to different audiences and recorded in video format. This system is still in use.
The Aviation Industry Computer-Based Training Committee (AICC) was founded. Aviation companies, including Boeing, started actively combining regular classroom activities and self-training sessions with training CDs for staff training.
SoftArc started working on the computer program FirstClass, which is considered the first learning management system, or LMS. The emergence of such systems made it possible to implement the ideas and forms of blended learning.
In pedagogical education
Instructor training is increasingly based on the formation of skills required to create a wide range of presentation methods and quickly selecting the most effective options according to the each learner’s abilities

In education management
In the future, blended learning will minimize the need for centralized educational process management and its maintenance of an army of officials in the education field

In education technologies
All innovation of electronic equipment will be integrated into methods of blended learning at the speed at which these new gadgets are mastered by instructors and learners. Blended learning will shortly require special resource development to match its methods

1999
In a press release of the US company Interactive Learning Center on the change of the company’s name to EPIC Learning, the term "blended learning" was used for the first time: "the company operates 220 online courses but will start offering its own online courses based on its own blended learning methodology"

2004
Randy Garrison and Heather Kanuka published the highly-cited article "Blended Learning: Uncovering Its Transformative Potential in Higher Education" in the journal The Internet and Higher Education

2006
The first guide to blended learning was published by Curtis Bonk and Charles Graham

2015
The company "Mobile e-education" (Russia) confirms the effectiveness of applying different forms of blended learning by implementing the "Piloting the comprehensive e-learning product 'Mobile distance school'" project

2019
At least 50% of lessons in American schools are planned to be conducted using blended learning methods
Business simulations and games

**Simulation** is an interactive learning event (ILE), a method of simulating real processes, events, locations, or situations. This involves creating risk-free environments where students develop specific skills and experience the impact of decisions that require a certain level of risk.

**Business simulation** is a simulation used for training management decisions.

**Serious play or a serious game** is a type of simulation that includes game-playing elements such as narrative, interactivity, feedback, and the game itself, including a game-playing process, rules, and a quantifiable outcome (achievement of a goal and/or a prize).

The games are used in learning to help students acquire various types of experience experience, develop skills, or reinforce their contact with the learning content. Feedback is critical for using games in learning. Otherwise, the players have no idea what they have learned or retained.

---

**Interactive learning event (ILE)**

<table>
<thead>
<tr>
<th>Process</th>
<th>Technique</th>
<th>Simulation</th>
<th>Business game</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulated</td>
<td>Nongame</td>
<td>Game</td>
<td>Business game</td>
</tr>
</tbody>
</table>

**Simulation** is typically a standardized product that can be replicated and scaled:
- Mathematical model
- Predictable outcome
- Focus/integration strategies
- No need for subject expertise on the part of the facilitator

A simulation differs from a serious game in the extent of its approximation of a real situation; while in a simulation the situation must be recognizable, in a serious game the situations may be imaginary.

**Testing games**

Focus on recalling knowledge rather than using it

**Teaching games**

Teach knowledge, facilitate learning, and/or skills acquisition

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**Some types of simulations**

- **Branching storyline** is a simulation based on a story presented with text, graphics, video, animation, or other formats, in which students make decisions one after the other, and each decision determines the further development of the plot and subsequent steps.

- **System dynamics simulation** is a simulation of complex systems (for example, the activities of a company) based on a mathematical model, where each decision makes a complex impact on the performance of the entire system.

- **A simulator** is a device (usually mechanical or computer-based) designed to simulate control over a process, instrument, or vehicle.
LEGO® SERIOUS PLAY®

This method was designed by LEGO®, a company that has virtually monopolized the market niche of games using construction sets. Its creators claim that manipulations with physical objects in the process of solving the game’s challenges can stimulate the creative abilities of the players. The method is based on the research of Wilder Graves Penfield, a Canadian neurosurgeon. He created a map of relationships between the brain areas and body parts responsible for particular functions. The research and experiments conducted by Penfield have shown that the relationship between the hand and the brain is much more extensive and deeper than we think. The brain areas responsible for movement and perception through the hands are larger than all others in terms of their surface and volume.

Hom is a Penfield homunculus, a sensory and motor function model. This is what our body would look like if its parts were proportional to the brain areas involved in their activity [119].

Business animations are role-playing team games that simulate a real situation in a metaphorical form [155]. They are designed for a large number of participants (up to 1,000 people or more). Business animations are used to bring people together at the level of intangible approaches and ideas when it is necessary to stimulate the manifestation of values at the level of behavior (e.g., customer focus, the corporate brand and its new interpretations, a new look at the strategy and vision of the company when companies, cities, and teams are united, etc.) The term was introduced by AMI Business School (St. Petersburg) that held the first business animation in Russia for 350 people as part of a project on branding URSA Bank established following the merger of two banks.
## Relationship between content and type of game-playing activity

<table>
<thead>
<tr>
<th>Declarative knowledge</th>
<th>Conceptual knowledge</th>
<th>Rule-based knowledge</th>
<th>Procedural knowledge</th>
<th>Decision making</th>
<th>Soft skills</th>
<th>Emotional knowledge</th>
<th>Psychomotor skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association between two or more objects such as facts, terminology, and acronyms. Content that must be remembered</td>
<td>Grouping similar or related ideas, objects, or events that have common attributes or a common set thereof</td>
<td>The rules set the parameters of preferred behavior with a predefined outcome</td>
<td>A series of steps to be taken in a particular order to achieve a specific outcome</td>
<td>Collecting information to make an informed choice or perform an action</td>
<td>Individual characteristics allowing a person to interact with other people</td>
<td>Knowledge of relationships, interests, values, beliefs, and emotions</td>
<td>Intersection of physical skills and cognitive knowledge</td>
</tr>
<tr>
<td>Matching, collecting, capturing, puzzle solving</td>
<td>Matching, puzzle solving</td>
<td>Simulation, matching, exploring</td>
<td>Simulation, matching, building, exploring</td>
<td>Simulation, resources allocating, strategizing</td>
<td>Simulation, role playing</td>
<td>Helping</td>
<td>Simulation</td>
</tr>
</tbody>
</table>
Key conditions for successful implementation of a business game

- Relevance: the selection of a tool depending on the goals of learning
- Improvement of the scenario and the ability to adapt it for a specific environment
- Technically tested elements, verified algorithm
- Feedback quality and facilitation (p. 64)
- Engagement and emotional background make it possible to hold the audience’s attention over a long period of time
- Postgame follow up

Typical errors

- Unnecessarily protracted game. It is difficult to sustain interest over a long period of time. The players quickly lose enthusiasm and become less engaged. A so-called “decision-making center” emerges in some groups. Typically, this is someone from Finance or IT who personally orchestrates the game to the end.
- A primitive algorithm that is too transparent. The players start to “play with the game”; instead of focusing on solving the game problems, they try to cheat it. The risk is especially high if the group includes a participant with qualifications in applied mathematics or IT.
- The user guide is too big. A developer who did not think about the user-friendliness and visual aspects of the rules "steals" valuable time from trainers and customers.
- Poor training of presenters and facilitators reduces the effectiveness of any format.

Maria M. Birshtein (1902–1992) was a Soviet economist, the creator of the “Restructuring of Production due to an Abrupt Change in the Production Program”, the first business game in the world. The game was conducted in 1932 at the Leningrad Institute of Engineering and Economics (Saint Petersburg State University of Engineering and Economics, ENGECON) in order to improve the effectiveness of the intellectual work of the managers and organizers of production facilities.

The largest players in the global market of business simulations and games

- **Capsim**
  - Business simulations
    - (Capstone, Foundation, CapsimCore, GlobalDNA)

- **Glo-Bus**
  - Online simulation of decision making in a competitive market (mainly for students)

- **Innovative Learning Solutions**
  - Business simulations (Marketplace Live, The Retail Management Game), interactive experimental online learning

- **BTS**
  - Many business simulations on different topics, training courses

- **Celemi**
  - Business simulations, experimental learning

- **StratX Simulations**
  - Business simulations (MarkStrat, BrandPro, MixPro, Boss)

### Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932</td>
<td>Maria M. Birshtein invented and conducted the world’s first business game “The Restructuring of Production due to an Abrupt Change in the Production Program”, aimed at addressing production problems.</td>
</tr>
<tr>
<td>1955</td>
<td>Researchers of Rand Corporation developed the first computer-based game.</td>
</tr>
<tr>
<td>1956</td>
<td>The American Management Association developed the widely-known game Top Management Decision Simulation.</td>
</tr>
<tr>
<td>1962</td>
<td>Research conducted in 107 business schools revealed that business simulations were used in 71% of surveyed schools.</td>
</tr>
</tbody>
</table>
### Examples of implementation of algorithms in Sberbank CU

<table>
<thead>
<tr>
<th><strong>Electronic/online simulations</strong></th>
<th><strong>System dynamics simulation</strong></th>
<th><strong>Branching storylines</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customization at the simulation model level</strong></td>
<td><strong>World of Banks</strong></td>
<td><strong>Compliance Quest</strong></td>
</tr>
<tr>
<td></td>
<td>A simulation jointly developed by Sberbank CU and Oliver Wyman</td>
<td>A simulation developed by Sberbank CU</td>
</tr>
<tr>
<td></td>
<td>Simulator of banking workflow. The goal is to achieve certain business performance indicators without violating the risk limits and ratios of the regulator</td>
<td>This individual computer quest simulates a bank environment to test the behavioral attitudes built in the Compliance program. The main character becomes involved in problematic situations requiring management decisions that take compliance risks into account. The development of the detective plot and the final outcome depends on the selected actions and remarks of the main character</td>
</tr>
<tr>
<td></td>
<td>Choice of three crisis scenarios:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complying with the regulator's requirements</td>
<td>Global crisis related to a drop in commodity prices. Tougher regulatory requirements for capital adequacy</td>
</tr>
<tr>
<td></td>
<td>Maximizing revenue/market share</td>
<td>Protracted crisis in the Russian economy. Crisis in Krakosia (international market)</td>
</tr>
<tr>
<td></td>
<td>Maximizing profit</td>
<td>Overheating in the consumer lending market and intervention by the regulator. Issues experienced by major corporate customers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Desktop/face-to-face simulations</strong></th>
<th><strong>Decision Base</strong></th>
<th><strong>Lego Serious Play</strong> (LSP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customization at the facilitation (implementation) level</strong></td>
<td>Developer: Celemi</td>
<td>During the LSP session, the participants use LEGO blocks to metaphorically answer various questions associated with their projects, business models, team, or development strategy.</td>
</tr>
<tr>
<td></td>
<td>Desktop team-based simulation. It develops skills for strategic and operational decision making in a competitive and changing external business environment. The management teams &quot;live&quot; for up to 10 years while establishing and developing their companies. The task of the participants is to make the right investments in new products, markets, and business processes to maximize the value of the company.</td>
<td>In Sberbank CU, LSP is used in such programs as Sberbank Mini MBA (in the course on the Customer-Centric Approach and Service Management to build models of a customer-centered approach) and Sberbank 500 (in the course on Talent Management)</td>
</tr>
</tbody>
</table>

---

**1969**

- The Business Games Handbook (*Graham and Gray*), which includes about 190 business simulations, was published

**1980**

- A survey of universities in Eastern Europe listed more than 30 business simulations used in 22 universities

**1985**

- About 200 business games were known to be used in German-speaking countries

**2016**

- The global market of business simulations and games is estimated at $106.6 billion, with an audience of 2.2 billion gamers [75]
Case method

**Case method**, or **case study**, is one of the main techniques in business education, defined as the methodically organized process of analyzing specific business situations (situation analysis) and debating alternative action plans to adequately deal with the situation, in which the learners develop their professional managerial skills.

A **case** is specially prepared learning material containing a structured description of situations drawn from real business practice.

**Case method principles**

- Inductive approach to learning—students with a certain knowledge base and experience proceed from the particular to the general
- Acquiring the skills of research, analysis, and decision-making that are necessary in future activities, accessing the required level of generalization
- Focusing on building habits and thinking skills. Particular attention is paid to the development of learning ability and the ability to process large amounts of information

**Christopher Columbus Langdell** (1826–1906) was an American lawyer and founder of the case method. He was the author of the first collections of cases, such as *Selection of Cases on the Law of Contracts* (1871), *Cases on Sales* (1872), and *Cases in Equity Pleading* (1883). In 1870–1895, he was first a Professor and then the Dean of Harvard Law School.

**Basic classification of cases**

1. **By amount of information**
   - **Harvard-style cases** provide full and comprehensive information on the business situation. A unique aspect of Harvard-style cases is the large amount of unnecessary information, which requires the learner to use his/her skills to identify the relevant information. Usually, the volume of such cases (without annexes) is no less than 24 pages. The Harvard learning method implies that case studies take up to 90% of classroom instruction, while the theories, notions, and concepts required for informed case study are learned in advance
   - **Mini cases** are cases with up to 10–15 pages of text. They are typically used in corporate learning

2. **By usage method:**
   - **A descriptive case** is a professionally presented practical example illustrating certain provisions of a theory, good or wrong decisions, etc. Usually, these cases are not intended for detailed discussion, but they can be used for individual assignments requiring the learners to analyze the situation and assess the adopted decisions
   - **A study case** is developed for discussion and the learner’s independent analysis and research, rather than for demonstrating how one should or should not have acted or how a theoretical provision works in practice. This type of case does not imply only one right decision; materials that help organize activities to identify the problem and independently search for solutions which are more valuable
Case method

Christopher Columbus Langdell, the Dean of Harvard Law School, began using case studies to train lawyers.

The first National MBA Case Competition was held in the USA (currently, Molson MBA International Case Competition and John Molson Undergraduate Case Competition, JMUCC).

The case method was recognized as the principal method of business education at HBS.

The case method spread across the business schools of Western Europe.

The Case Clearing House of Great Britain and Ireland (since 1991, the European Case Clearing House, ECCH) was founded.

HBS published the first collection of business cases.

The Art of Doing Business, the first experimental course based on case studies, was introduced at HBS.

Harvard Business School (HBS) was founded.

The first National MBA Case Competition was held in the USA (currently, Molson MBA International Case Competition and John Molson Undergraduate Case Competition, JMUCC).

Learning participants

Have work experience

Structure their knowledge through case studies

• Practical applicability
• Best practices and solutions
• Practicing skills
• New knowledge from experience

Have no/minimal experience

Get business experience through case studies

• Relevant information
• Problem structuring
• Decision-making experience

More illustrative cases

A professionally presented practical example, an illustration of individual theoretical provisions, good or bad decisions, etc. To a greater extent, they are suitable for independent situation analysis rather than an expanded discussion. The learner can be given an assignment to analyze and assess previously adopted decisions.

More study cases

Developed for discussion and the learner’s own analysis and research rather than for demonstrating how one should or should not have acted, or how a theoretical provision works in practice. It does not imply that there is "only one right decision," as the greatest value is in the materials that help organize activities to identify the problem and independently search for solutions.

Types of cases

1870
Christopher Columbus Langdell, the Dean of Harvard Law School, began using case studies to train lawyers

1908
Harvard Business School (HBS) was founded

1912
The Art of Doing Business, the first experimental course based on case studies, was introduced at HBS

1920
HBS published the first collection of business cases

1924
The case method was recognized as the principal method of business education at HBS

1950s
The case method spread across the business schools of Western Europe

1973
The Case Clearing House of Great Britain and Ireland (since 1991, the European Case Clearing House, ECCH) was founded

1981
The first National MBA Case Competition was held in the USA (currently, Molson MBA International Case Competition and John Molson Undergraduate Case Competition, JMUCC)
Transformation of the case method

The method has developed in three areas:

1. Customization
2. Dramatization/liveliness to increase the emotional engagement and motivation of learners
3. Higher variability (e.g., cases in VUCA (volatility, uncertainty, complexity, ambiguity) reality)

Traditional written and now also multimedia cases perform the role of codified experience. They should not be seen as being in opposition to new formats based on the case method, including real or live cases. The latter can both supplement a traditional case (the case is presented and analyzed together with real participants of events described in it) and be used as a separate format. The case method based on internal cases is becoming one of the key methods in blended learning (p. 29).

The need of in-house cases

- For the deep customization of programs and immersion of learners in the specific aspects of business
- For analysis and searching for the best practices both within and outside the company
- For analysis of personal mistakes and learning from them

Furthermore, in the modern practice of corporate learning, cases are used to develop a wide range of competences, in particular:

**Behavior change**
- Personal experience in problem solving
- Variability of thinking and willingness to learn from the experience of others
- Speed and quality of decision making
- Readiness to defend one's personal position with sound reasoning

**Development of corporate culture**
- Joint problem solving
- Tolerance for error—it is important to quickly identify and correct mistakes
- Value of innovation
- Productive models of corporate behavior: openness, flexibility, mutual respect

**Risk management**
- Strategic analysis of problems, desire to clarify the outcomes, and long-term implications of decisions
- Instant problem analysis, attention to potential risks
- Experience in solving typical business problems, reducing the likelihood of negative scenarios in the real business environment
- Proactive preparation in a rapidly changing environment

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</thead>
<tbody>
<tr>
<td>The World Association for Case Method Research &amp; Case Method Application (WACRA) was founded</td>
<td>ECCH launched the world’s first online case database</td>
<td>HBS and Xerox launched a project to convert 7,000 cases into a digital format (the first such case was used in a class in 1996)</td>
<td>The first student case clubs were opened in Russia (HSE, MGIMO)</td>
<td>The Russian Case Studies Center in the Graduate School of Management of Saint Petersburg State University (the only Russian collection registered in the Case Center, it currently contains 231 storage units (cases, methodological guidelines)) was founded</td>
<td>The first Russian learner competition in Mind Wrestling (since 2010, the Challenge) occurred</td>
<td>ECCH was transformed into the Case Center (the largest global center of cases, with more than 100,000 storage units, including cases, methodological guidelines, and videos)</td>
</tr>
</tbody>
</table>
With the right focus, the case method can successfully compete with simulations in the area of cognitive strategies.

### Area of transformation of the case method

<table>
<thead>
<tr>
<th>Area of transformation</th>
<th>Overcoming limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching the case type with the tasks addressed by the case (expected outcome)</td>
<td>Solving real rather than imaginary tasks</td>
</tr>
<tr>
<td>Relevance of the case type to the target audience</td>
<td>Independent research for the solution</td>
</tr>
<tr>
<td>The case includes a problem and a plot</td>
<td>Up-to-date cases</td>
</tr>
<tr>
<td>Nontrivial solution</td>
<td>Uniqueness</td>
</tr>
<tr>
<td>Preparing participants to solve the case</td>
<td>Acquiring one’s own experience rather than copying the experience of someone else</td>
</tr>
<tr>
<td>Method of implementation</td>
<td>Not only solution but also the implementation</td>
</tr>
<tr>
<td>Generalization</td>
<td>Adaptivity</td>
</tr>
</tbody>
</table>

**Traditional case: learning by thinking**

- Reading, researching, analyzing data, drawing conclusions, planning action
- Problem/illustration
- Abstract logic level
- IQ

**Live case: learning by acting**

- Watching, listening, analyzing actions, trusting, comparing, trying on, evaluating oneself
- Role model
- Subject-specific logic level
- EQ

### Cases for VUCA reality

**VUCA** (volatility, uncertainty, complexity, ambiguity) is a concept formulated in the 1990s by Stefan Garros, a US Army colonel and PhD in Behavioral Sciences. Rather than referring to a temporary state of the environment, VUCA describes a new quality of reality to which it is important to adapt at the level of behavior, skills, thinking, and mindset.

**VUCA cases**

- Teach how to make decisions in conditions of fundamentally incomplete information, to find meaning in copious, often unrelated, and contradictory information, to take into account the interrelations of many factors
- Develop variability of thinking, scenario vision, and the ability to quickly switch between different scenarios and easily abandon your decision in favor of a better one
- Build a networking mindset, a communicative model of decision making, and a tolerance for contradictions and mutually exclusive options in the development of events
- Help learn how to experience psychological comfort in the face of information overload
Developing a case

Required elements

- Problem
- Expertise
- Scenario
- Drama
- Context

Case story

Describing a situation that includes a set of events related to a particular problem as a single story

In cases used for business education, the business environment, organizations, and decision makers are the key objects of study

Storytelling, the foundation of a live case, is a method for influencing the audience by telling stories with real or fictional characters

Principles of successful storytelling

- The story is personally significant for the speaker
- It includes drama: the conflict/collision of interests and circumstances
- Life cycle of a story. Composed of three parts: the starting point, climax, and denouement
- Threefold repetition of the main point
- Message: the conclusion should be evident but not declared

Seven archetypal plots

<table>
<thead>
<tr>
<th>Man vs. man</th>
<th>Man vs. nature</th>
<th>Man vs. God</th>
<th>Man vs. himself</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man at the crossroads</td>
<td>Man vs. society</td>
<td>Man and woman</td>
<td></td>
</tr>
</tbody>
</table>

Plots: business

- Achieving BIHAG-style goals (Big Hairy Audacious Goal)
- Leader and employees: impact on career and development
- Customer-centric approach: difficult cases with customers
- Leadership as a personal choice: setting goals and overcoming obstacles

Collection of cases

For the corporate learning process, cases are provided by the main case clearing houses:

1. **International case-clearing houses:**
   - The Case Center (formerly ECCH)

2. **Case centers of the world’s leading business schools:**
   - Harvard Business Publishing (USA), INSEAD (France, UAE, Singapore), Stanford Graduate School of Business (USA), IMD (Switzerland), Ivey Publishing (Canada), Darden School of Business (USA), Harvard Kennedy School Case Program (USA), IBS Hyderabad (India), Amity Research Centers (India)

3. **Case centers of Russia’s top-rated business schools:**
   - The Graduate School of Management of St. Petersburg University. This is the only Russian collection registered in the Case Center, and it is ranked 33rd by the number of cases as of January 1, 2017

4. **Customized collections of company cases**
   - In 2016, Sberbank Corporate University published Cases for Programs of the School of Finance, a textbook with 28 cases in the areas of economics, bank finance, enterprise finance, and corporate finance. The collection includes the best cases selected in the first competition of cases in the area of finance held among Sberbank executives (the textbook has a total of 21 coauthors)
**Collaborative learning**

**Collaborative learning** is an approach which assumes that the learning is based on close interaction among learners or between learners and the instructor. The participants acquire knowledge through the active joint search for information, discussion, reflection, and use of that information in the form of group projects, joint R&D, creative sessions, brainstorming, etc. [52]. Some authors do not consider collaborative learning to be a learning method but rather just a theory of interaction in the learning process [40].

**Effectiveness of collaborative learning**

Collaborative learning is most effective in groups predominantly made up of experienced employees who can share their expertise with each other and with less experienced colleagues:

- For group work on a project where it is necessary to go through the entire cycle of project preparation, from goal setting to achievement of outcomes
- For solving semistructured tasks, multivariate analysis, and in other cases in which the joint intellectual efforts of several (many) participants are needed to find a solution to the problem
- For training communication skills, observing and analyzing role models, and identifying opportunities to create project teams
- For relaying knowledge gained by participants in previous stages of learning
- While creating a learning environment to test a project before release

**Assessment of** collaborative learning effectiveness is often subjective because it depends on numerous unpredictable factors:

- Duration: in collaborative learning, it is not always possible to set a time frame
- Difficulty in assessing the amount of acquired knowledge and extent of its assimilation
- Spontaneous nature of learning: no learning program/scenario
- Subjective feedback in terms of form/content/emotional coloring. There could be psychological concerns. For example, in some corporate cultures, it could be difficult to evaluate colleagues and the extent of their participation in the learning process, etc.

**Tools for collaborative learning**

- **Online collaborations**
  - Internal online collaborations (social networks, intranet, blogs)
  - Special resources for online collaborations (social and educational platforms, portals, etc.)

- **"Live" collaborations**
  - Conversations, discussions
  - Brainstorming
  - Project teams

- **Virtual collaborative spaces**
**Competence**

A competence is the ability of a specialist (employee) to solve a specific category of professional problems/tasks. It also includes formal requirements for the personal, professional, and other qualities of a company's employees (or any group of employees).

There is a similar term “competency” that has an odd relationship. Even though “competence” and “competency” seem to mean the same thing, they are often used in different contexts. We use “competency” when talking about an individual being more task-oriented. If we want to highlight the general abilities of a person we use “competence”.

**J. Winterton's typology of competences in management theory:**

<table>
<thead>
<tr>
<th>Professional</th>
<th>Personal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual</td>
<td>Cognitive competences</td>
</tr>
<tr>
<td>Operational</td>
<td>Functional competences</td>
</tr>
</tbody>
</table>

**Metacompetences**

Metacompetences include the inherent characteristics of an individual. The ability of individuals to realize their own intellectual strengths and weaknesses, the way they act in different circumstances when solving problems, the use of knowledge and skills, and compensation for gaps in competences [77].

This includes:
- Skills for planning, launching, testing, and evaluating one's own cognitive processes
- Understanding of the difficulty level of tasks
- Ability to work with information
- Skills for using effective cognitive aids and tools, such as charts and analogies

**Social competences**

A number of researchers have further expanded the concept of J. Winterton and identified additional competences that may be tentatively categorized as social competences.

F. T. L. Leong and P. T. Wong distinguish between cultural and cross-cultural competences within the situational model of competences [89].

Such competences are especially relevant in intercultural and interreligious communication.

R. E. Boyatzis, J. M. Batista-Foguet, et al., separately describe emotional competence as the ability to identify, perceive, and use emotional information about oneself or others that mediates the effective performance of work.

R. Boyatzis combines these competences into the concept of emotional intelligence (EI) [10].
Typology of competences in developmental psychology [68]

- **Cognitive competences**
  Rule-based abstract knowledge about the entire field of activity

- **Functional competencies**
  The methods and skills required for using cognitive competences in specific situations

- **Operational competences**
  Assessing the problem and selecting the appropriate strategy to solve it

This approach is criticized because it is limited to only cognitive aspects and denies socially conditioned transformation in the subjective outlook of the individual [58].

**Competency model**

**Competency model** and a document describing this model are tools of Human Resource Management and a key element in the strategy of the company. This model includes a set of competences required to successfully perform specific work in the given organization. Models can be created for specific jobs, work groups, occupations, industries, and organizations.

Competence is a useful term that helps bridge the gap between education and work requirements [154]. For the purposes of education, it is important that the competences required in certain (typical) areas, such as sales and management, have been carefully studied. There is broad consensus on key skills, attitudes, and behaviors required for success. There is also a methodology for using these models to identify the strengths and weaknesses of employees, project teams, and functional units.

A competency model is an internal corporate document that may take various forms but typically includes the following:
- A list of competences, such as "being a team player"
- A description of the behavior and specific actions associated with each competence
- A diagram of the model

Generally, organizations create a model structure by combining knowledge and skills requirements into specific categories [36], [42], [156].

**Sberbank competency model**

**New competences are the extension of our values**
### Competence assessment

**Objective competences**
Standard tests of activities and potential activities are used for assessment

**Subjective competences**
Assessing the abilities and skills required to perform tasks and solve problems

### Time to competence

Time spent by the learner until stable manifestation of the target competence is achieved.

### Core competences

Core competences are those that are independent from the context; they can be used without loss of effectiveness in different institutional settings, occupations, and tasks. They usually include basic skills and competences such as literacy, numeracy, and general education; methodological competences, including problem solving and IT skills; communication skills, including the ability to communicate thoughts in writing and the ability to make a presentation; analytical competences, such as critical thinking, etc.

### Transformation of the current model of competences

Researchers distinguish 3 consecutive stages in the development of assessing the professional level of employees

<table>
<thead>
<tr>
<th>Preindustrial stage</th>
<th>Industrial stage</th>
<th>Postindustrial stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical theories of personnel management</td>
<td>Theories of human relations and human resources</td>
<td>Theory of human capital</td>
</tr>
<tr>
<td>Requirements for the ability of the employee to perform job activities and operations—<strong>know-how and skills</strong></td>
<td>Requirements for the degree of proficiency in specific production skills established in the requirements for professions and specialties—<strong>qualification</strong></td>
<td>Requirements for the range of knowledge, adaptability, and professional and personal qualities needed to achieve the economic goals of a specific organization—<strong>competence</strong></td>
</tr>
</tbody>
</table>

### Model of competences designed by the Association for Talent Development (ATD) for professionals in the area of learning and development

**Areas of expertise**
- Performance improvement
- Educational design
- Implementation of learning
- Learning technology
- Assessment of learning impact
- Educational program management

**Fundamental competences**
- Business skills
- Global mindset
- Industry knowledge
- Interpersonal skills
- Personal skills
- Technology literacy
Competences of the future

The near future will demand a radically new set of competences that are essential in the world of VUCA (p. 44)—volatility, uncertainty, complexity, ambiguity. In five years, more than a third of important workplace skills (35%) will change. By 2020, the fourth industrial revolution will lead to the rise of advanced robotics, autonomous transport, artificial intelligence, machine learning, advanced materials, biotechnology, and genomics.

<table>
<thead>
<tr>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive problem solving</td>
<td>Comprehensive problem solving</td>
</tr>
<tr>
<td>Activities coordination with other people</td>
<td>Critical thinking</td>
</tr>
<tr>
<td>People management</td>
<td>Creativity</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>People management</td>
</tr>
<tr>
<td>Interaction, negotiation</td>
<td>Activities coordination with other people</td>
</tr>
<tr>
<td>Quality control</td>
<td>Emotional intelligence</td>
</tr>
<tr>
<td>Service-oriented approach</td>
<td>Judgment ability and decision making</td>
</tr>
<tr>
<td>Judgment ability and decision making</td>
<td>Service-oriented approach</td>
</tr>
<tr>
<td>Active listening</td>
<td>Interaction, negotiation</td>
</tr>
<tr>
<td>Creativity</td>
<td>Cognitive flexibility</td>
</tr>
</tbody>
</table>

The Atlas of New Professions compiled by the presidential Agency for Strategic Initiatives of the Russian Federation and SKOLKOVO Foundation in 2014 identified 132 new professions in 19 fields and more than 30 retiring professions which, according to experts, are expected to disappear in the near future.

Supraprofessional competences according to the Atlas:

- Systemic thinking (ability to define complex systems and work with them. This includes system engineering.)
- Intersectoral communication skills (understanding the technology, processes, and market trends in various related and unrelated sectors)
- Ability to manage projects and processes
- Programming IT solutions/managing complex automated systems/working with artificial intelligence
- Customer-oriented approach; ability to work with customer requests
- Multilingualism and multiculturalism (fluency in English and knowledge of a second language, understanding national and cultural contexts of partner countries, understanding specific aspects of working in various industries in other countries)
- Ability to work with teams, groups, and individuals
- Work in the mode of high uncertainty and rapidly changing conditions of tasks (ability to make quick decisions, respond to changing work conditions, ability to allocate resources and manage time)
- Ability for artistic creativity; developed aesthetic taste
- Lean production
Content creation tools

Content creation is a term used to describe various practices that result in any type of content, including text, videos, graphic files, presentations, etc., for educational purposes.

In the real digital world, amid unlimited access to information and the spread of distance (p. 76) and adaptive (p. 13) forms of learning, and with the development of customization (p. 64) and personalization (p. 193) of educational products, content creation using one’s own resources has become a prerequisite of effective competition for learners’ attention.

Independently prepared content is one of the principles for using a flipped classroom (p. 95), a core model of blended learning (p. 29). The instructor prepares materials for learners’ independent work in advance and during classes helps them complete practical assignments. Engagement and interest in the material is largely achieved through the personality of the instructor.

Benefits of proprietary content

- Relevant
- Customized
- Adaptive
- Meaningful
- Embedded into the learning system

The described trend is shaping the market of ready-made solutions and tools for content creation that can be used by instructors without special (design, editorial, etc.) training.

Popular content creation tools

Long-format text

Flexible, user-friendly, and multifunctional tool. It represents a "canvas" of text with many embedded items. This makes it possible to add video, illustrations, and photos to the text (including scrolling), visually divide the text into meaningful units by using headings to highlight key ideas, and add quotes, GIFs, etc.

<table>
<thead>
<tr>
<th>Blogger</th>
<th>Trello</th>
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<tbody>
<tr>
<td>Ghost</td>
<td>Tumblr</td>
</tr>
<tr>
<td>Medium</td>
<td>WordPress</td>
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<tr>
<td>Telegraph</td>
<td>Write.as</td>
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<tr>
<td>Tilda</td>
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</table>

Presentations

Online slide designer. It can be supplemented with advanced animation features. This may include smooth transitions from slide to slide and the ability to show the entire picture—the full list of the presentation slides.

<table>
<thead>
<tr>
<th>Canva</th>
<th>Prezi</th>
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<tbody>
<tr>
<td>Emaze</td>
<td>Slide</td>
</tr>
<tr>
<td>Flipsnack</td>
<td>Slidebean</td>
</tr>
<tr>
<td>Haiku Deck</td>
<td>SlideDog</td>
</tr>
<tr>
<td>Infogram</td>
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</tbody>
</table>
**Video: screen capture**

Tools for video recording directly from your monitor.
The user determines the screen or window area to be captured and sets the recording parameters before starting the recording. The programs can also record audio from a microphone or speakers, or display video from a webcam on the screen.
Furthermore, the tools can record screen images in video files of different formats, edit the video and export it in formats which the program supports.

**Video: content creation** *(animated clips and "live" presentations)*

For example, the online service **GoAnimate** is a design set with a built-in selection of characters, backgrounds, sounds, transitions, animated "live" backgrounds, art filters, etc. It can create a video course, a lesson, or a training video with characters, dialogs, storyline, voice acting, and animation.

**Video: adding interactive elements**

An online service for video editing and adding voice comments and questions on covered material.
You can use existing video training databases, such as YouTube, KhanAcademy, LearnZillion, and others; this makes searching for educational materials much faster. It also makes it possible to track which learners have already watched the video, and how they handled the assigned tasks.

**Interactive content**

Tools for creating computer simulations.

---

Camtasia  
Capto  
Cattura  
Screeencastify  
GoAnimate  
PowToon  
Moovly  
EDpuzzle  
PlayPosit  
Zaption  
Vidzor  
BranchTrack  
Rapt Media
Content curation

Content curation is a comprehensive approach to learning solutions management, which implies selection and adaptation of content on a specific topic from available sources and arrangement of the selected content into a coherent and consistent educational solution.

Key trends contributing to the development of content curation in today’s world

Lightning-fast changes
Content curation makes it possible to combine the most relevant educational materials that are in line with current trends.

Unlimited access to educational content
The aggregation and combination of available content makes it possible to create a diversified portfolio of programs that meet a wide range of needs.

Multiple formats and cross-disciplinary approach
A combination of various subjects and formats complemented by the context and comments of expert curators makes it possible to achieve outstanding results.

Minimal time for creating new programs
With the involvement of customers as content curators, the aggregation and combination of previously created content makes it possible to quickly create customized education solutions (p. 64).

Modern content curation goes beyond the selection of common educational materials. Content used in training is extremely diverse (online courses, electronic tutorials (p. 84), infographics, longreads, texts, etc.) and includes user-generated materials from social networks: posts, blog entries, comments, and threads (discussion chain in comments), motivators, collages, self-produced videos, podcasts, etc.

Content curation models

Aggregation
Bringing together separate pieces of content about a particular topic into a single location, e.g., a collection of videos on educational trends, or microlearning, or agile

Chronology
Organizing random content units in chronological order to show the evolution of an idea.

Generalization
Recognizing a larger trend in the sea of seemingly less important content.

Merging
Unique curated juxtapositions where merging existing content is used to create a new point of view on the same topic, rising to a new level of understanding, and creating a new and original view on the topic [18]. A Wikipedia article is a good example of this approach.

Distillation
Selecting the most important and relevant pieces, sorting out everything secondary and unimportant. It includes sorting content by keywords and hashtags in order to choose exactly what is needed for the educational solution.
Bloom’s Taxonomy is a hierarchy of learning objectives in education, which was introduced in 1956 by a group of scientists headed by Benjamin Bloom. Learning objectives are statements that define the expected goal of the lesson or activity in terms of demonstrable skills or knowledge that will be acquired by a learner as a result of instruction. Learning objectives can be cognitive, affective, and psychomotor, from the simplest - recalling - to the most complex, which is making judgements on the value and significance of an idea. [21]

The cognitive domain of taxonomy includes the following categories: knowledge, comprehension, application, analysis, synthesis, evaluation

The affective (emotion-based) domain combines receiving, responding, valuing, organizing, perceiving, and distributing

The psychomotor domain combines the objectives related to the coordination of brain and muscle activity skills: writing and speech, labor and physical activity.
The disadvantages of Bloom’s taxonomy include disregarding comprehensive use of cognitive processes and failure to distinguish concepts from different categories: specific learning outcomes (remembering, comprehension, application) and mental activities required for these results (analysis, synthesis, evaluation). In 2001, a group of cognitive psychologists led by Lorin W. Anderson published a new version of the taxonomy, which clearly shows the distinction between the thinking and the ability to use cognitive skills in problem-solving [4].

<table>
<thead>
<tr>
<th>Cognitive processes</th>
<th>Metacognitive</th>
<th>Procedural</th>
<th>Conceptual</th>
<th>Factual</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Identify</td>
<td>Tabularize</td>
<td>Describe</td>
<td>List</td>
</tr>
<tr>
<td></td>
<td>Create</td>
<td>Predict</td>
<td>Interpret</td>
<td>Generalize</td>
</tr>
<tr>
<td></td>
<td>Achieve</td>
<td>Calculate</td>
<td>Expertise</td>
<td>Classify</td>
</tr>
<tr>
<td></td>
<td>Expertise</td>
<td>Differentiate</td>
<td>Explain</td>
<td>Regulate</td>
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<tr>
<td></td>
<td>Reflect</td>
<td>Decide</td>
<td>Evaluate</td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>Create</td>
<td>Construct</td>
<td>Project</td>
<td>Combine</td>
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</tbody>
</table>


Traditional representation of cognitive domain in Bloom’s Taxonomy

- Evaluation
- Synthesis
- Analysis
- Application
- Comprehension
- Knowledge

Level 1
Educational questions

Level 2
Problem questions

Level 3
Essential question

Representation of revised cognitive domain in Bloom’s and Anderson’s Taxonomy

<table>
<thead>
<tr>
<th>Metacognitive</th>
<th>Procedural</th>
<th>Conceptual</th>
<th>Factual</th>
<th>Cognitive processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>Tabularize</td>
<td>Describe</td>
<td>List</td>
<td>Remember</td>
</tr>
<tr>
<td>Create</td>
<td>Predict</td>
<td>Interpret</td>
<td>Generalize</td>
<td>Understand</td>
</tr>
<tr>
<td>Achieve</td>
<td>Calculate</td>
<td>Expertise</td>
<td>Classify</td>
<td>Apply</td>
</tr>
<tr>
<td>Expertise</td>
<td>Differentiate</td>
<td>Explain</td>
<td>Regulate</td>
<td>Analyze</td>
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<tr>
<td>Reflect</td>
<td>Decide</td>
<td>Evaluate</td>
<td>Range</td>
<td>Evaluate</td>
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<tr>
<td>Create</td>
<td>Construct</td>
<td>Project</td>
<td>Combine</td>
<td>Create</td>
</tr>
</tbody>
</table>
Content curator

Content curator takes on and combines the following roles: (p.201):

**Subject Matter Expert (SME)** — a specialist who can clearly describe a subject, its terminology, features, processes and patterns, as well as ensure the use of best professional practices and trends for the subject’s learning.

**Learning Experience Designer / Instructional Designer** — a specialist who designs methodology and approaches to learning experience, which is well-organized system with clearly defined characteristics, logical structure, and process of its implementation.

<table>
<thead>
<tr>
<th>Merging</th>
<th>Merging</th>
<th>Merging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curator’s skills</td>
<td>Curator’s competencies</td>
<td>Curator’s duties</td>
</tr>
<tr>
<td>Research</td>
<td>Social intelligence</td>
<td>Filter incoming content</td>
</tr>
<tr>
<td>Media literacy</td>
<td>Adaptive thinking</td>
<td>Check the sources</td>
</tr>
<tr>
<td>Communication</td>
<td>Project thinking</td>
<td>Classify using metadata</td>
</tr>
<tr>
<td>Editing</td>
<td>Cross-cultural competence</td>
<td>Offer items from other curators</td>
</tr>
<tr>
<td>Semantic</td>
<td>Virtual cooperation</td>
<td>Add an introduction for a particular audience</td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td>Comment a text for better understanding</td>
</tr>
<tr>
<td>Informational and library</td>
<td></td>
<td>Format the content</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td>Integrate links</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optimize, edit titles</td>
</tr>
</tbody>
</table>

Siemens case on content curation

The “Learning World” of Siemens’ “Global Learning Campus” is a trendsetter in the Corporate Learning arena. It provides easy access to thousands of curated learning objects from Siemens internal and external sources. The learners can customize the platform to their needs (“My Learning World”), and are able to follow topics, influences, or channels. Learning paths allow a structured navigation through the universe of learning offerings. A global network of learning curators ensures continuous updated relevant content objects in different languages and focusing on strategic topics, like Digitalization, Corporate Core Technologies, Unconscious Bias, etc.
The curation process follows the “seek, sense, share” approach to:

<table>
<thead>
<tr>
<th>Draw attention to what really matters</th>
<th>Make it easily accessible in one place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the audience, the context, the changes</td>
<td>In various but specific contexts</td>
</tr>
<tr>
<td>Act as a human filter. Give sense</td>
<td>Via an efficient search</td>
</tr>
<tr>
<td>Give employees what they really need!</td>
<td>Via shared learning recommendations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allow employees to create their own learning story</th>
<th>Some facts of the Learning World:</th>
</tr>
</thead>
<tbody>
<tr>
<td>To personalize their learning environment</td>
<td>7 learning channels</td>
</tr>
<tr>
<td>To follow relevant and desired topics or experts</td>
<td>9 learning exhibitions</td>
</tr>
<tr>
<td>To share learning recommendations and experience</td>
<td>70,000+ unique users</td>
</tr>
<tr>
<td></td>
<td>3000+ content objects</td>
</tr>
</tbody>
</table>

Several significant works on content curation were published: “Is Content Curation in Your Skill Set? It Should Be” by e-learning guru David Kelly, “The Content Curation Handbook” by Eibhlin MacIntosh, and “Content Curation” by Dan Donahue.

The Training Industry Company included content curation into “Training Process Framework”.

The platform Zeef is launched. It allows to find and share the best dev/tech resources through short and to the point lists.

The research paper “The New Learning Architect” by Clive Shepherd states that content curation becomes an integral part of a learning experience designer’s activity.

Pawan Deshpande launched the largest online resource on content curation, Curata.com, which publishes relevant analytics and reviews.

Some facts of the Learning World:

- 7 learning channels
- 9 learning exhibitions
- 70,000+ unique users
- 3000+ content objects

7 learning channels
9 learning exhibitions
70,000+ unique users
3000+ content objects
Corporate learning models

A corporate learning model is a learning system based on the distribution/balance of learning types (formal, informal, and social) adopted by the organization.

Formal learning is structured learning within specific educational programs, courses, and other educational events. In this case, the goals and learning outcomes are formally defined and put in writing.

Informal learning is learning with non-defined goals. Learning is often a "side effect" of other activities (work, communication, etc.). Informal learning is usually associated with daily professional activities and includes on-the-job learning (p. 186) by trial and error. In a broad sense, informal learning also includes social learning (p. 207) and collaborative learning (p. 46). However, some methods of informal learning, such as reading, cannot be attributed to social learning.

Social learning is learning through interaction with other learners. Most often, it takes place informally and unconsciously and is a natural outcome of the professional activity and life of the learner.

70-20-10 model

A model corporate learning model is based on the following distribution of theoretical and practical approaches:

- 70% of the time is spent on learning in the workplace
- 20% of the time is spent on social learning (includes guidance, coaching, mentoring, tutoring, etc.)
- 10% of the time is spent on formal learning

The model was designed by the Center for Creative Leadership (CCL)
Morgan McCall and his colleagues at the Center for Creative Leadership are considered founders of the 70-20-10 model. Two of them, Michael Lombardo and Robert Eichinger, described the 70-20-10 learning model in their book "The Career Architect Development Planner" (1996). Workplace experience, tasks, and problem-solving account for 70% of learning. Mentorship and examples (positive and negative) account for 20% of learning. The remaining 10% comes from formal traditional learning, such as courses, reading, etc.

**Criticism of the 70-20-10 model**

In recent years, many scientists have questioned the expected effectiveness of the 70-20-10 model. The critics point out:
- The lack of empirical supporting data
- The need for even numbers
- Subjectivity

It is also assumed that the model does not reflect global trends in corporate learning, especially those associated with technology development. For example, this model does not take into account the growing role of social learning.

**Application**

One of the most common learning approaches in large corporations. The traditional version of the 70-20-10 model is used in Hewlett-Packard for talent development. According to company representatives, this model allows the learning process in the workplace to be effectively organized. MARS is a proponent of the 70-20-10 model for training not only line managers but also its senior management. Google uses this model in innovation management where the company must allocate 70% of its time to addressing key business tasks, 20% to projects related to core activities, and 10% to other projects.

**60-20-20 model**

Sberbank has developed and implemented a 60-20-20 model of corporate learning, which is in line with the new model of competences adopted by the Bank:
- 60% of time is spent on learning in the workplace
- 20% is spent on informal learning
- 20% is spent on formal learning

An increase of the formal learning percentage is justified by several factors. First, the imperfection of the traditional higher education system and the inability of universities to keep pace with accelerating change in the labor market and company requirements for graduates' practical skills. Second, due to digital transformations in business activities, learning becomes a key factor for all transformational changes of business activities, operations, technology and people.

**33-33-33 model**

Time is allocated evenly between formal, informal, and social learning

The model was designed by the Association for Talent Development (ATD)
Corporate university

A Corporate University is an educational division designed to support a company’s strategic development and to be a catalyst for its renewal by training managers and other employees, as well as by creating, accumulating and disseminating advanced knowledge within the organization.

The main goal of a Corporate University (CU) is to make the parent company more competitive by shaping and strengthening its unique human capital and its organizational ability to grow and change at a pace no less than that of change in the business environment. Investments in the CU are a strategic project of the company aimed at creating an intangible asset (the CU infrastructure is secondary in this sense) which cannot be bought on the market and which is intended to become a source of sustainable (and extremely difficult to copy) competitive advantages—a profoundly customized system for employee learning and development, knowledge management and entrenchment of the corporate culture. Corporate universities differ from traditional universities in their synthesis of learning and practical work toward achieving the business objectives of specific companies, and they differ from traditional corporate training centers in their systematic approach to developing talent in order to meet the company's strategic goals and in their internal expertise in advanced concepts and learning methods.

Synonymous terms

Corporate Academy (P&G Leadership Academy, Daimler Corporate Academy, Rosatom Academy), Corporate Institute (Allianz Management Institute, Gazprom Corporate Institute), Leadership Development Center (Jack F. Welch Leadership Development Center, Boeing Leadership Center), Business School (Lufthansa School of Business, ING Business School from 1998 until it was renamed to ING Bank Academy in 2011). The variant "Corporate Academy" is typical in continental Europe, where historically the term "university" is strongly associated with traditional universities performing fundamental research and following academic approaches to education. Many companies do not use the adjective "corporate," simply calling their CU a "university" (Apple University, ArcelorMittal University, Capgemini University, Deloitte University, Toyota University, Beeline University). The CU format is also used in government organizations. A few examples are: in the USA: the Defense Acquisition University on the federal level and Chesterfield University on the county level; and in Russia, the Moscow Metropolitan Governance University, and the Corporate University of the Ulyanovsk Region.

CU growth factors in the modern world

Today there are more than 4 000 CUs worldwide [41]. The first corporate training centers, the prototypes of modern CUs, emerged in the USA in the 1950s. The 1990s–2000s saw a rapid expansion of CUs: in the United States, their number increased from forty in the mid-1980s to four hundred in the early 1990s and over two thousand in 2000, while in Europe, where CUs emerged in the early 1970s, they quickly spread in the 1990s; by 2001, Europe had at least one hundred CUs. Currently, almost all Fortune 500 companies have fully developed CUs. More than forty CUs are functioning in Russia (and more than one hundred Russian companies have stated that they have a corporate university project or program).

As early as the 1990s, leading companies in all economically developed regions of the world understood the key role of human capital in creating sustainable competitive advantages in the developing knowledge economy. Another factor in the growth of the number of CUs was the inability of traditional institutions of higher education to keep pace with accelerating changes in labor markets and the requirements of companies in terms of their graduates' practical skills. Finally, the creation of CUs was stimulated by corporate globalization strategies and, in particular, the phenomenon of the leading companies of the BRICS countries, which made global competitiveness and the creation of adequate personnel training systems a priority (examples are the CUs of Huawei, Infosys, Banco do Brasil and Sberbank).
Classifications of Corporate Universities

**By organizational and legal form**
- A department within a company (usually part of the HR function or subordinated directly to the CEO)
- A subsidiary company (in Russia, usually having the status of an Autonomous Non-Commercial Organization, for example, the CUs of Rosatom, Roscosmos and Sberbank)

**By portfolio of programs**
From a small family of programs for the development of key leaders of the company to a broad menu (from a few dozen to hundreds) of programs for the development of soft, professional (or hard), and digital skills for managers and employees, which may include both short training sessions and longer, "level" programs for transition to the next level of management, including diploma programs—mini-MBA and "non-academic master's" programs (for example, the UBS Master in Wealth Management or Repsol Energy Management Master), as well as various combinations of in-class, blended, distance and electronic programs.

**By infrastructure**
From a few rooms in one of the company's offices to a full university campus with classrooms, conference rooms, and hotel and sports facilities. Numerous combinations of functional digital platforms for corporate training (virtual schools, educational portals, social media, etc.).

**The emergence of the modern CU concept: important books and analytics**
- 1990—Peter Senge's book "The Fifth Discipline," which was the first to show the relationship between organizational learning and company strategy and to formulate the concept of a "learning organization."
- 1997—A McKinsey report entitled "The War for Talent," which spurred the creation of a new system of corporate learning/talent development among the world's leading companies
- 1990—Jeanne Meister’s book "Corporate Universities: Lessons in Building a World-class Work Force"; after the publication of which the term "corporate university" became commonly used.
- 1997—A McKinsey report entitled "The War for Talent," which spurred the creation of a new system of corporate learning/talent development among the world's leading companies

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<tbody>
<tr>
<td>Early models of CUs were created by the American companies Motorola, General Electric (GE), Disney, Arthur D. Little and McDonalds</td>
<td>The first European prototype of the modern CU, Lufthansa’s international training center, was created</td>
<td>Rebuilding of GE’s Corporate University in Crotonville by Jack Welch began. The university became an icon of the new CU model, contributing to the company’s strategic renewal</td>
<td>The first CUs of European (Unipart, Anglian Water, Lufthansa, Ericsson, Heineken, Daimler, Capgemini) and Russian (Gazprom, AVTOVAZ, Vimpelcom) companies were created</td>
<td>The first professional association of CUs was founded: The Corporate University Xchange (CorpU), with headquarters in the US and the UK</td>
<td>The EFMD established the first (and currently the most prestigious) global professional accreditation for CUs—CLIP (Corporate Learning Improvement Process)</td>
<td>The first global association of CUs was established: The Global Council of Corporate Universities (GlobalCCU)</td>
</tr>
<tr>
<td>In Russia, the International Association for Corporate Learning (IACL) was founded</td>
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</tbody>
</table>
Two important terms associated with the modern concept of the CU

**Learning & development, L&D,** is the modern understanding of one of the key aspects of the human resource management function (people management), which replaced its earlier designation, in the era of “personnel management” T&D—**training & development.** While these terms may seem synonymous, they reflect qualitatively different approaches to corporate learning: discrete training sessions to achieve the tactical goals of personnel development differ from systematic learning to ensure the implementation of a company’s business strategy. In addition, the spread of the term “learning” reflected the growth of a qualitatively new approach to learning in the knowledge society: a shift in the emphasis from the transfer of knowledge and skills from an instructor to self-learning and collaborative learning of company employees as well as intensification of the trend toward **lifelong learning** (p. 156). The difference in potential between these two forms of learning organization is also significant. A training center can help support and improve the current capabilities of an individual or a team, while a CU as a format typical of the L&D approach, can, among other things, help develop, maintain and communicate corporate culture and quickly change organizational capabilities.

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**The Chief Learning Officer, CLO,** is the key executive for the learning function in modern companies, usually having the status of a (senior) vice president, and is a typical example of a position introduced by organizations that understand talent development as a strategic priority. Here we may draw an analogy to the position of CIO (Chief Information Officer), which spread rapidly in leading companies worldwide in the 1990s as one of the main symbols of awareness of the strategic role of information technology and systems for competition in the coming information age. Jack Welch is thought to have made GE the first company with such a senior executive position when he appointed Steve Kerr as CLO. By the early 2000s, it became the norm, and in 2003 the first issue of the *Chief Learning Officer* (CLO) magazine came out in the United States; it is now the most authoritative periodical in the world for L&D professionals, and holds prestigious global recognitions, such as the Learning Elite and the Learning in Practice Awards.

---

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>The Russian professional T&amp;D industry journal Corporate Universities first came out.</td>
</tr>
<tr>
<td>2008</td>
<td>The first book on the experience of creating a CU in a Russian company (Norilsk Nickel) [78] was published.</td>
</tr>
<tr>
<td>2009</td>
<td>A Russian CU (Beeline University) received international recognition for the CorpU Award for Supporting Corporate Learning Strategy.</td>
</tr>
<tr>
<td>2013</td>
<td>The increased role of CUs worldwide was noted by Forbes magazine in an article entitled “Corporate Universities: An Emerging Threat to Graduate Business Education.”</td>
</tr>
<tr>
<td>2015</td>
<td>Russia received its first rating &quot;15 Leaders of Corporate Education,&quot; in RBC magazine.</td>
</tr>
<tr>
<td>2016</td>
<td>Sberbank CU became the first in the history of Russian business to be awarded the CLIP accreditation and CLO magazine’s silver award in the global Learning Elite competition &quot;Best CU—Business Impact&quot; (Sberbank CU) and the silver prize in the category &quot;Best CU—Innovation&quot; (MTS CU).</td>
</tr>
<tr>
<td>2017</td>
<td>Two Russian CUs received awards in GlobalCCU’s professional competition: the gold prize in the category “Best CU—Business Impact.”</td>
</tr>
</tbody>
</table>

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**John Francis "Jack" Welch, Jr.** (b. 1935) is an American manager, one of the greatest of the twentieth century (alongside Henry Ford and Alfred Sloan). In 1981–2001, he was the CEO of General Electric, where he introduced revolutionary approaches to managing a big business. He rebuilt the executive management training system at GE’s CU, which had been operating since 1956 in Crotonville, New York, making it a key tool in the strategic renewal of the company. Welch also introduced an innovative approach to learning—such as "leaders teaching leaders"— and was the first to use a CU to educate executives of GE client companies.
Changes to the CU paradigm for the digital world

A new learning paradigm for the digital transformation of a company

- Learning is an important factor in any kind of transformation, whether of business, operations, technologies, or people

A new learning paradigm in the digital world

- Focus shift from portfolio management to educational experience management

Example of a new mission focus

CU 2.0 is one of the key drivers of digital transformation at Sberbank

Key aspects of CU 1.0

<table>
<thead>
<tr>
<th>Educational services provider</th>
<th>Catalyst for the development of a new generation of executives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content development</td>
<td>Moderation of content, including its development</td>
</tr>
<tr>
<td>World-class content as a priority</td>
<td>Customization of programs to meet customer needs as a priority</td>
</tr>
<tr>
<td>Combination of in-class and distance learning</td>
<td>Combination of formal and informal training (social, collaborative)</td>
</tr>
<tr>
<td>Standardization of learning</td>
<td>Personalization of learning</td>
</tr>
<tr>
<td>Focus on transfer of knowledge</td>
<td>Focus on formation and certification of skills</td>
</tr>
</tbody>
</table>

Key aspects of CU 2.0

- Impact on achievement of existing career and business goals
- Transition from formal to informal experience
- Establishing a strategic partnership with business
- Acceleration of ecosystem development around the customer's business
- Digitalization of learning
- Promotion of education based on a self-service system
Customization

**Customization** means bringing a product or its individual characteristics in line with the actual needs of the client. In education, this means the relevance of educational solutions to the challenges faced by the customer. The higher the level of customization, the more specialized the learning solution and the narrower the range of potential learners are.

### Depth of customization

<table>
<thead>
<tr>
<th>Specialization</th>
<th>Audience size</th>
<th>Educational Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Out-of-the-box solution</td>
</tr>
<tr>
<td>Medium</td>
<td>Low</td>
<td>Facilitation</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>Deep customization</td>
</tr>
<tr>
<td>Very high</td>
<td>Low</td>
<td>Specialized educational solutions</td>
</tr>
</tbody>
</table>

**No customization** (out-of-the-box solution)
These programs can be used to train the broadest range of learners. Various MBA programs, business games, and open programs are usually at the zero level.

**Facilitation**
Out-of-the-box solutions, whose rules and features are adapted by the facilitator for a specific customer.

**Specialized educational solutions**
Selection of content, examples, or structure of learning solutions in accordance with the requirements of the customer. Such solutions imply a limited number of learners for whom the content of specialized learning solutions will be relevant.

**Deep customization**
A unique program that is relevant only for a narrow range of learners. The learning solution is based on cases, practice, and specific characteristics of a company or even a unit of the company. Absolutely everything can be customized for the specific objectives of the customer, including content, format, instructors, methods, etc.

For example, Sbergile, a program of Sberbank CU, is based on the Agile methodology, but it was substantially revised and built on Sberbank cases with the active involvement of Bank leaders who took the roles of instructors.

**Personalized educational solution**
Customization for a specific learner, depending, for example, on his/her role in the team or based on his/her preliminary training or determined in the process of preliminary testing, etc. This includes, for example, the Product Owner, a program of Sberbank CU aimed at employees with this role in the team.
As an extreme form of deep customization, the **personalization of learning** (p. 193) can be used as a local solution in **adaptive** (p. 13) programs with any level of customization, including mass products. The simplest and most common forms of personalization for learning solutions are **custom adaptive tests** (p. 17) and the robotic creation of **individual educational paths** (p. 193) that take into account such individual parameters as the level of subject expertise, range of interests of the learner, decision-making speed, tempo, and specific behavioral characteristics, identified by statistical methods using **artificial intelligence** (p. 20).

Deep (precise) personalization improves the learning experience through all sorts of settings applied to the content and presentation in accordance with the particular preferences of a specific learner and his/her personal and even physiological characteristics. For example, one person may be more receptive to visual content, another one to audio content, while the third one may need tactile sensations.

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**Traditionalists**
Some people learn better at their own pace

**Listeners**
Some people prefer auditory learning

**Doers**
Some people learn better by doing specific tasks

**Watchers**
Some people prefer visual learning
Design thinking in learning

Design thinking is a method for organizing intellectual activity based on creative design approaches to the development of products and services. The main characteristics of design thinking in all phases of problem solving are emphasis on the emotional component of the customer experience and the prevalence of a creative approach over an analytical one, which leads to the most unexpected ideas that improve the quality of decisions.

Human-focused design

Human-centered design, HCD

This is a method of designing and managing the process of developing products and services, at each stage of which problems are addressed on the basis of creative thought and the emotional engagement of developers. Human involvement usually occurs when observing a problem in context, brainstorming, conceptualizing, developing, and implementing a solution.

User-centered design (UCD)

or user-driven development (UDD)

In the development of products or services, the main focus is on identifying gaps in the user experience of interaction with a product or service and the subsequent elimination of these gaps by taking into account the anticipated emotional engagement and impressions of the consumer. The experience gap is the difference between user expectation and reality in the process of using a product or service.

The development of a product or service is based on the desire to please and satisfy the user by meeting and exceeding the user’s expectations. Priority is given to the feelings and emotions the user experiences when using the product.

Principles of design thinking [158]

Trust the process
Understand what stage of the overall process you are at, what methods you should use, and what other goals you have. This guarantees results within the established period, even if the task was not set clearly initially.

Focus on what delivers value to people
To create a popular product or service, it is important to develop empathy with the users in order to understand what is really valuable and important to them.

Communicate with people from other fields and areas
Engage people from other divisions and departments to work on the project. Nontrivial solutions that are elegant in their simplicity come at the junction of different disciplines.

Act immediately
Design thinking can be better defined by actions than by thoughts and ideas. Direct your efforts toward actions, such as observation, communication, and prototyping.

Experiment
Prototyping is more a way of using the creative side of thinking rather than a separate stage for testing an idea.

Make it clear
Provide a clear, logically sound description of the problem instead of giving a list of all identified gaps. Set the boundaries of the problem clearly and in such a way that the project team has space for creativity and potentially interesting solutions.

Be compelling
Use sketches, outlines, and prototypes and describe the solution with user stories.
David Kelley (b. 1951) is one of the founders of the design thinking methodology; he holds honorary PhDs from the Art Center College in Pasadena and Thayer School of Engineering. He is included in the list of the 100 most influential people in Silicon Valley compiled by The Mercury News, an American daily newspaper [110]. In 1978, he founded IDEO, a design company that developed the first computer mouse for Apple in 1980. In 1984, he established Onset, a venture capital firm, and in 2004 together with Hasso Plattner Kelly founded The Hasso Plattner Institute of Design, known as d.school, where the learning process combines management and business practices with traditional engineering education.

Design-thinking methods

At different stages, design thinking combines divergent and convergent thinking. Since a person rarely has both convergent and divergent thinking, the success of the project team requires that it consists of people with different types of thinking. If a project manager understands the nature of design thinking, they will know how to select a team of experts.
The design thinking approach consists of the following stages:

1. **Empathy**, or immersion in the user experience. It is necessary to understand as fully as possible the realities, values, motivations, and fears of the users for whom the solution is being developed. At this stage, it is important to discard established opinions and stereotypes and to be as sincere and open as possible in listening, hearing, and observing users.

2. **Analysis and synthesis**, or interpreting the information obtained at the Empathy stage. The analysis of obtained information will make it possible to generate hypotheses about the needs, hidden meanings, and underlying motivations that drive the users.

3. **Generation of ideas**, or the effort to come up with as many ways as possible to close the gaps between user expectations and the real product. Ideas should be aimed at addressing the underlying problems. Therefore, you need to come up with a solution to treat the disease and not just hide its symptoms.

4. **Prototyping**, or the process of “thinking with your hands.” A key stage in design thinking is the creation of quick and very simple prototypes. This may include making a model from modeling clay, gluing together a mock-up from cardboard, sketching a storyboard of the process, or drafting a document template.

5. **Testing** (p. 17) or verifying your hypotheses. The user plays with a prototype and then notes what can be improved. Smart testing makes it possible to eliminate defects at no extra cost before scaling up the solution.

6. **Storytelling** (p. 45), or literally telling stories. At the last stage, you should tell about the solution as completely, simply, and emotionally as possible.

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**Design thinking in solving cases (p. 41)**

Major companies such as Boeing, 3M, SAP, Procter & Gamble, Deutsche Bank, Mail.Ru Group, and Sberbank are making wide use of design thinking to create innovative products. Design thinking works at its best in uncertain conditions, and in such conditions most innovation is born. [64]

**The case of Mujer Banorte bank (Mexico)**

**Insight**

In Mexico, women have a tremendous influence on financial decisions in the family and act as a huge economic force. Their role is constantly increasing. However, banks do not offer affordable loans and an adequate range of services for Mexican women.

**Solution**

Mujer Banorte bank focused on women interested in regular financial services as well as on the banking needs of women establishing a new business. The package of services includes medical, legal, and household assistance (such as the services of plumbers, electricians, etc.), not to mention usual bank offerings such as access to ATMs and no minimum account balance requirement.
The Case of Wizzit (South Africa)

**Insight**
It is easier to attract low-income consumers by selling mobile phones rather than by opening bank accounts. So why not use phones to offer banking services to those who usually do not come to the bank for them?

**Solution**
Wizzit created a banking service for mobile phones specifically designed for the unbanked from South Africa — low-income people, including those who are illiterate. Services include money transfers, payment for mobile communication, support service, withdrawals of money from ATMs, and payments for goods in shops using a Maestro card.

Wizzit has no traditional bank branch offices; the services are provided exclusively by mobile phone. Money can be deposited in any post office or branch of ABSA financial group and in offices of the South African Bank of Athens, the largest bank in South Africa in terms of deposits.

The emergence of Wizzit forced traditional banks to lower prices for their services. This service is also motivating large telecommunication companies, such as Vodafone, to develop new markets by introducing mobile banking services for those who are unable to visit a bank.

Sberbank Corporate University’s design-thinking program

**Design Thinking: From Insights to Innovation**

Design Thinking: from Insights to Innovation is one of the most popular programs of Sberbank Corporate University. This program is based on the methodology of Stanford University and adapted to the Russian market and the needs of the Bank. During a two-day in-class module, the participants explore all six stages of design thinking based on a real business case. For two months after completing their in-class learning, the participants implement their own projects to consolidate the acquired knowledge and introduce the culture of design thinking in their workplace. More than 2,700 executives of the Bank have completed the program since its launch in 2013.

In 2013, Sberbank Corporate University published the first Russian textbook on design thinking (Natalia Zhuravleva, Irina Kuteneva. Design Thinking: Think in a New Way). It has become an invaluable resource for design thinkers all over Russia and has also been published in English and Turkish.

In 2016, to develop and replicate expertise on design thinking in Sberbank, the School of Design Thinking was established within Sberbank Corporate University. One of the results of its activities was a collection of mini case studies on how design thinking was used in various projects of Sberbank, published in late 2017.
Digitalization of learning

Digitalization of learning is learning based on the use of distance learning technology—the use of digital technology to change business models and create new learning opportunities, such as a process of transition to e-learning.

Digitalization and automation of learning

<table>
<thead>
<tr>
<th>Automation</th>
<th>Digitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using digital technology to simplify the learning process when performing a number of ordered repetitive operations</td>
<td>Using digital technology to introduce innovation in the learning process and increase its effectiveness</td>
</tr>
<tr>
<td>Responding to the queries of program managers</td>
<td>Responding to a shift in the learning paradigm</td>
</tr>
<tr>
<td>Streamlining processes and trying to build a new learning model without changing its essential nature</td>
<td>Transforming not only the model but also the essence of learning</td>
</tr>
<tr>
<td>Allowing partial automation of specific tasks and elements of learning</td>
<td>Integrated process</td>
</tr>
</tbody>
</table>

Transformation of learning under the influence of digitalization

From virtualization to digitalization

With the gamification (p. 203), personalization, and digitalization of content, the learning process becomes more dynamic. Corporate universities are no longer constrained by physical limitations and can fully digitalize processes, including using computer-based learning, virtual (p. 217) and augmented reality (VR/AR) (p. 23), mobile apps, designing an educational environment that stimulates interaction in the digital world, and using learning analytics (p. 129).
Mobile devices have set the basis for the next stage in the educational process. AR/VR technology and mobile apps make it possible to increase the engagement of employees in the learning process.

Designing educational environments that stimulate interaction in the digital world

The development of Internet infrastructure has made it possible to use digital channels for designing special environments for interaction in real time and free exchange of various information.

Making data-driven decisions

In addition to assessment of effectiveness, learning analytics help to:

- Measure and assess the characteristics of employees (knowledge, abilities, motivation) and content (format, difficulty, workload) to organize learning in an adaptive form
- Assess the difficulty and acceptability of certain parts of the educational program in order to modify it
- Identify personal differences between employees, measure them, and take them into account to improve learning outcomes

Examples of implementation

Case: VR training for public speaking

Public speaking is an important element in the work of middle-level and senior managers; however, not everyone feels comfortable in front of an audience.

Google teaches its employees business communication skills in realistic scenarios by using a VR application. Users can practice their presentations in front of a large and/or important audience. According to company statistics, this product has helped 92% of users to feel much more confident and improve their business communication skills.
Case: Introducing VR classrooms

SOLVAY helps companies equip their classrooms with everything they need to conduct classes using VR technology.

This makes it possible to:

• Reduce time spent on training seminars in other cities/countries
• Reach the maximum number of participants from different branches of the company in a single classroom
• Make changes in the learning process in real time

Instruction on how to use the system is held in the same kind of classrooms (6 virtual seminars). Employees can learn how these classrooms work, obtain full access to all necessary informational resources, provide feedback, and share their experiences with other participants of the seminar.

Conclusions based on learning outcomes

• Classrooms that use virtual reality enable learners to remotely obtain all necessary theoretical information, participate in discussions in real time, and collaborate on real projects.
• Learning activities should be more focused on real work projects rather than on theoretical classes.
• Interaction with an expert in virtual learning makes it easier to implement VR technology in the company.
• Classes in VR classrooms should not be obligatory for employees as some find it very hard to communicate remotely in virtual reality and without the presence of a specialist monitoring the classes.

Educational platform

Makes it possible to address the tasks of centralized storage and access to educational information in real time, and to monitor and analyze learning outcomes.

Case: Social learning on Slack

Capgemini used Slack, a social platform, as a means of creating a community that brings experts from different areas together. Users can find topics of interest to them and connect with other participants who are experts in a particular area.

In a pilot project, all known architects in the UK received an invitation to join the Slack team and create their own information channel.

As a result of the experiment, about 42% of all architects in the UK joined Slack and sent invitations to other architects from various countries. High activity was observed not only when the chief architect of the channel made a post but also during regular discussions on topics of interest. At the end of the pilot project (4 months), Slack received a request from the community of architects to allow them to continue using Slack until an alternative social platform was developed.

Case: e-learning for e-learning

A three-week course of blended learning for 166 participants from 19 countries aimed at familiarizing them with the methods of e-learning.

The aim of the course is to help professionals involved in the training and development function of the company understand and internationalize the impact of e-learning, demonstrate the concept of digital learning in action, and obtain necessary knowledge about social learning.
Distance learning

**Distance learning** is learning based on the use of distance learning technologies, which are primarily implemented through information and telecommunication networks with mediated (remote) interaction between learners and instructors. Most often, distance learning comes in the form of **synchronous e-learning** (p. 81), although asynchronous interactions are also possible.

**Formats of distance learning**

**Chat classes** are classes held using chat technology. They are held synchronously, therefore all participants have simultaneous access to the chat. Many distance learning institutions have a chat school where the activities of remote instructors and learners are organized in chat rooms.

**Web classes** are online classes, conferences, seminars, business games, laboratory work, hands-on sessions, and other forms of classes held using telecommunications facilities and other capabilities offered by the Internet. Web forums differ from chat classes in that they allow for longer (multiple-day) activities and asynchronous interaction between learners and instructors.

**A teleconference** is a class with geographically remote participants that is held by using telecommunications facilities. Such classes can be divided into **audioconferences** (based on voice communication) and **video conferences** (based on video communication).

**A webinar or online seminar** is a web conference held in the form of online meetings or presentations. During a web conference, the participants remain in front of their computers, and communication is maintained via the Internet with either a downloadable application installed on the computer of each participant or a web-based application. A webinar is a type of web conference that involves primarily a one-way communication from the speaker and minimum input from the audience. Webinars may also be collaborative and include sessions with polls and surveys that provide full interaction between the audience and presenter. In some cases, voice communication may be implemented via a separate device, such as a speaker phone. Some other technologies available on the market support VoIP (Voice over Internet Protocol) to provide full-fledged audio communication over the network. Depending on the provider, webinars may feature the anonymity or "invisibility" of users. As a result, the participants in the same conference may not know about each other's presence.

**A web conference** is a technology and set of tools for holding online meetings and collaborating in real time via the Internet. Web conferences make it possible to hold online presentations, share documents and applications, view websites, video, and image files, while each participant remains at their own workstation.

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**Sir Isaac Pitman** (1813–1897) was a British stenographer and religious figure who invented a shorthand system that became one of the most widespread in the 19th century. With the introduction of uniform postage rates in 1840, his distance learning course with an element of feedback proved to be successful and became official in Great Britain. The Phonographic Teacher [122], a manual written by Pitman, has been published more than 100 times.

---

**1840**

The first distance-learning course. Sir Isaac Pitman presented his shorthand system, later named "Pitman shorthand" in his honor, and introduced the term "correspondence learning." He sent postcards to his learners with transcribed texts, received the answers, and returned the corrected work.

**1858**

The University of London International Programs became the first one to offer its learners the opportunity to earn a university degree through distance learning. As of 2017, the number of University graduates exceeded 100,000.

**1873**

Anna Eliot Ticknor, an American writer, established a correspondence school for women called "Ticknor's Society."
Distance learning

Services for web conferences may include the following features and tools:
- Screen sharing
- Interactive board
- Presentations
- Co-browsing
- Screen annotations
- Monitoring participants’ attendance
- Text chat
- Integrated VoIP communication
- Video conferencing
- Ability to change the presenter
- Control of someone else’s screen, ability to give control of the mouse and keyboard
- Moderated online meetings
- Feedback (e.g., surveys or assessments)
- Scheduling meetings and inviting participants
- Recording the web conference

A live virtual class (LVC) is an online class held in real time with the participation of an instructor. Unlike traditional webinars and video conferencing, this format implements the technology of interactive learning, which makes it possible to use such tools as VoIP, feature-rich presentation packages, and a complete set of interactive tools (whiteboard, chat, video, application sharing, etc.) These webinars resemble regular sessions held in classrooms, except that their participants attend them remotely. During classes, the learners can be in different cities, countries, or regions. The participants interact through an Internet connection; they can hear each other, see their instructor on the screen, and ask them questions. In the process of learning, the instructor can communicate both with the entire group and each learner, and each learner can fully communicate with the instructor and the entire group.

<table>
<thead>
<tr>
<th>1950s</th>
<th>1969</th>
<th>1989</th>
<th>2010s</th>
</tr>
</thead>
<tbody>
<tr>
<td>First educational TV shows</td>
<td>The first open university is started in Great Britain. With the use of the latest technology, it became a full-fledged alternative to traditional forms of learning</td>
<td>Secondary schools in Moscow, Leningrad, and several U.S. cities became the participants of School E-mail, a Soviet-American project</td>
<td>The first mass open online courses enabling interactive communication between learners and instructors as well as online exams appeared</td>
</tr>
</tbody>
</table>
Electronic learning, E-learning

Electronic learning, or e-learning, is the organization of educational activities using information in databases and data used in the implementation of educational programs, information technology and technical means used to process these data and information, as well as information and telecommunication networks that ensure the transmission of that information over communication lines and interactions between the learners and instructors. E-learning includes differentiation between synchronous and thus enable asynchronous learning.

**Synchronous e-learning:** formats of e-learning where all participants interact with each other and with the instructor simultaneously and in real time. Examples include webinars, video conferences, video consultation and online feedback (p. 76), chat rooms, communication over Skype, virtual classrooms (p. 215), activities in virtual collaborative spaces, and any other formats where the participants are online and interact simultaneously.

**Asynchronous e-learning,** also known as self-paced learning: includes formats of e-learning where the participants use e-learning resources to get information, complete assignments, propose ideas, and share ideas and information as well as for other forms of interaction without time or place restriction or dependence on the simultaneous involvement of other participants or the instructor in learning. Examples include audio, video and other multimedia e-courses that can be studied by participants at their own pace and on their own; studying e-textbooks (p. 80) and other learning materials available on the pages of programs in educational platforms; learning via e-mail, blogs, wikis, discussion walls, social networks and platforms (p. 209), and other similar formats.

**Linda Marie Harasim** (b. 1949) is a Canadian pioneer and leading theorist in the area of online education. In 1986, together with Dorothy Smith, a sociologist, she prepared and conducted the world's first online class. In 1987–1989, Harasim developed a methodology for online teaching that was later adapted at the University of Phoenix (Arizona, USA). She is the author of such early books on online learning as Educational Applications of Computer Networks (1986) and Online Education: Perspectives on a New Environment (1990). In 1993, together with professor Thomas Calvert of Simon Fraser University, Harasim developed Virtual-U software for online courses.
Criticism of traditional e-learning

E-learning is a well-known and widely used technology, but currently a number of practices in traditional e-learning have given rise to justified criticism [141].

<table>
<thead>
<tr>
<th>Practices of traditional e-learning that raise concern</th>
<th>Requirements of &quot;serious e-learning&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on the content</td>
<td>Creation of real impact</td>
</tr>
<tr>
<td>Emphasis on development speed</td>
<td>Meaningful for learners</td>
</tr>
<tr>
<td>Passive engagement</td>
<td>Emotional engagement</td>
</tr>
<tr>
<td>Knowledge delivery</td>
<td>Authentic contexts</td>
</tr>
<tr>
<td>Testing facts instead of skills</td>
<td>Realistic solutions</td>
</tr>
<tr>
<td>One format for all</td>
<td>Personalized solutions</td>
</tr>
<tr>
<td>Simultaneous learning events</td>
<td>Events distributed over time</td>
</tr>
</tbody>
</table>

The Serious E-Learning Manifesto, ATD [149]

- Learning does not always provide a solution to a specific problem of the company
- When learning is a solution, e-learning may not be the only (or the best) solution
- Learning should tie back to organizational impact
- The goal is to improve the performance of employees
- Realistic practice is required, including simulations, scenario-based decision making, case-based evaluations, and authentic exercises
- Authentic context are required
- Guidance and feedback to learners are essencial
- When providing feedback during learning, show realistic consequences
- Adapt to learner needs
- Relate to learner goals and motivate their engagement
- Long-term impact is the real goal

- Interactivity prompts deep engagement
- Post-training follow-through is critical
- Diagnose root causes: endeavor to be proactive when assessing organizational performance, do not wait for requests from organizational stakeholders
- Use performance support in the workplace
- Measure learning outcomes at the organizational level
- Measure actual performance results
- Measure learning comprehension and decision making during learning
- Measure meaningful learner perceptions
- Iteration in learning is necessary
- Support the application of what was learned in the workplace
- Support learners' understanding with conceptual models
- Use rich examples and counterexamples
- Mistakes can be a good learning tool
The e-learning market

In 2016, the global online learning market was estimated at $166.5 billion [157]. The largest market emerged in North America ($17 billion in 2016) due to a well-functioning Internet infrastructure and high public and private spending on educational technology. The sector is developing most rapidly in India and China as these countries are improving their education systems. According to forecasts, the market will grow by 6% annually until 2022 due to technologies that attract and motivate more learners (including virtual and augmented reality, artificial intelligence (pp. 217, 23, 67)][11].

With an annual growth of 7.2%, the global market could be worth $325 billion by 2025 [3]. 95% of employers require the applicant to have microcredits (certificates of short online courses where a person acquires a new skill in some area ranging from business correspondence to big data) [127]. Every dollar invested in online learning of employees generates 30 dollars as a result of the increased productivity of the worker. Companies using e-learning technologies increase the engagement of their employees by 18% [113].
Electronics textbook, E-textbook

An e-textbook is software with educational content in various formats (e.g., text or video) as well as various monitoring and simulation programs designed to improve the effectiveness of learning. A modern e-textbook is not just a digital analog of the printed edition but a full-fledged educational tool with more advanced capabilities than printed textbooks.

Key benefits of e-textbooks over printed ones

- Ability to quickly search the text
- Saving time with hyperlinks and bookmarks, ability to quickly access saved parts of an e-book
- Interactivity. Complementing the text content with various educational tools, such as ones for testing or consolidating knowledge (p. 121)
- Ability to get quick feedback from readers in a digital format
- Learning analytics (p. 129)
- Intermediate assignments and tests and multimedia modules that monitor their completion
- Tools for communication between teacher and learners in a flipped classroom format (p. 95)
- Collaborative learning (p. 46) capability, for example, by highlighting the most popular materials selected by other users in the textbook or by publishing and discussing questions based on e-textbook materials, for which a separate section is created
- Gamification (p. 103) of learning by implementing a system of achievements and rewards for completing the educational materials of the e-book
- A system of rewards for completing the book
- A news feed on the achievements and progress of other readers
- Illustrations
- Video
- Tests with possible feedback from the instructor
- The ability to ask the instructor questions
- A news feed on the achievements and progress of other readers

Given that today’s interactive textbooks actively use an Internet connection, the speed and availability of this type of communication have become a critical condition for the implementation and use of e-textbooks.

Example of an e-textbook in corporate learning

Risk Management, an interactive book published by Sberbank CU, includes:

- Illustrations
- Video
- Tests with possible feedback from the instructor
- The ability to ask the instructor questions
- A system of rewards for completing the book
- A news feed on the achievements and progress of other readers

Future plans provide for the use of augmented reality (p. 23) to improve the visualization of educational content and detailed simulation of objects in a real-world environment.
Electronic textbook, E-textbook

E-publisher ZyBooks, social platform and service business

The largest creator of interactive e-textbooks in the world, ZyBooks, began with the development of its own interactive textbooks for technical disciplines. Subsequently it became a platform for instructors at educational institutions in the USA to create interactive textbooks aimed at developing both hard and soft competences with the help of a simple interface for creating complex educational materials and tests to support their text and video materials.

Authors have access to all the advantages of interactive e-books. For example, the assessment of a learner's knowledge is completely automatic. Depending on the intermediate results of a group of learners or an individual learner, an instructor can change the order of provision of the materials or, for example, redirect a learner to a certain part of another interactive book on the platform.

Users of ZyBooks e-textbooks are able to learn interactively not only by reading text but also by watching lots of animation, models, and educational videos and audio; this enables ZyBooks to increase learners' satisfaction with their university studies by an average of 60%. Today, 450 US universities, 1,400 instructors, and more than 200,000 users are connected to the ZyBooks platform.

ZyBooks compared to traditional textbooks

An intensive and condensed textbook
The same key learners learn better when the text is compressed
- The material of one lesson with minimal text was learned better by 118%.
- The minimal text retains the substance by explaining the same content in more precise language
- Methods: avoid unnecessary words/phrases, use narrative sentences, put the text closer to the diagrams if possible
- Learners themselves said minimal text had substantial advantages

Learners work seriously
Learners study interactive web materials honestly
- Less than 3% of learners "cheat the system" when using ZyBooks
- Even though the answers can be peeked at, most learners honestly try to finish the test on their own
- Technologists: give several points for completing the assignment and assign reasonable volumes of work
Experiential learning

Experiential learning is a set of educational technologies providing for the participation of learners in some activity, acquisition of relevant experience, as well as the assessment of that activity and acquired experience, identification, and assimilation of new knowledge and skills.

Experiential learning can be divided into the following groups of educational technologies:

- **Business simulations and games** are learning technologies that reproduce processes, events, places, and situations to provide an interactive learning experience with a controlled level of risk. Business games are a simulation that includes such game-playing elements as a story, goals, feedback, and the actual game (for more details, see p. 33).

- **On-the-job learning** occurs in the course of the participant’s regular work and may be structured (coaching, tutorship, etc.) or unstructured (knowledge sharing in work-related communications, observation of other people’s work) (for more details, see p. 186).

- **Action learning** entails methods of learning when individual participants or teams complete assignments and learn during the process of developing solutions for real-world business problems and situations (for more details, see p. 8).
The experiential learning cycle is a tool for presenting a sequence of steps in experiential learning. In an experiential learning cycle, the steps are often assumed to be managed by the facilitator (instructor), but they can also be managed by the learners themselves or not "managed" at all because experiential learning is a common daily process for many people. In most experiential learning models, the learning cycle includes two to five steps.

The model of experiential learning theory was developed by D. Kolb.

The first version of the model was designed by David Kolb (experiential learning theory, ELT [83]) in the early 1970s. Kolb defined experiential learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience."

The ELT model describes:

Dialectically related methods of grasping experience:

- **Concrete experience**, or doing something and gaining experience
- **Abstract conceptualization**, or arriving at conclusions and learning from experience

Dialectically related methods of transforming experience:

- **Reflexive observation**, or assessment of what is going on, thinking or talking about the experience
- **Active experimentation**, or planning the next steps, testing what was learned from experience

According to Kolb, the learning process includes these 4 stages and may begin with any of them, but most often it begins with immediate or concrete experience that provides the foundation for observation and reflection. The reflection is assimilated and transformed into abstract concepts which can be actively tested and will be used as guidance for further action and new experiences.

Kolb used the experiential learning cycle to derive various learning or cognitive styles, which refer to relatively stable qualities, preferences, or skills used by individuals to process information to solve problems.

In individuals, specific learning styles develop slowly through experience and cannot be modified by a specific learning activity or training. They are closely related to such components of the individual's personality as emotional intelligence, temperament, and motivation.

According to Kolb, one of four learning styles defines the method for grasping experience (concrete experience vs. abstract conceptualization) and the method of transforming the experience (reflective observation vs. active experimentation) used by a specific individual: ideas generator, theorist, analyst, and activist.

Approx. 350 B.C.

One of the first mentions of experiential learning. In Nicomachean Ethics, Aristotle wrote, "For the things we have to learn before we can do them, we learn by doing them"

1938

John Dewey, an American philosopher and educator, published his book "Experience and Education," in which he reviewed the contemporary education system and stressed the importance of using experience, experimentation, and other concepts of progressive education in learning

1971

Based on the work of John Dewey, Kurt Lewin and Jacques Piaget, David Kolb designed the learning style inventory model to assess individual learning styles

1975

W. Pfeiffer and J. Jones created a model of experiential learning with a 5-stage learning cycle, which includes experiencing, exchange (reactions, outcomes, observations), processing (analysis, discussion, reflection), generalizing, and applying
Concrete experience
Doing something and gaining experience

Active experimentation
Planning the next steps and checking what was learned from experience

Abstract conceptualization
Formulating conclusions and learning from experience

Reflexive observation
Assessment of what is going on, thinking or talking about the experience

ACTIVIST
How: by performing the kinds of work that intuitively seem to be right
Strengths: flexible thinking, ability to adapt quickly to a specific situation
Who: school teachers offering new methods of teaching and learning

IDEA GENERATOR
How: intuitively through reflection
Strengths: imagination and fantasy, assessment from different points of view
Who: researchers relying on multiple sources of information to formulate a specific theory

ANALYST
How: first thinking, then doing
Strengths: looking for specific and clear answers for real application of obtained information
Who: scientists and engineers

THEORIST
How: through analysis and reflection
Strengths: combining disparate facts into a meaningful theory
Who: university faculty and developers of theories

1977
David Kolb (b. 1939) is an American education theorist, an expert in adult learning psychology, and the author of the first full-fledged experiential learning theory (the Kolb model). He earned his PhD from Harvard University and taught at Case Western Reserve University. His areas of interest include individual and social changes, career development, experiential learning, and professional training.

Establishment of the Association for Experiential Education (AEE) in the USA, with a proclaimed goal of promoting experiential education, supporting instructors who use this approach, and further developing the methods of experiential learning through such services as conferences, publications, consulting, research, seminars, etc.

In his book "Experiential Learning: Experience as the Source of Learning and Development," David Kolb provided the most complete description of his experiential learning theory, which later became a classical theory in this field, based on the assumptions of J. Dewey, K. Lewin, and J. Piaget, including the 4-stage experiential learning cycle

1990–2000
Use of various experiential learning forms in higher education and corporate learning became widespread

2015
According to the Corporate Learning Factbook of Bersin by Deloitte, the best organizations in terms of training and development are 30% more likely to use experiential learning methods.

2016
An ATD study revealed that 76% of companies are using some form of experiential learning in their corporate learning system.
Development of experiential learning models

Kolb’s ELT model was subsequently developed in more complex models.

In the model of W. Pfeiffer and J. Jones [120], the learning cycle includes 5 stages:
• Experiencing
• Exchanging (reactions, outcomes, observations)
• Processing (analysis, discussion, reflection)
• Generalizing
• Applying

The HRDO experiential learning model [71] identifies 7 stages of the learning cycle:
• Modifying: discussion in order to understand what to change
• Practicing: using the acquired knowledge in the workplace to gain new experience
• Integration: encouraging learners to self-review, at some later point, what has changed in them, and to what extent they have acquired and used new knowledge, skills, and attitudes
• Focusing: engaging the learner in learning before it starts
• Experiencing: the learner must acquire some experience through some activity, and that activity must be both engaging and meaningful
• Reflecting: provoking the use of critical thinking skills so that learners can recall previous situations/examples
• Thinking: theoretical discussion to help understand the acquired experience
The proliferation of experiential learning in corporate practice

In May 2016, the Association for Talent Development (ATD) conducted a large-scale study involving 270 companies (of which 75% were commercial businesses, and the rest were public and nonprofit entities; 60% were large and major companies (with more than 1,000 employees). It was found that experiential learning is used by 76% of these companies [61].

Who is using experiential learning?
69%—Senior and middle-level executives
22%—Only middle-level executives
9%—Only senior executives

Expectations:
72%—Increased effectiveness of the company through qualitative improvement of management and more effective engagement of executives in learning
71%—More effective engagement of executives in learning
65%—Deeper assimilation of learning
64%—Increased effectiveness of programs for development of leadership competences
55%—Accelerated learning process
51%—Improved behavioral performance in stressful situations
49%—Consolidation of knowledge gained during traditional learning
34%—Reduced learning costs

Effectiveness:
What indicators are used to assess the effectiveness of experiential learning?
54%—Satisfaction of learners with the learning process
48%—Application of acquired knowledge/skills by learners
47%—Career growth/promotion of learners
35%—Specific business indicators linked to specific learning
35%—Performance of tasks or steps related to completed learning
Flipped classroom

The flipped classroom is a key model of blended learning (p. 29) in which the traditional order of learning activities is changed. The theoretical material is presented in the form of lectures and practical home assignments:

- Learners study the theory and concepts on their own before proceeding to classroom learning on the subject.
- During the class, the instructor creates opportunities for the learners to apply their knowledge and develop habits and skills (through exercises, individual discussions of projects, group discussions and brainstorming, other activities).

Key principles used in a flipped classroom

- Advanced distance-learning technology for interactive and independent activities of learners.
- Instructors prepare materials in advance (usually on their own) for the independent activities of learners and in the classroom environment help them complete the practical assignments.
- Team work of learners in groups where the learners help each other.
- Reflection and regular feedback.

The concept of the flipped classroom is evolving toward a deeper understanding of the sequence, forms, and formats of learning both in and out of the classroom. This deeper understanding can be described with the term "flipped learning" (p. 97).

Key market trends [44]

- Personalization of content during development.
- Substantial share of microlearning (p. 165).
- Data analytics (p. 129) to define competences.
- Use of artificial intelligence (chat bots) (p. 21) in facilitation (p. 64).

Key vendors of flipped classroom solutions [7]

Adobe Systems, Incorporated  Haiku Learning  OpenEye  Dell
Echo360  TechSmith  Crestron  Aptara
Desire2Learn  Articulate  MediaCore  N2N
Panopto  Cisco  City&Guilds  Schoology

A flipped classroom was described for the first time in the scientific article "From Sage on the Stage to Guide on the Side" [142].
The first book on peer learning [96], a method that preceded flipped learning, was published.
Khan Academy, the first video-based online learning platform, was launched.
First adaptation of the flipped classroom in US schools.
A presentation of the founder of Khan Academy on TED about the flipped classroom received almost 5 million views.
Main methodological issues

When implementing a flipped class, it is necessary to address 3 main methodological issues:

1. How to make sure that the learner studies the required theoretical material independently and to an extent sufficient for learning purposes, and attends the face-to-face class prepared

2. How to create the distance part of the program using the most cost-effective, most flexible, and fastest methods. This should also include ensuring that the instructor is highly motivated to work independently on preparing unique content

3. How to effectively use valuable face-to-face contact time between the learner and instructor

### Created by the learner

<table>
<thead>
<tr>
<th>Demonstration and application</th>
<th>Experiential engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;What now?&quot;</td>
<td>&quot;Activity&quot;</td>
</tr>
<tr>
<td>1. Through creative, personalized projects and presentations</td>
<td>2. Games, simulations</td>
</tr>
<tr>
<td></td>
<td>2. Conversations, discussions</td>
</tr>
<tr>
<td>3. Creating meaning</td>
<td>3. Case study</td>
</tr>
<tr>
<td>&quot;So what?&quot;</td>
<td>4. Study of theory</td>
</tr>
<tr>
<td>4. Blogs</td>
<td>5. Exercises</td>
</tr>
<tr>
<td>5. Tests</td>
<td>6. Online chat</td>
</tr>
<tr>
<td>6. Reflective videos</td>
<td>7. Video lectures</td>
</tr>
<tr>
<td></td>
<td>8. Audio lectures</td>
</tr>
<tr>
<td></td>
<td>9. Web sites with content</td>
</tr>
<tr>
<td></td>
<td>Experiments</td>
</tr>
<tr>
<td></td>
<td>10. Long-format text</td>
</tr>
<tr>
<td></td>
<td>11. E-courses</td>
</tr>
</tbody>
</table>

### Created by the teacher

<table>
<thead>
<tr>
<th>Synchronous (in classroom)</th>
<th>Asynchronous (outside the classroom)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstration and application</td>
<td>3. Creating meaning</td>
</tr>
<tr>
<td>2. Experiential engagement</td>
<td>4. Study of theory</td>
</tr>
</tbody>
</table>

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Aaron Sams (b. 1977) and Jonathan Bergmann (b. 1964) are American chemistry instructors. In 2007, they first recorded their lectures on video and posted them online for learners who had missed their classes. They began to provide the videos as home tasks and used the time of in-class studies for interactive learning. Sams and Bergmann are the authors of such methodology guides as Flip Your Classroom: Reach Every Student in Every Class Every Day (2012) [13] and Flipped Learning: Gateway to Student Engagement (2014) [14] in which they described their experience in implementing the concept of the flipped classroom. They created Flipped Learning Network [62].

The first school in the United States completely switched to flipped learning

MEF University in Istanbul became the world’s first University teaching exclusively in accordance with the flipped classroom model

HBX Live, the first virtual classroom at Harvard Business School, was launched

Jonathan Bergmann established the Flipped Learning Global Initiative (FLGI), a coalition of instructors supporting flipped classroom methodology around the world
Flipped learning

*Flipped learning* is a technology for *blended learning* (p. 29), in which the direct transfer of knowledge shifts from the group-based learning environment to the individual learning environment, and the group-based learning environment is transformed into a dynamic and interactive environment in which the instructor takes the role of facilitator, mentor, tutor, and consultant and helps learners apply their theoretical knowledge in practice, develop skills, and engage in deep reflection on the subject for further self-learning and development.

At the core of any flipped learning is the *flipped classroom* (p. 95). The mass implementation of flipped learning is constrained by the natural inertia of traditional schools. However, its high effectiveness both in corporate and general education is beyond doubt. In the digital world, this model has virtually no valuable alternative.

**Industry-specific implementation**

**Universities**
- Adaptation and integration with systemic methodologies that are specific to a particular pedagogical school, for example, the methodologies of the systemic mental activity approach [137], etc.
- P2P interaction
- Proactive approach to development
- Project-based approach to classes
- Activity simulation games
- Foresight sessions

**Corporations**
- Integration with the learning matrix and performance management
- Business simulations
- Case studies on customer relations
- E-learning (p. 81) programs for each unit

**Position differences of key providers** [2]
Example of corporate implementation

**Sberbank CU: School of Finance programs**

CU School of Finance uses flipped learning in such programs as Finance for Managers II and Sberbank Mini MBA and has begun to implement it in Sberbank 500. In 2017, the School used this technology in 40% of its programs. Before attending the in-class part of these programs, the learners study the e-materials online, participate in webinars, and pass a test for knowledge of theory. The in-class part includes only case studies, business simulations, and group-based learning. At the end, the module includes reflection as an element of the learning process (self-development when possible). After the in-class module, the learners have a week in distance mode to review what they have learned. To consolidate their knowledge of the materials during this period, they use adaptive tests that present more problems on the topics that are difficult for each particular learner. The programs end with an online exam.

**Key points:**
- Cases
- Simulations
- Voting
- Program structure is adapted to the flipped class
- Learning by groups and in groups
- Reflection on self-development opportunities in the context of 3 out of 6 approved competences

**Adaptive tests**
- Knowledge of the material will be consolidated using adaptive tests that give more problems on the topics that are difficult for each individual learner
- The best should know more
Gamification

Gamification is the application of approaches that are typical for games in nongame processes to attract learners and improve their engagement in achieving learning objectives.

An interactive learning event (ILE) creates an artificial environment for learning, consolidating, and practicing skills and behavior patterns. It engages the learner into an interactive experience (with other participants or with the content).

**Main principles of gamification:**

- **Dynamics:** applying scenarios that require learners’ attention and response in a real time
- **Mechanics:** applying scenario elements typical for games, such as scoring, skill and difficulty levels, rewards, status, ratings and performance indicators, competition between participants, virtual currencies, etc.
- **Aesthetics:** the development of an overall game-playing experience that facilitates emotional engagement
- **Social interaction:** a wide range of techniques typical for games to ensure the user interaction

**Gamification around us:**

- Airline bonus programs
- Loyalty cards and programs
- Statuses/badges for using services
- Online contests
- Radar detectors and discounted traffic fines
- Stickers collection
- Socialist emulation
- Student ratings
- Ungraded assessments in primary school

**Game dynamics creation criteria**

- Challenging activity that requires skills
- Merging action and awareness
- Clear objectives and feedback
- Focus on the task
- Control of the situation

This results in concentration and a change in the perception of time, a state of flow
Octalysis model

The **Octalysis model** of Yu-kai Chou highlights 8 core drives of players that must be considered for effective gamification.

**Epic meaning and calling:**
The player believes that he is doing something greater than himself; he believes that he was chosen for a specific mission. As a result, he devotes a huge amount of personal time to maintaining a forum or helping to create value for the entire community.

**Development and accomplishment:**
Internal drive for making progress, developing skills, and overcoming challenges.

**Empowerment of creativity and feedback:**
Users get accustomed to the creative process where they repeatedly figure new solutions out and try different combinations; they also need to be able to see the results of their creativity, receive feedback, and respond in turn.

**Social influence and relatedness:**
This drive incorporates all the social elements that drive people (mentorship, acceptance, companionship, competition and envy, the desire we have to draw closer to people, places, or events that we can relate to).

**Scarcity and impatience:**
This is the drive of wanting something because you can’t have it.

**Unpredictability and curiosity:**
The drive to find out what is really going on. People irrationally want to see what will happen next if there is a chance for positive development, even if they know that a negative outcome is the most likely.

**Ownership and possession:**
The drive to want something; when a player owns something, they innately want to own more and improve what they own.

**Loss and avoidance:**
This drive is based on the desire to avoid something negative. In learning, it is used, in particular, in time restrictions for completing assignments.

---

**1910**
Kellogg Company, a manufacturer of food products, offered customers a free Funny Jungleland Moving-Pictures book giveaway with every two boxes of cereal that were brought back.

**1929**
Pravda, a Soviet newspaper, published the article “The Agreement on Socialist Emulation of Fettlers in the Pipe Shop of the KrasnyVyborzhets Plant” [105].

**2002**
Nick Pelling, a British programmer, suggested the term “gamification” [29].

**2010**
In Stockholm, an experiment with gamification of traffic rules led to a 22% decrease in (excessive) traffic speed [143].
Gamification began to be actively used in business processes by Microsoft, IBM, SAP, LiveOps, Deloitte, and others. The players of Foldit, an online game developed by the University of Washington in 2008, helped to decipher the structure of M-PMV retroviral protease that causes AIDS in monkeys. The model of this protein had been a mystery for 15 years, but enthusiastic users discovered it in just 10 days [82].

Yu-kai Chou proposed the Octalysis model that linked the effectiveness of gamification with 8 core drives of players. Yu-kai Chou founded Octalysis Group, a consulting company. He regularly gives lectures on gamification and behavioral design at Stanford University, Innovation Center in Denmark, Google, LEGO, and TED conferences.

Principles of gamification

Ensuring continuous, measurable feedback from the participant to enable the dynamic adjustment of user behavior and, as a result, the rapid achievement of learning outcomes and incremental immersion of the participant in more complicated situations

Creating a narrative or story with dramatic elements that accompanies the learning process to provide a feeling of involvement, contribution to common cause, or interest in achieving some fictional goals

Phased change and increase of goals and objectives difficulty when learners acquire new skills and competences to achieve learning outcomes while maintaining the engagement of participants

Participants should be motivated to interact; since the most powerful drives to action are the desires to experience pleasure or avoid discomfort, it is necessary to describe as accurately as possible participants’ feelings if they win

Unexpected discoveries and rewards (bonus content, special rewards, unexpected praise, new opportunities) that arouse curiosity in people, which subsequently generate the desire to achieve the ultimate goal of the contest, assignment, or competition

Desire for status: a competition that offers numerous opportunities to demonstrate progress and success and allows users to prove their personal superiority both to competitors and themselves

The reward (emotional, physical, personal, or related to higher status) must be something that is valuable for the target audience

Tools

- Narrative elements in courses
- Scoring systems
- Ability to spend and use scored points
- Ratings as an opportunity to compare one’s own score with those of other users
- Tools for initial assessment of a user’s knowledge
- Adjustment of learning program trajectory for specific users

Yu-kai Chou (b. 1986) is a Chinese entrepreneur and pioneer of gamification. In 2012, he proposed the Octalysis model that linked the effectiveness of gamification with 8 core drives of players. Yu-kai Chou founded Octalysis Group, a consulting company. He regularly gives lectures on gamification and behavioral design at Stanford University, Innovation Center in Denmark, Google, LEGO, and TED conferences.

81% of Russian companies noted the positive impact of games and entertainment on the productivity and quality of work of their employees [125].
Structural complexity

Three types of gamification have been adopted by developers from the computer games industry:

**Light, casual**
- Simple rules
- Background immersion
- Real world
- Game and real resources
- Real roles

For example, honour rolls, the junior personnel briefing by using comics and/or simple game situations, quiz games, etc. Can be developed for a specific task in a real time (usually without the participation of gamification experts). Also, many casual solutions (for typical tasks) are available in the mass market as cloud-based services.

**Middle complexity**
- Background immersion
- Game world
- Game and real resources
- Game-playing and real roles

Embedding gamification elements in workflows

**Hard**
- Complex rules
- Full immersion
- Game world
- Game-playing resources
- Game-playing roles

Requires a well-coordinated team of professional developers, designers, and task setters. Strictly speaking, does not belong to the category of gamification (see Business Simulations and Games, p. 33)

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Quiz games of Sberbank CU

- Short questions
- Limited time for answers
- Competition with a human or robot
- 36 quiz games a year
- 6,000+ users
- Up to 10+ quiz games per topic
- On average, each quiz involved 167 people
- Top players score up to 150,000 points (the maximum number of points per game is 300)

Course for consultants on banking products

The audience includes employees aged 18 to 23. The course was written in HTML5 and adapted for tablets. The program can be found in the Retail Business segment of the Virtual school of Sberbank.

"Cybersecurity Agent" game

270,000 users
6 sections
29 game modules
10 game mechanics
120 screens of source materials
1 video clip
3 characters
- Create and remember strong passwords
- Select channels for sending official or personal information
- Recognize a phishing attack launched via e-mail or a text message
Gamification in Russian companies [125]

What system should be implemented for gamification of company’s activities?

- Most likely yes: 48%
- Yes: 39%
- Most likely no: 13%

Can gamification effectively motivate personnel?

- Recognition of achievements: 39%
- Prize motivation: 14%
- Game motivation: 4%
- Other: 4%
- Plot motivation: 6%

At what generation is the method of gamification aimed?

- Baby boomers (1943–1963): 6%
- X (1963–1983): 38%

43% believe that the most effective approach is to immerse all employees in the game.

Success does not depend on the specific department:

- IT: 3%
- PR: 4%
- R&D: 6%
- Customer relations: 9%
- Marketing: 12%
- Other: 12%
- Sales: 18%

In what departments would the use of gamification be advisable?
Immersive learning

Immersive learning is a specific form of experiential learning (p. 86) that places learners in a specially designed virtual environment that has a high degree of credibility and can fully capture their attention to develop skills and stimulate behavioral change.

Immersion is a psychological state in which the learner completely shifts attention to another reality while in a virtual environment. At the same time, immersion can also refer to the technological capabilities of virtual reality systems (p. 217), in which the psychological state of the user’s immersion is directly the effect of using this technology.

Role of the learning environment

Experts face two types of behavioral problems: lack of skills and lack of will—that is, the attitude needed to use the skills. Both problems can be addressed through functional training based on experiential learning. However, while the lack of skills can usually be offset by the motivation to acquire knowledge and develop abilities, the lack of attitude represents a more difficult case. In this situation, learners may logically and conceptually understand the need to develop a particular skill but still experience difficulties in translating that understanding into real action. They need some serious behavioral changes, which can be triggered by immersing the learners in a context-rich environment that captures the full diversity of human life.

The scenario of such learning need not be realistic, but the environment itself must be as captivating and believable as possible; this can be achieved by using high-quality drama and a true-to-context setting. Such an environment must have multiple levels of complex elements designed to fully engage the mental abilities of learners. Only an environment with a complex set of components can trigger natural behavior in order to be corrected.

The process of designing experiential learning is less complex; it requires less attention to detail, as it occurs in a linear environment where the specific actions of the learner have only explicitly correct or incorrect outcomes. Immersive learning does not focus on whether the outcome was “correct” or “incorrect”; its goal is to create a complete experience reflecting certain real-life circumstances that take into account many "gray areas" that we face every day.

Experiential learning provides learners with the opportunity to perform tasks that resemble reality, allowing the learner to learn from the experience. Immersive learning, on the contrary, makes it possible to take learners out of their familiar environment and immerse them in completely new circumstances [99].
A key element of immersive learning is creating conditions for the development of awareness and self-reflection both immediately upon making errors and thereafter, as well as for facilitation and feedback.
In-class learning, new formats

In the digital world, in-class learning and new formats develop primarily competences (p. 47) related to creativity, teambuilding, and the development of communication and collaboration and typically come in the form of experiential learning (p. 86) and/or collaborative learning (p. 46). The emergence of new in-class learning formats is a direct result of the explosive growth of new formats in distance learning (p. 76) and flipped learning (p. 97), while the intensity of their development is driven by the freeing of instructors' time and energy in the new structure of educational services.

Meetup
A meeting of specialists in a subject area to share experiences. The term was coined in 2001 following the creation of Meetup, a social network [97] that helped users find like-minded people and hold meetings using simple tools. In corporate learning, meetups can be held among employees to share experiences, generate ideas, solve problems, and complete other tasks.

Learning journey
This is the process of exploring new possibilities, cultures, and experiences through intensive immersion to test and modify underlying assumptions about the future. It makes it possible to acquire new knowledge, inspire new ideas, transform thinking, break down stereotypes, rally the team, and get a better idea about the risks and effects of decisions in specific conditions beyond the comfort zone.

Transformation laboratory
A space for holding regular meetings for a group of people with different experience and specializations to engage in collaborative learning of technologies and develop skills.
- Specific composition, goals, and structure
- The goal can be either the optimization of existing technology and skills or their transformation

Example: Transformative Learning Technologies Lab [151] of Stanford University explores new ways of studying the learners' speech, gestures, sketches, etc., using artificial intelligence (p. 21) to better describe the learning process for content curation (p. 53).
Hackathon

An event in which experts from different fields (programmers, designers, managers, etc.) work together to create a product/process for solving a specific problem, for example, making a prototype of a new application, service, or product. The term "hackathon" appeared in 1999 to designate a meeting on cryptography. After that, hackathons were held among hackers, as they competed in hacking information systems. In the mid-2000s, companies began to organize hackathons to test the security of their own applications, databases, etc. Meetings in this format are used to brainstorm and rapidly prototype innovative solutions in IT. This is a full-fledged collaborative learning tool, which makes building horizontal relations possible. Hackathons are widely used to select experts for hiring and have become popular even among instructors of national history in Russia [74].

- Strict time frames
- Focus on results
- Competitive spirit

Example: Sberbank CU hackathon

This is a hackathon aimed at developing machine learning and searching for algorithms that can operate in a situation of uncertainty.

- Applications of solutions designed by the winners of the competition in the business activities of Sberbank:
  - Risk-return management
  - Pricing
  - Customer value management
  - Others
- The 100 best participants of the selection stage are invited to a closed offline hackathon held at Sberbank CU.
Interactive learning methods

Interactive learning methods are methods for the interactive communication of learners with the instructor and with each other in collaborative learning (p. 46).

Basic principles of interactive learning methods

- Arousing interest
- Making an impact on each learner
- Encouraging active participation in the process
- Maximum engagement of all participants
- Continuous sharing of knowledge and ideas
- Focus on effective assimilation of learning materials
- Developing independent opinions and practical skills in learners
- Providing feedback

Varieties of interactive learning methods

A round table is a group discussion of several problem issues in which the participants express their opinions on a peer-to-peer basis.

Interaction is a comprehensive group discussion of a controversial issue aimed at obtaining a solution acceptable to all group members.

Debates are the organized and clearly structured public exchange of opinions on a specific topic.

Brainstorming is a process for collaborative generation of ideas and sharing of opinions, in which the participants propose as many solutions to a problem as possible within a short period of time. It is followed by the critical evaluation of the proposed solutions and the selection of the most practical options.

Serious play or a serious game (p. 33) is the modeling of the real environment of professional activities and simulation of human activities and social interaction in the working environment. Each participant of the game is assigned a specific role and function as part of the performance of a work task.

Case study (p. 41) is the analysis of an imaginary or real situation to identify problems, effective solutions, and opportunities for practical application of acquired knowledge.

A master class is a method for transmitting new ideas and concepts. A master class should demonstrate original theories, methodologies, or technology. It may also include practical assignments to consolidate knowledge and skills.

A webinar (p. 76) is a virtual seminar based on interactivity when one person makes a presentation and then replies to questions from the audience.

A video conference is interactive communication between two or more remote parties sharing (transmitting and providing) audio and video in real time using special equipment.

A video lecture is a lecture recorded on video, including visual materials (tables, figures, diagrams, video).

Microworlds are exercises for simulating prolonged (several months or years) situations to assess their long-term outcomes.
An interactive lecture is a presentation made by an instructor in front of a large audience, which includes discussions, the use of presentations or videos, brainstorming, or motivational speaking.

An interview is a conversation on a specific topic.

Lecture-provocation is a lecture with deliberate errors in the presentation of material. It is followed by the analysis of solutions and review of the errors.

A decision tree is the selection of an optimal solution for a problem by building a "decision tree" and evaluating the benefits and shortcomings of possible options.

Take a position is an interactive process in which the participants are asked questions evoking mutually exclusive answers. The survey reveals divergent views on the issue, a reasoned discussion is held, and a decision is made.

PRES formula is a method for arguing a position in a discussion where P stands for position (presenting one’s own point of view), R stands for reasoning, E stands for example/evidence, and S stands for summary.

Project-based learning is work on an individual or group project on a given topic, in which the learners collect data, learn to use it, and develop research skills and systems thinking.

Portfolio-based learning is the assessment of learning outcomes and professional experience over a period. The outcomes are tangible, and collected and stored in one location.

An online seminar is a real-time online meeting or presentation held on the Internet.

Film-based learning is implemented for reflection on problematic issues described before viewing the film.

Public presentation is the provision of learning materials in a way that is structured, graphical, and easy to assimilate. The presentation may serve as an additional illustration of learning material and reflect its key points.

A small group workshop is the division of the team into small groups to discuss specific issues and develop solutions to a case problem. This method helps engage all learners and train them in collaborative and personal communication skills.

Socratic dialogue means raising particular issues during conversation to encourage thinking, focus attention, and adequately assess the current discussion and one’s own role in it. As a rule, a dialogue includes three stages: consent, doubt, and reasoning. The outcome is expressed in the following forms: you succeed in making your dialogue partner less contradictory, you adequately articulate your point of view, or you find the most effective approach to the arguments of your dialogue partner.

Sociopsychological training is training aimed at the acquisition or development of behavioral skills. Training may be discussion-based, game-based, or sensitivity training.

Internship is the temporary performance of work duties in a specific area to obtain professional experience.

Training (coaching) is the development of personal, creative, social, and professional competences and skills and acquisition of new knowledge. The purpose of training is to become more effective at achieving specific goals.

A focus group is a group of people (experts, experienced professionals) that in the course of discussion elaborates high-quality proposals to address a specific problem. The discussion lasts for two hours and is typically recorded on audio and video media.

Using interactive methods, the instructor acts as an assistant and coordinator of the process while transferring the active learning function to learners. He also regulates the process through the preparation of special assignments, consultations, provision of a technological base, assessment of papers and feedback.

In the process of interactive learning, learners communicate together and solve problems independently, share information, and assess the outcomes of their work and the work of other learners.
Leaders teaching leaders

Leaders teaching leaders (LTL) is an approach that involves organization key executives and experts in teaching. The leaders discuss internal and external challenges the organization might face, its values and mission and share leadership attributes, management models, professional knowledge and skills when educating successors.

In the 1990s and 2000s, a new approach to corporate learning, known today as “Leaders Teaching Leaders” (or “Leaders as Teachers”), developed as rapidly as corporate universities in the same time period (p. 60). Instructor-led live classes and master classes by top and middle executives for managers and employees of large companies have been known since their appearance in the first third of the 20th century. At the turn of the 21st century, these teaching practices took new qualities in three ways.

First, even though the initial emphasis was placed on transferring experience and explaining advanced approaches to the production and technical aspects of a company’s work, leadership and corporate culture issues came to the fore.

Second, the “Leaders Teaching Leaders” approach immediately proved to be highly efficient during the radical transformation of companies, especially in organizational aspects (particularly after mergers and acquisitions).

Third, raising new generations of leaders by means of teaching company key executives has ceased to be discrete, becoming a systematic way of forming human capital in successful companies. The “Leaders Teaching Leaders” approach has generally become the most important tool of strategy implementation for the companies that seek sustainable competitiveness in a rapidly changing world. The change of top executives’ role in corporate training is reflected in the concepts of “learning organization” by Peter Senge (“The Fifth Discipline,” 1990) and of the “leadership engine” by Noel Tichy (“The Leadership Engine,” 1997).

Though many companies began to introduce the LTL approach almost simultaneously, the most famous are the cases of General Electric, Boeing, Huawei, and Sberbank. CEOs (Jack Welch, Jerry McNerney, Ren Zhengfei, and Herman Gref) in different industries with different institutional contexts turned this approach into a key benchmark of modern corporate training development. Although companies include their own features into LTL approach, the following maturity criteria can be distinguished:

• **Transition** from an informal to a formalized system, which involves all top and middle executives (or even the best “role model” (p. 201) lower-level managers) in regular teaching, sometimes within standard hours. The approach is used to assess leaders’ progress with regard to their ability to develop new generations of leaders, which is critical to ensure the company’s long-term sustainable development.

• **Variety of subjects** taught. It means that mandatory strategy, leadership, corporate culture and team management questions are combined with a leader’s professional topics (for example, finance, risk management, advanced technological platforms).

• **Variety of forms** of leaders’ participation in corporate training. Today LTL implies not only instructor-led live classes and master classes but also special courses, participation in the training materials design and development and guiding the learners’ project work progress.

• **LTL approach** performance management. It implies both advanced system of planning and its implementation (including a scoring system or other methods of leader’s teaching performance evaluation) and analysis of approach impact on corporate training effectiveness and cost reduction from decreasing external providers.

Noel M. Tichy (b. 1945) is an organizational behavior specialist and one of the main designers of the “Leaders Teaching Leaders” approach. His book “The Leadership Engine” is based on the experience of leading companies’ studies and shows that long-term market success depends on leaders training tools. He described a “teachable point of view” model and suggested a hierarchy of leadership approaches based on it. He is the author of over 30 books. The Washington Post named his work “Control Your Destiny or Someone Else Will” (co-authored with Stratford Sherman) as one of the Top 10 leadership books.
**LTL approach** is based on the model of a teachable point of view by Noel Tichy and on the hierarchy of approaches to leadership and successor training. Successful adoption of the LTL approach is stipulated by an inclusive leadership model, which suggests that every person is a leader and his potential should be manifested (as opposed to an exclusive model, which means that company assigns some of its employees to possible leaders in advance).

**Teaching Competency Development**

The specialist feels comfortable and motivated to participate in LTL approach when he understands his value, receives feedback and sees the outcomes. Leaders are usually being prepared to work with LTL approach by means of personal methodological curatorship. Companies run special training programs on public speaking, drama and storytelling skills, feedback skills, other teaching and presentation skills development, as well as the individual trainer briefing right before their presentation. Often younger leaders are assigned to older ones to teach them digital skills (reverse mentoring).

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**A Leader’s Teachable Point of View [150]**

**Approaches to leadership and teaching [150]**
LTL Advantages [85]

For a leader

- Enhances leader’s self-awareness: 45%
- Supports talent awareness by exposing leaders to a wider range of employees: 44%
- Provides professional development opportunities for leaders: 44%
- Exposes leaders to information or opinions not likely encountered otherwise: 36%

For employees

- Increases engagement of the workforce: 54%
- Exposes employees to senior leaders in the organization: 53%
- Provides employees with company-specific skills and knowledge: 53%
- Encourages employee enthusiasm about learning: 50%
- Accelerates learning and comprehension for employees: 45%

For educational functions

- Aids in aligning learning strategy to business strategy: 53%
- Improves support for the learning function from the C-level: 40%
- Leads to more resources for learning: 38%
- Saves the cost of an instructor or facilitator: 30%
- Saves the cost of content development by learning staff: 21%

For an organization

- Support a culture of learning: 59%
- Aids in aligning learning strategy to business strategy: 56%
- Aids in organizational culture change: 53%
- Facilitates transfer of leaders’ deep tacit knowledge: 52%
- Strengthens ties between L&D and the business: 51%
- Enhances internal communications: 51%

Formats in which leaders are involved [85]

- Instructor-led live classes: 48%
- Meetings/discussions groups: 47%
- Webinars: 22%
- Online courses: 19%
- Simulations: 15%
- Use of social networks to deliver learning: 11%
- Podcasts: 10%
- Gamification: 8%
- MOOCs: 6%
Implementation

Sberbank Corporate University case

The LTL approach involves more than 400 managers in 30-40 programs annually. The organization implemented teaching competences development programs and other tools to support leaders’ internal need to share their knowledge. The Bank adopts the “leader without a title” vision which means that top executives are not the only leaders who teach and develop new leaders. Almost all top and middle managers should be able to successfully address to an audience at least three topics: Bank strategy, corporate culture, and leadership. In addition, most of the senior managers successfully share a wide range of professional knowledge based on the Bank’s internal expertise (e.g. finance and risk management).

LTL formal approach

- Job descriptions and employment contracts include responsibilities to develop employees’ expertise.
- All key executives are required to teach at Sberbank Corporate University for at least 8 hours annually, as approved by the Board of the Bank

Formats in which leaders are involved

- In-class
  - Lectures / Seminars / Follow-up sessions
- Video lecture and short video development (both microlearning and as a part of the complex multimedia content)
- Training materials design and development (cases, manuals, business games, etc.)
- Project supervision/spONSorship at level-based training programs
- Participation in program project defence
- Bank strategy presentation during meetings with department staff
- Task/essay assessment during the admission process on the level-based training programs (e.g., Sberbank 2020)

Efficiency metrics

- Feedback metrics: Net Promoter Score (p. 140)
- Metrics of corporate training costs reduction

General Electric case: in-class and virtual platforms for LTL implementation

- GE opened John F. Welch Leadership Development Center, where employees learn how to create methodologies, run sessions, and become mentors. Any employee can apply for programs twice a year.
- Internal portals:
  - Brilliant You – similar to Coursera
  - Women’s Network – initially it was launched to support women in business, but now participants fight all forms of discrimination
- Tinder-like app for finding a “mentor”

1980-s 1997 2003

Jack Welch, the General Electric CEO, turned “Leaders Teaching Leaders” into the main approach of training at GE’s CU in Crotonville, New York [5]

Studying at GE’s CU became mandatory for the company’s top managers [76]

Noel Tichy, an American organizational behavior specialist and consultant, published his book “The Leadership Engine.” He described “Leaders Teaching Leaders” approach, where a company’s leading employees act as teachers [150]

Joseph Raelin, professor at Northeastern University (Boston, Massachusetts), published his book, “Creating Leaderful Organizations: How to Bring Out Leadership in Everyone.” In the book he proposed an inclusive model of leadership. It assumes that every employee in a company, regardless of their position, is a leader and can participate in management [126]
Boeing case: live dialogue is the main value of the LTL approach

The program’s method is based on three principals:
• Conduct a dialogue instead of a monologue;
• Ask difficult and interesting questions;
• Share real-life experiences.

All participants benefit from direct communication between accomplished leaders and the still-learning employees. Each course involves different leaders; they spend two or three hours with the learners, discuss specific topics, talk about their experiences in the company. Participation in the center’s programs is an obvious recognition and confirmation of a leader’s exclusive knowledge.

IBM case: Managers’ key roles development and competencies contributes to the achievement of business outcomes

Leaders’ role in developing and training managers include program curriculum development and learning outcomes evaluation.
Learning agility

Learning agility is a key skill in today's business that lies in the ability to effectively acquire new experience (gain new knowledge in the learning process, or during training, or to master new job duties that require an employee to do something they have never done before). There is no single model of learning agility, but experts usually distinguish several basic elements.

Potential to learn

Learning requires open and receptive thinking. Through years of experience, we often acquire expertise and competence, which may make us blind to potentially better ways of achieving goals and improving processes.

Learning capability is based on a person's abilities, including

- **Learning rate**, or the efficiency and speed of performing common tasks associated with information analysis
- **Task criticality in learning**, or the ability to separate important factors from unimportant ones in case of information overload
- **Flexibility in learning**, or, in case of uncertainty, the ability to doubt and to choose a more probable, rational solution rather than an intuitive one. Flexibility helps a person re-educate oneself in a changing environment and acquire truly new knowledge and experience
- **Solving problems based on systematic, rational, and logical approaches**
- **Proving the relevance and importance of one's own ideas, beliefs, and values**
- **At the same time, considering different viewpoints when making a decision**
- **Identifying, shaping and assessing the arguments for or against a certain opinion**
- **Critically evaluating arguments, seeing inconsistency and errors**

Motivation to learn

Basic interest and willingness of a person to change, overcome stereotypes, and gain new experiences.

Adaptability to learn:

Learners with a high degree of learning agility are proactive, and they look for new opportunities to learn and experiment with new approaches. Instead of simply following the business-as-usual routine, individuals with adaptability to learn are constantly reflecting on the effectiveness of their existing skills. This helps them personally determine what new competences they should develop and find ways to improve their effectiveness and get better results.
High learning agility behavior model, Center for Creative Leadership (CCL)

More extroverted
- Better prepared for social interaction
- More active
- Better prepared for change

More original
- More likely to create new plans and generate ideas
- Seek comprehensiveness
- Easily acknowledge change and innovation

Less accommodating
More likely to:
- Challenge others
- Welcome engagement
- Express opinions

More resilient
- More natural
- Calmer
- More optimistic
- Rebound from stressful events more quickly

More focused
- Continually refine and polish their skills
- More organized
- More driven
- More methodical

The ability and desire to learn from direct experience and apply the knowledge to new/unusual situations are becoming important criteria for employee assessment.

Employees with greater ability to learn from experience are promoted more quickly compared to their peers, are recognized as more competent, and earn more.
Learning analytics

Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs [84].

### Objectives of learning analytics [60]

<table>
<thead>
<tr>
<th>Area of application</th>
<th>Questions</th>
<th>Type of data required for analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modeling user knowledge</td>
<td>What should the learner know/be able to do (e.g., specific skills and concepts or knowledge of a technology/method and higher-order thinking skills (HOTS))</td>
<td>Answers of learners (correct, incorrect, partially correct), time interval before starting to answer the question, requests for hints, repeated wrong answers, errors</td>
</tr>
<tr>
<td>Modeling user behavior</td>
<td>What characteristics of learner behavior are important for learning? Are the learners motivated?</td>
<td>Answers of learners (correct, incorrect, partially correct), time interval before starting to answer the question, requests for hints, repeated wrong answers, errors</td>
</tr>
<tr>
<td>Modeling user experience</td>
<td>Are the users satisfied with their experience?</td>
<td>Answers to surveys and questionnaires Peculiarities of the choices and behavior demonstrated by learners, their subsequent effectiveness in learning</td>
</tr>
<tr>
<td>User segmentation</td>
<td>How can the users be grouped?</td>
<td>Answers of learners (correct, incorrect, partially correct), time interval before starting to answer the question, requests for hints, repeated wrong answers, errors</td>
</tr>
<tr>
<td>Thematic planning</td>
<td>How can topics be most accurately divided into modules, and how should these modules be organized?</td>
<td>Answers of learners (correct, incorrect, partially correct) and quality of learning module implementation with changes in the scope of individual training materials compared to the standard module Systematization of topics in the subject area Relationships within the task area and between the skills and assigned tasks</td>
</tr>
<tr>
<td>Analyzing components and learning methods (didactic methods)</td>
<td>What components best facilitate learning? What methods are useful? How effective is the entire learning program?</td>
<td>Answers of learners (correct, incorrect, partially correct) and quality of the learning module implementation with changes in the level of detail compared to standard module Systematization of topics in the subject area Structural relationships within the task area and between the skills and assigned tasks</td>
</tr>
</tbody>
</table>
### Analyzing trends

What is changing in the course of learning and how?  
The analysis depends on what information is of interest; usually, at least three time intervals of recorded data are required to identify a trend  
Collection of data on enrollment, courses passed and certificates received, learning completed and diplomas received, learning conditions, and learning in high school over several years

### Adaptation and personalization (p. 193)

What are the next steps suggested for users?  
How can the experience of the further user be changed based on insights from the experience of the previous user?  
How can user experience be changed, particularly in real time?  
Depends on specific recommendations  
Data about the learning experience of the user and relevant information on recommended educational products and resources may be required  
Certificate of academic achievement

### Relationship between learning analytics and educational data analysis [133]

<table>
<thead>
<tr>
<th>Learning analytics</th>
<th>Educational data mining, EDM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Obtaining new results</strong></td>
<td>The judgment of the specialist plays a key role; automatic methods of development provide support</td>
</tr>
<tr>
<td><strong>Reduction and holism</strong></td>
<td>Focus on understanding systems as a whole, in all their fullness and complexity</td>
</tr>
<tr>
<td><strong>Origin</strong></td>
<td>Learning analytics emerged from semantic networks, smart &quot;learning programs,&quot; forecasting of outcomes and systemic impacts</td>
</tr>
<tr>
<td><strong>Adaptation and personalization</strong></td>
<td>The main focus is on informing and supporting coaches and learners</td>
</tr>
<tr>
<td><strong>Techniques and methods</strong></td>
<td>Social network analysis, content analysis, including sentiment analysis and discourse analysis, analysis of opinion leaders, conceptual analysis, and models for clarifying the meaning of outcomes</td>
</tr>
</tbody>
</table>
The relationship between learning analytics and business analytics by level of decision making
(HR analytics/people analytics/talent analytics/T&D analytics, depending on the level of detail)

For business analytics: query from business. (Business value plays a key role.)

For learning analytics: query from the learning process. ("Understanding and streamlining learning and the environment" play a key role.)

The division is not always rigid but rather involves different levels of abstractions.

Building a learner model based on big data

Sources of evidence

Interaction with educational resources
Interaction metrics at the time of learning, including navigation style, answers to exercises and tests, types of errors made, and time characteristics associated with the behavior of the learner during learning activities

Social metrics
Indicator of the learner’s engagement with other learners and the instructor in the learning process or with recorded speech (with all its various properties, such as semantic content, prosody, etc.)

Mindset
Data from a questionnaire or self-report on how the learner establishes a connection between his strategic efforts during the course of learning and 1) the development of competences and 2) on the functioning of the subject area

Past performance
Historical indicators of past performance of the learner revealing the assimilation of ideas, skills, or competences at the current time

Preferences for learning media or genres
Historical indicators of media or genres preferred by the learner when options are available

Perseverance or persistence
Historical indicators of perseverance and persistence demonstrated by the learner when facing difficulties in learning, which are indexed as errors and time indicators

Administrative data
Distal context indicators, such as instructor, school, district, local community, or state (based on administrative data)

Demographic information
Distal context indicators, such as demographic information about the learner

Temporal history
Proximal context indicators representing the temporal history of learner activities on which data is available for a specific day

Emotional state
Proximal indicators related to learning, such as emotional state, sleep quality, and nutrition

Social network
Proximal context indicators such as social relations and data on social networks

Classroom deviation
Proximal and distal context indicators on classroom disruptions according to records of behavioral incidents in the classroom of the learner on a specific day or over a time period

1995
Corbett and Anderson’s study on Bayesian Knowledge Tracing, an early key algorithm that still retains its popularity

2000
First workshop related to EDM

2001
Dina Zayan’s theoretical study on EDM methods

2005
First workshop where the term of "educational data mining" was used

2006
First published book on EDM: "Data Mining in E-Learning" by Romero and Ventura

2008
First international conference on educational data mining (EDM)
Educational data mining (EDM) and data mining

Among the abovementioned methodological categories, predictive analysis, cluster analysis, and relationship search are considered universal for all types of data mining, but Discovery with Models and Distillation of Data for Human Judgment are viewed as better-known approaches to EDM.

**Case: Predictive analytics for audience segmentation [66]**

- More than 1,000 participants • Two adaptive tests • Time for analysis and data of all participants

The audience is quickly segmented, and in the future, there are no dynamics in the results, which makes it possible to predict the ability of specific group to perceive a given material.

**Assessment/number of attempts**

Identified dependency between the demonstrated results and the number of attempts to pass the test.

**Assessment/improved the results**

Additional segmentation based on dynamics.

**Assessment/"got stuck"**

<table>
<thead>
<tr>
<th>Identified three audience segments</th>
<th>Want and can</th>
<th>Want but cannot (&quot;got stuck&quot;)</th>
<th>Do not want (&quot;abandoned&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendations</td>
<td>Tell</td>
<td>Train</td>
<td>Engage</td>
</tr>
</tbody>
</table>

**2009**
First issue of the Journal of EDM was published; so far, it has been cited 189 times (15.75 citations per article annually)

**2010**
Publication of the first handbook on EDM written by Romero, Ventura, Pechenizkiy, and Baker

**2011**
First conference on Learning Analytics and Knowledge.
Establishment of the International Electron Devices & Materials Symposium (IEDMS)

**2012**
First Learning Summer Institute

**2013**
First Analytics and data mining are considered indispensable for comprehensive educational studies, and it is expected that by 2022 they will have become commonly used.

**2017**

Learning culture

Learning culture is a set of mechanisms, values, and practices developed within an organization and connected with the training of employees; a corporate culture where these processes are considered important and in which they play a key role.

A learning organization (p. 146) supports all formats of education—formal, informal, education in the workplace, etc., and treats learning as an integral part of the work process. Interactive syllabi are developed using real cases and give learners an opportunity to practice. The focus is on self-learning and lifelong learning.

Trends in learning culture [106]

Developing a self-learning culture in organizations: Designing and supporting a marketplace for educational services

Today, more and more organizations are promoting training based on a self-service model. To do this, companies develop learning culture that includes the following: internal programs development and external courses promotion to prioritize and reward learning, internal platforms of social education development to support knowledge sharing and reflection, 360 feedback to provide honest and constructive feedback, etc.

Companies create and support an educational marketplace (p. 154) to implement the latest trends in learning culture.

An example of an educational marketplace: Sberbank CU

External platforms

CourseMA, Lynda.com, Udemy, Udacity, Skillshare, etc.

They act as aggregators for training courses on business, technology, foreign languages, etc. They include video lectures automatic grading, review of assignments and an interactive discussion forum. Upon completion, the user obtains an electronic certificate. In addition to these aggregators, there are other educational platforms.

Example: The series of courses “Pixar in a Box,” presented by the Pixar Company in partnership with the Khan Academy [81]

Currently, it includes more than 10 free educational courses on animation, creating special effects, the art of narration, rendering, and other aspects of animation.

The courses demonstrate how traditional school subjects (mathematics, physics, and painting) can become a vital part of everyday work in producing animated films. The learning process includes watching videos and performing tasks to verify understanding of the material.
Self-selection of learning areas

Online educational platforms allow organizations to provide an employee or team with a wide range of different programs and courses. This gives employees the opportunity to independently assess their educational needs and then select specific areas for development by building individual educational programs.

Example: Learning Together, an educational program of Boeing
It enables employees to receive a diploma, professional certificate or take individual courses from more than 270 partner colleges and universities [23]. Boeing has invested more than one billion dollars in the program. Employees who have worked in the company for more than a year, regardless of their position on the career ladder, are eligible for studies. Moreover, the area of learning need not correspond to the current specialization of the employee, as the company encourages employees to try new roles.

At this point, Learning Together is a leading learning assistance program in the industry.

Supporting the continuous employees learning during change in their roles/functions

Promotion, horizontal transfer, or just the expansion of job duties, all require new knowledge, skills, and competences from an employee. Today’s online platforms enable companies to plan learning based on the needs of employees, for example, on the basis of the corporate competency model (p. 48). This supports the lifelong learning of employees during changes in their roles or functions.

Example: corporate training programs, Canon [31]
The company actively supports a learning system in which each employee can select a course and engage in self-development. One of these programs is Management Training, in an e-learning format, which is designed for new managers.

Its goal is to pay special attention to employees who moved to a new position to make this transition as effective as possible.
Learning effectiveness

Learning effectiveness is a measure of how well the results achieved coincide with the aims of the educational program. There are three words in English: efficiency, effectiveness, and efficacy, which refer to the correlation between costs and benefits, performance, and alignment with expectations and aims, respectively.

For the assessment of effectiveness, two types of indicators are used:

**Consumptive metrics:** "Look what it costs you!"

**Impact metrics:** "Look how much value we give you!"

---

**Phillips V-model**

- **Preference needs**
  - 1. Reaction goals
  - 2. Learning goals
  - 3. Application goals
  - 4. Impact goals
  - 5. ROI goals

**Kirkpatrick Model**

- **ROI**
  - Results
  - Impact
  - Applications
  - Behavior
  - Learning

**Five fundamental principles of Kirkpatrick model:**

- The end is the beginning.
- Return on expectations (ROE) is the ultimate indicator of value.
- Business partnership is necessary to bring about positive ROE.
- Value must be created before it can be demonstrated.
- A compelling chain of evidence demonstrates your bottom-line value.

---

**1950s**

One of the first surveys using 360-degree assessment was conducted by Esso to collect information about the employees of the company.

**1959**

American researcher Donald Kirkpatrick suggested a model for the assessment of learning effectiveness that has been widely used and is a classic today.

**1991**

Jack Phillips added a new fifth level to the four-level model by suggesting the calculation of the economic effect of learning—return on investment (ROI).

**2000s**

The development of the Internet helped overcome one of the biggest difficulties in evaluating learning effectiveness: data sets can now be collected and processed online.
Kirkpatrick model

In 1959, American researcher Donald Kirkpatrick suggested a model for evaluating learning effectiveness that has been widely used and is a classic today. The model involves assessment on four levels; however, the importance of each level is different for different stakeholders.

**Level 1. Reaction**
To what extent learners react positively to a learning event

**Level 2. Learning**
To what extent learners have acquired the expected knowledge, skills, and mindsets based on their participation in a learning event

**Level 3. Behavior**
To what extent the participants apply what they have learned during the learning process when they return to their workplaces

**Level 4. Results**
To what extent the target results of the company were a consequence of training activity and subsequent events (reminders, evaluation, monitoring)

ROE (return on expectations) means that it is necessary not only to meet expectations (at each level of assessment) but to achieve results that exceed expectations (also at each level of assessment). As a result, the educational program creates a new value: exceeding expectations at each level.

**Donald Kirkpatrick** (1924–2014), an American researcher, Professor Emeritus at the University of Wisconsin in the United States, and a past president of the American Society for Training and Development (ASTD). In 1954, he created a four-level model for training course evaluation that served as the subject of his PhD dissertation. Kirkpatrick's ideas were published to a broader audience in 1959 in a series of articles in the American Training and Development Journal, but they are better known from such books as "Evaluating Training Programs" (published in 1994) and "Transferring Learning to Behavior and Implementing the Four Levels" (published in 2005).

Phillips Five-level model [121]

**Level 0. Input data and indicators.**
- How many trained people?
- How many hours of training?
- What are the costs for training per person?

**Level 1. Reaction and planned actions**
- Was the program relevant to employees?
- Will the program help learners succeed?
- Does the program provide new knowledge?
- Will learners use what they learned in the program?
- Would learners recommend the program to their colleagues?
- What can be improved about the educational materials, educational environment, and teaching skills?

Rethinking of Kirkpatrick model.
Modern researchers suggest additional evaluation for the engagement of learning participants and the extent to which learners would use the acquired knowledge and skills in their activity.

According to a study by McKinsey, current investments in formal training are about 4% of total salary funding (1,500 companies were surveyed worldwide). On average, an employee receives 34 hours of formal training each year.

A study by the Talent Development Association (ATD) showed that for most companies, offering training, the first and second levels of evaluation according to Kirkpatrick model (“Reaction” and “Learning”) are not very important. The most important for them are the third and fourth levels showing to what extent training influences the behavior of its participants and the overall results of the company.
Level 2. Learning
• Do learners know how they can apply the knowledge they have acquired?
• Do learners then actually apply the knowledge they acquired?
• What are the next steps of the learners for expanding their expertise?

Level 3. Behavior
• How effectively can the learners apply the knowledge they acquired?
• How often will they have to apply the knowledge they have acquired?
• What percent of the knowledge acquired is actually applicable in practice?
• If the learners apply the knowledge they have acquired in their work process, who provides them with support and assistance?
• If the learners do not apply the knowledge they acquired in practice, why not?

Level 4. Results
• To what extent does the application of the knowledge and skills acquired by the learners help improve the performance, quality, time, and cost indicators of the company?
• Does training increase the level of customer satisfaction, the level of satisfaction with the quality of working conditions or the level of innovation?
• Why can we state that the program had a real positive impact on the indicators listed above?

Level 5. ROI (return on investments)
• Can we say the quantitatively evaluated results of the educational program exceed the costs for the development of the program?

ROI (return on investments), Jack Phillips methodology that helps measure, using various formulas, the return on investments in training as the ratio between all the benefits associated with the training in monetary terms and all the costs (investments) for the training process, also in monetary terms. The calculation of this indicator is complicated and in many ways subjective, and so obtaining and calculating ROI often does not have much significant value.

ROI = Net Program Benefits / Program Costs x 100

Jack J. Phillips (b. 1945), PhD, member of the Consultative Council of KnowledgeAdvisors, Inc., chairman of the ROI Institute, leading service supplier for measuring and evaluation of indicators and analytics. Developed the ROI methodology and created or edited more than 75 books on evaluation, metrics, and analytics. The author of the “Handbook of Training Evaluation and Measurement Methods” (published in 1983). Today, his works are published in the Wall Street Journal, Bloomberg Businessweek, Fortune, and on CNN.
Human capital model

Based on the measurement of the company’s productivity by determining the gaps in the knowledge and skills of employees and the return on their compensation by the training system. The parameters of evaluation when using the model are problems with implementation of business processes (in monetary terms), evaluation of the knowledge and skills that the employee needs to solve problems in business processes, and problems with the implementation of business processes connected with the work of the employees.

Examples of indicators in the models

<table>
<thead>
<tr>
<th>Phillips model</th>
<th>Human capital</th>
<th>Kirkpatrick model</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Material benefits (estimation of labor productivity in monetary terms, change in costs)</td>
<td>• The period of performance of operations</td>
<td>• Evaluation of the program and instructor, the usefulness of the program content, and the learning environment</td>
</tr>
<tr>
<td>• Intangible benefits (change in employee satisfaction, staff turnover, costs for personnel selection)</td>
<td>• Problems with cash flow, shortage</td>
<td>• Assessment of the level of mastery of the program by its participants</td>
</tr>
<tr>
<td>• The cost of instructor services; costs of equipment, costs of educational materials, costs of catering, costs of employee absence from the workplace for the period of training</td>
<td>• What percentage of the problem may be attributed to motivation, skills, or technical solutions?</td>
<td>• Correlation of the developed skills with employee job duties, applicability and relevance of the obtained knowledge</td>
</tr>
<tr>
<td></td>
<td>• The percentage of problems in the implementation of business processes that are caused by the work of the employee, or lack of customer satisfaction</td>
<td>• Employee productivity after training</td>
</tr>
</tbody>
</table>

Expectations of those who commissioned the training program

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost</th>
<th>Reaction</th>
<th>Learning</th>
<th>Behavior</th>
<th>Results</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring now</td>
<td>Must be measured in the future</td>
<td>Measuring now</td>
<td>Must be measured in the future</td>
<td>Measuring now</td>
<td>Must be measured in the future</td>
<td>Measuring now</td>
</tr>
</tbody>
</table>
Stages of the development of the performance assessment system

Any assessment system goes through several development stages. In 2017, the journal Chief Learning Officer proposed subdividing the process into four stages:

Stage 1. Using individual tools and metrics to assess satisfaction
- Assessing satisfaction with the learning programs at the first level of the Kirkpatrick-Phillips model

Stage 2. Creating a uniform assessment system
- Program success criteria are determined
- Assessment tools are systematized based on the Kirkpatrick-Phillips model
- Programs are benchmarked on a regular basis

Stage 3. Transition to a dynamic, standardized assessment system (includes Stage 1)
- A unified information platform for the assessment of learning effectiveness
- Metrics are available to key stakeholders
- Assessment of short-term and long-term effects of the learning program (predictive analytics)
- Management of the programs portfolio based on effectiveness assessment data

Stage 4. Development of unique practices for assessing performance for the company’s needs (includes Stages 1 and 2)
- ROI assessment method for 5% of programs
- Business data analysis
- HR data analysis
- Using learning analytics methods
- Proxy indicator

People analytics, analysis of HR data in combination with other corporate data (including employee learning data).

Backward design, a method of creating a learning program in which the content and methods of learning are determined based on the company’s business tasks.

Learning analytics, the measurement, collection, and analysis of data and preparation of reports on learners and their contexts to understand and optimize the learning process and the environment where it takes place (p. 16)
Net Promoter Score (NPS), an index of willingness to recommend, a loyalty metric. Respondents are asked to answer only one question: "What is the probability that you will recommend the learning program to your colleagues?"

\[
\text{Net promoter score (NPS)} = \frac{\text{(number of promoters)} - \text{(number of detractors)}}{\text{(number of respondents)}} \times 100\%
\]

Assessment methods at Sberbank Corporate University

Sberbank Corporate University is simultaneously at all four stages of performance assessment and successfully applies some advanced assessment methods in various learning programs.

**Sberbank 500 retraining program**
- Management level: middle. Over 2,000 employees have been trained
- Effectiveness assessment methods: assessment of the business project success rate at the level of financial indicators
- Monitoring of career paths
- Assessment of professional competences
- 9.2, learner satisfaction score

**Risk management I, II**
- Management level: line, middle. 15,000 employees have been trained
- Effectiveness assessment methods: Proxy indicator method for assessing the dynamics of the bank’s risk culture (based on a survey of 90,000 employees)
- The questionnaire is based on a Likert scale
- 75%, overall indicator of risk culture
- 9.0, learner satisfaction score

**Chief of ISU (Internal Structural Unit) Workshop**
- Management level: line. Over 18,000 employees have been trained
- Effectiveness assessment methods: pilot for assessing the effect of learning on business indicators through integral assessment of work with deviations
- 9.7, learner satisfaction score

**A Team of Leaders**
- Management level: line, middle, top. Over 1,600 employees have been trained
- Effectiveness assessment methods: pre- and postprogram diagnostics by the performance team
- Action plan monitoring
- Follow-up sessions
- 14%, team effectiveness dynamics
- 9.6, learner satisfaction score
Learning experience

**Learning experience** can be acquired both in a traditional academic format, with the support of instructors and professors in the classroom, and in a nontraditional format of interaction (in a game, interactively, virtually, remotely, etc.) with a user/customer/any person and/or in the format of self-learning when learners learn/assimilate/realize something new.

The concept of learning experience gains quite some prominence these days; given the promotion of the idea that learners are increasingly in charge of their own learning and need to get enabled to do so. Hence, looking at learning from the eyes of the learner and how learning fits best in the working routines of an employee.

It is important to distinguish between **learning experience design (LX design)** and **instructional design**: while instructional design is focused on the development of training courses and materials, LX design is focused on the individual, their perception of learning and learning preferences, and the work environment.

The conscious application of the learning experience requires analysis of the user's needs and the resources necessary and sufficient for obtaining the expected learning outcomes.

**Jesse James Garrett’s elements of learning experience**

<table>
<thead>
<tr>
<th>Concrete</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory experience means how the learner perceives the learning experience and what they feel in the process of assimilating it</td>
<td>Strategy defines the needs and goals of the learning experience from the point of view of both the learner and the provider of the learning experience</td>
</tr>
<tr>
<td>Interaction experience means the formats of content assimilation and interaction with various elements of the educational process during learning</td>
<td>Decisions define what needs to be considered and done to implement the strategy</td>
</tr>
<tr>
<td>The structure of the learning experience includes methodology, logistics, etc.</td>
<td></td>
</tr>
</tbody>
</table>

**Connie Malamed** is a consultant and designer of e-learning programs, information and visual communication materials [147]. She has a Master's Degree in Instructional Technology. Connie is thought to have coined the term "learning experience" in 2015. In 1999, she founded Connie Malamed Consulting, a consulting company [22]. Connie authored the books "Visual Design Solutions" and "Visual Language for Designers: Principles For Creating Graphics That People Understand."
Learning management system, LMS

A learning management system (LMS) is a platform or software application designed to integrate learning tools, as well as to administer, manage, and distribute the learning programs and generate learning analytics and reports.

An LMS is a high-level, strategic solution for planning, implementing, and managing all learning programs and activities, including online learning, virtual classrooms, and lectures held by an instructor [67]. The main objective is to replace isolated and fragmented learning programs with systematic methodologies for assessing and improving competence and performance across the organization. Another common term is Distance Learning System (DLS), since the LMS is used primarily for distance learning or providing remote support to the educational process.

Functions of an LMS in a learner-oriented system:

- Posting e-learning content developed in various formats
- Learners registration, data collection, and monitoring of the learning process
- Distinction of access levels to training materials
- Monitoring the learning process, including the learner activity timeline, and monitoring the assignments completion
- Learning process participants interaction and communication
- Creation of new learning content as well as assessment of learning effectiveness

Capabilities of a LMS [67]:

- Support of blended learning
- Integration with HR
- Administration tools
- Content integration
- Testing possibilities
- Knowledge management (the knowledge management module makes it possible to determine learning needs based on the competence and the level of the learner’s preparedness)

Edward M. Foster published the paper The Machine Stops where he discussed the advantages of using audio for remote learning [63].

Sidney L. Pressey developed the first teaching machine that provided several types of tasks and formats of questions [48]. Nine years later, professor of the University of Alberta M. E. LaZerte converted the machine to a problem cylinder able to match problems and solutions.

The University of Houston started holding video sessions of classes [145]. Later, experts from the University of Illinois developed programmed logic for automated teaching operations (PLATO), which enabled users to share content irrespective of their location.

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1953
The University of Houston started holding video sessions of classes [145]. Later, experts from the University of Illinois developed programmed logic for automated teaching operations (PLATO), which enabled users to share content irrespective of their location.

1956
Robin McKinnon-Wood and Gordon Pask published the first adaptive learning system, SAKI [145]. Later, experts from the University of Illinois developed programmed logic for automated teaching operations (PLATO), which enabled users to share content irrespective of their location.

1970–1980
The idea of computerized learning was rapidly spreading among educational institutions. The Western Institute of Behavioral Sciences in California presented the first accredited online learning program.
Starting Q3 2017, Sberbank CU is migrating to SuccessFactors (SF), a centralized HR cycle and learning management system. The Virtual Platform, which is a proprietary customized educational platform, is integrated with SF. This allows for one- or two-way sharing of information about the learning process and learning outcomes of learners. The Virtual Platform, in turn, integrates the external educational platforms and solutions that also support the sharing of statistical data.

As a result, all the information on enrollment/completion and learning outcomes of learners is accumulated in the Virtual Platform and can be communicated in both directions.

The integration of an LMS with other technology solutions—the case of the Sberbank CU Virtual Platform

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**1991**
- Norway’s NKI Distance Education Network developed and published the first full-scale learning management system (LMS) called EKKO [116]

**1994**
- New Brunswick’s NB Learning Network presented an analog system for DOS intended for business learning

**2000**
- Zurich University revolutionized the concept of digitized education when it presented the first open LMS, called OLAT [112]

**2001**
- Microsoft issued the first certified SCORM-package, called SharePoint

**2017**
- Learning management systems were launched in almost all institutions of higher education and organizations, which train their employees. The most popular LMSs: Moodle, Sakai, Blackboard, Cornerstone, Saba, Skillsoft, SuccessFactors
Learning content management system

A learning content management system (LCMS) is a program for managing the creation, storage, primary and repeated use of educational materials (content).

The main focus of an LCMS is learning content. A LCMS provides authors, designers, and experts with tools for the more effective creation of learning materials. The main business task handled by an LCMS is the creation of the required content within the required time to meet learning needs.

LMS Technology [79]

Standards for content creation and integration in LMS:

- **AICC (Aviation Industry CBT Committee)**: the very first standard of e-learning. The more modern version is the **SCORM Standard**

- **SCORM (Sharable Content Object Reference Model)** is a set of specifications and standards developed for remote learning systems. It contains the requirements for learning material administration and the entire remote learning system. SCORM enables the compatibility of components and the possibility of their repeated use: learning material is presented in separate small blocks that can be included in different learning programs and can be used by the remote learning system regardless of who created them, where, and by what means

- **xAPI (tin can API, experience API)** is a new generation standard consisting of a specification of programs in the field of remote learning, enabling learning systems to communicate among themselves by tracking and recording learning sessions of all kinds. Information on learning activities is stored in a special database—the learning record store, LRS

- **LTI (learning tools interoperability)** makes it possible to embed a remote service directly into an e-course on a learning management system side, eliminating the need for multiple authorizations and work in various interfaces
## LMS and LCMS: differences and similarities [67]

<table>
<thead>
<tr>
<th>Feature</th>
<th>LMS</th>
<th>LCMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>For whom is it intended?</td>
<td>All learners; organization</td>
<td>Content developers; learners who need personalized content</td>
</tr>
<tr>
<td>It mainly provides management:</td>
<td>Learning process; learning requirements; learning programs and planning</td>
<td>Learning content</td>
</tr>
<tr>
<td>Manages e-learning</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Manages traditional forms of learning</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Monitors results</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Supports cooperation of learners</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Includes management of learning profiles</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Provides the ability for HR and ERP systems to use learning data</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Schedule</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Analysis of competency profiles/knowledge maps</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Notifications about registration for the program and the requirements for review and notifications about expulsion</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Creating questions and managing tests</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support of dynamic preliminary testing and adaptive learning</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Support of content creation</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Organization of repeatedly used content</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Workflow tools for managing the content creation process</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>The development of content navigation and user interface</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Learning organization

A learning organization creates, acquires, transfers, and retains knowledge and can successfully modify its behavior to reflect new knowledge about itself and/or its environment in real time. In these organizations, human resources and talent are the key factor of productivity and the purpose of investments, while change management is the primary goal of management. Senge defines a learning organization as a place "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, ... and where people are continually learning how to learn together" [132].

Principles of a learning organization

- Learn faster than competitors
- Learn within the organization (from each other and working groups)
- Learn outside the organization (from suppliers and consumers)
- Learn vertically (from the top to the bottom of the organization)
- Ask the right questions and apply action learning
- Forecast the future, create scenarios, and use them to learn
- Put into practice what was learned and learn by doing
- Learn faster than the external environment changes
- Gain knowledge in spheres which you have never learned before

Peter M. Senge (b. 1947) is an American scholar, PhD in management, director of the Center for Organizational Learning at MIT’s Sloan School of Management and senior lecturer at the New England Complex Systems Institute. He is the author of the book “The Fifth Discipline: The Art and Practice of the Learning Organization” (1990). An engineer by training, Peter was a protégé of John H. Hopkins and wrote his books based on innovative research. In 1997, he founded the Society for Organizational Learning. In 1999, the Journal of Business Strategy named Senge one of the 24 people who have made the greatest impact on business strategies over the last 100 years.

Characteristics of long-lived companies

The study of longevity among corporations makes it possible to define the common characteristics of companies with long-term operations. It was found that these firms have a number of common traits, such as:

- Adaptability to the external environment (and its potential changes) determines the ability to learn
- High cohesion and a strong sense of identity in the organization affect the company’s ability to create the values that form its foundation
- Tolerance to new or unpopular ideas and activities (which often leads to management decentralization) ensures openness in learning and objective assessment of the overall external environment
- Conservative financing is a constraining factor for high risk investments made by the corporation

The long-term sustainability of a company is associated with its ability to effectively and thoughtfully manage its own development. Firms showing adaptability, strong sense of identity, willingness to change and to allow intelligent risk-taking live longer [65].
Five disciplines of a learning organization according to P. Senge

**Personal Mastery**
Although business attracts energetic people, few of them can stay "on the rise" for a long time. By the age of 30–40, most lose their commitment and sense of personal importance. However, only a few companies encourage their employees to move forward.

**Mental Models**
Stereotypes about various management cases are ingrained in us in the same way as purely mundane stereotypes are. This is why many good managerial ideas are never implemented in real life.

**Shared Vision**
Many executives overlook the fact that their personal vision for the development of organization is not understood and shared by all employees. With a shared vision, people learn because they want to.

**Team Learning**
This includes not only training or seminars but also dialogue for the autonomous sharing of ideas in groups. Dialogue between employees leads to insights not accessible when everyone acts alone.

**System Thinking**
Without it, all other disciplines remain just isolated techniques, a trendy management novelty.

It is vital that all five disciplines develop systemically rather than separately.

Eleven characteristics of learning organizations according to M. Pedler [118]

- A learning, flexible approach to strategy
- Employees are actively involved in elaborating the strategy and tactics of the organization
- Information is used to understand what is happening to make the right decisions, rather than as a basis for rewards or punishments
- Accounting and monitoring that contribute to the development of the organization
- Internal exchange of services between units
- Flexible reward system
- Enabling structures (units and other "boundaries" are viewed as a temporary structure that may be changed when needed)
- Scanning of the environment by all workers
- Continuous sharing of experience with partners and customers
- Learning-driven environment in organization
- Self-development opportunities for employees

Companies that have proven themselves as learning organizations

- The training center in Crotonville motivates managers and other leaders to constantly learn; during key career changes, they come here to learn and teach.
- The Pine Street learning center provides essential knowledge to a large part of the company’s managers on an ongoing basis.
- Constantly invents and implements new technologies and, in recognizing the vital value of its customers, views them as long-term assets.
Honeywell

The Six Sigma approach enables continuous improvement of quality while reducing the costs

Microsoft

When the market changed, the corporation successfully shifted focus from desktops to the Internet

Johnson & Johnson

Inspired by its famous philosophy, the company is constantly improving its existing products and inventing new ones by always focusing on the consumer

Apple

Captures unrecognized market needs and creates new products to meet them.

Toyota

Uses lean manufacturing and continuous improvement in order to achieve small but constant enhancements of its products and processes.

USA Today

It invented and continues to invent technology for presenting information in a colorful way, including electronically, and for managing distribution.

These companies constantly create markets, market approaches, products, and greater customer value, and they never waste the competitive advantages for which they worked so hard by allowing their competitors to think or act faster.

**Top managers of a learning organization**

- Personally supervise the analysis of actions
- Monitor key stages of projects
- Speak freely about what they learn outside the organization
- Publicly show interest in what others are learning
- Work to eliminate any potential resistance to learning
- Force themselves to remain receptive to learning, even when it is hampered by working conditions
- Create mechanisms to transfer and spread the information, by establishing structural means, such as summary reports, meetings with candidates, etc.

**Google's learning culture** [15], [69]

**Two paths of information**

A learning-oriented company knows that to make information memorable and useful for employees, materials should be distributed by means appropriate to the task and in the style of a push/pull strategy. One of the best and easiest ways to give your employees the opportunity to learn and self-organize is to ensure continuous access to resources. Create an archive and make sure that the employees know how to access and use it. Create opportunities for learning; with a comprehensive database, the employees of different units can expand their knowledge and thus get opportunities for growth and greater awareness, to the company’s benefit and their own.

Reduce scheduling conflicts: by providing your employees with self-learning tools, you can eliminate the scheduling nightmare that would arise in the case of compulsory group sessions.

Refresh your memory: it is difficult or impossible to learn everything in one to two sessions. 24/7 access provides a natural way of learning to employees and lets them refresh material as needed.
Sharing means caring... and learning

In an organization, collective knowledge works best when it is actively shared. A strong learning culture is achieved primarily by enabling employees to ask questions and discuss ideas without fear of being accused of incompetence. In addition, company leaders should ensure that different opinions are valued and encouraged. It is important to understand that even though not every idea can be put into practice, diverse sets of ideas may offer excellent solutions and compromises. In this case, disagreements can be respected.

Here are some not-so-obvious ways to share knowledge:

- Asking for feedback, advice, and opinions. Ask another person to describe what they would do if this was their job or responsibility
- Seeking help. This ability is consistent with the idea of safety and should be encouraged where necessary
- Keeping others informed of what you are doing and why

Learn from famous mistakes

Falling is the first step towards rising

There are many ways to share knowledge within a company: vertical and horizontal sharing, or sharing between individuals, groups, and even organizations. For maximum efficiency, this sharing should be systematic and well defined. Information that is focused on an internal audience may be associated with analysis after the completion of the project, while external sharing will include a survey of customers and industry experts for clearer understanding. Process management and development ensure that the information will reach its destination.
Learning outcomes

Learning outcomes are assimilated knowledge, skills, habits, and acquired competences; this is what the learners will know, understand, and be able to do after successfully completing their learning process.

The term "learning outcome" was officially used for the first time in 2003 in the communiqué of the Berlin Conference of Ministers responsible for Higher Education, which was a part of the Bologna process documents [129]. One of the goals of the Bologna process is "to create a system of credits as an appropriate tool to stimulate the widest learner mobility." A part of the Bologna process is the European Credit Transfer and Accumulation System (ECTS), which is a learner-oriented system for the accumulation and transfer of credits based on the transparency of learning outcomes and learning processes.

The purpose of the system is to facilitate the processes of planning, implementation, assessment, recognition, and legalization for:

- Acquiring qualifications
- Credits
- Learner mobility

In a learner-oriented system, educational organizations:

- Assist and support learners in the formation of their individual educational paths and help learners build their own learning style and experience
- Give learners more choice in terms of content, methods, speed, and place of learning
- Use learning outcomes and learner workload to assess learning

Learning outcomes, including competences, are viewed in ECTS as the overall results of learning. Learning outcomes must:

- Include verifiable claims
- Reflect the relationship between teaching, learning, and assessment
- Include the basis for assessing the workload and distribution of credits
- Be accompanied by clear assessment criteria: both minimum requirements and the expected level
- Reflect broad conceptual knowledge and adaptive vocational and generic skills
- Reflect the desired end of learning experience, not the tools or process

Key indicators of learning outcome achievement

Knowledge is the outcome of learning reality that generalizes and systematizes the received information, concepts, judgments, theories, and ideas about objects and phenomena of reality.

Characteristics of knowledge

Depth is the level of assimilation of the essence and relationships of the studied objects and the phenomena of reality
Flexibility is the ability to apply knowledge in a variety of conditions
Strength is how long knowledge is preserved
Effectiveness is the ability to apply knowledge for practical purposes

Skills are the learned ways to perform actions, the ability to apply acquired knowledge and habits in practice in a changing environment.
**Habits or skills** are adopted, applied, and in some cases automatic models of an employee's actions as a set of knowledge, skills, and motivation to apply these models of actions in their activities.

Habits can be:
- Perceptual (sensual): the automated sensory reflection of the essence of a previously comprehended object or phenomenon
- Mental (thinking): automated methods of performing a previously comprehended task
- Motor: a repeatedly performed and previously automated mechanical action on an object to transform it

**Built competencies**

**Competence** (p. 47)
- The ability to apply knowledge and skills and successfully act on the basis of practical experience to solve general problems and problems in a specific broad area
- A basic characteristic of an individual that includes a set of interrelated personal qualities required for effective and productive activity
- A set of interrelated basic characteristics of an individual that includes the use of knowledge, skills, and habits in effective and productive activity

**Benjamin Bloom's Taxonomy of Educational Objectives** (1956)[20]

It enables the expression of learning outcomes through cognitive skills. According to this classification, there are six levels (ranging from basic to complex cognitive skills):

- **Knowledge** is factual information
- **Comprehension** is the essence of information
- **Application** is the ability to use the received information in practice
- **Analysis** is a separating of something into its constituent parts to facilitate the understanding of a phenomenon
- **Synthesis** is a viewing of the phenomenon as a whole
- **Evaluation** is a value-based judgment

Along with the cognitive skills described by Bloom, Robert Gagne, a psychologist, identified five types of abilities acquired as learning outcomes: intellectual skills, verbal information, attitudes, motor skills, and cognitive strategies.

**Learning outcomes as pedagogical goals and relevant educational recommendations according to Gagne** [19]

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>Pedagogical goal</th>
<th>Corresponding conditions of learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intellectual skills:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-order rules</td>
<td>The learner can calculate the area of a trapezoid</td>
<td>Explanation of rules: verbal instructions related to rule memorization and application</td>
</tr>
<tr>
<td>High-order rules</td>
<td>The learner can identify characteristics common to all mammals</td>
<td>The learner must present the desired outcome; this includes a review of basic concepts on the topic and specific examples</td>
</tr>
<tr>
<td>Concepts</td>
<td>The learner can categorize objects by color and size</td>
<td>Examples: the learner gives examples by himself/herself; reinforcement</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Differentiation</td>
<td>The learner can differentiate between printed letters</td>
<td>Stimuli for differentiation are given simultaneously; reinforcement; repetition</td>
</tr>
<tr>
<td>Basic types of learning (signal learning, stimulus-response learning)</td>
<td>Positive attitude toward learning</td>
<td>Reinforcement; models; positive experience in various contexts</td>
</tr>
<tr>
<td>2. Verbal information</td>
<td>The learner can describe the five categories of learning proposed by Gagne</td>
<td>Information is arranged by content; semantic context; motivation</td>
</tr>
<tr>
<td>3. Cognitive strategies</td>
<td>The learner can develop his/her own strategy of memorization</td>
<td>Frequent problem solving; discussion and direct learning of strategic thinking</td>
</tr>
<tr>
<td>4. Attitudes</td>
<td>The learner prefers a psychology textbook to fiction</td>
<td>Models; reinforcement; verbal guidance</td>
</tr>
<tr>
<td>5. Motor skills</td>
<td>The learner can personally print a text summary</td>
<td>Models; verbal instructions; reinforcement (knowledge of results); practice</td>
</tr>
</tbody>
</table>

Habits that are developed through relevant knowledge and skills acquisition, with motivation to apply them in practice, form a new, more effective model of managerial behavior.

Habit-oriented learning makes it possible to build basic skills that are further strengthened in the practical activity of the executive. In habit-oriented learning, the knowledge and skills included in the program must be relevant and sufficient for the establishment of the desired habits. At the same time, the motivation or desire to apply them in practice is built by creating the relevant experience and attitudes before the start of the program, during the program, and after the learning program.

The formation of skills is associated with the competence-based approach to learning. The target level of competences with its relevant skills is defined for each level of management.

There are two main approaches to understanding competences in management:

- **The American approach** views competences as a description of an employee's behavior. Competence is the main characteristic of the employees; its possession enables them to demonstrate correct behavior and, therefore, achieve high performance in work.

- **The European approach** views competences as a description of work-related tasks or expected work outcomes. Competence is the ability of employees to act in accordance with the standards adopted in the organization.

It is necessary to separate the concepts of "competence" and "learning outcomes" in terms of the different roles played by the participants of the educational process. Competences are a dynamic combination of knowledge, comprehension, skills, habits, and abilities. Competences are focused on results. In this case, the results could be both the acquisition of knowledge, habits, and skills by the learner as well as the ability of the learner to apply them in practice in a variable environment. The learning outcomes reflect the level of competences achieved by the learner and are aimed at the process.
Learning outcomes

Skill education diagram

**Outcome**

**Actions**

**Competence**

Skills according to Stephen Covey [43]

- **Desire**: motivation
  - I must want to listen; until I have the desire to do so, knowledge and skills will not become a habit

- **Skill**: how to do it
  - I must learn to listen carefully to others and to master the appropriate methods and techniques

- **Knowledge**: what to do and why
  - I must master the principles of human interaction and learn to listen to others

- **Building initial habits as a result of the program**

- **Reinforcing initially-built habits and building a sustainable habit at the workplace**

**Building motivation to acquire habits (attitudes) before starting the program**

**Current model of behavior**

- When I interact with my colleagues, wife, and children, I always tell them my point of view and never listen to their opinion.
- I am not effective in interacting with others. How can I change this model of behavior?
Learning solution

A learning solution is a product or service that implements/addresses a complex objective of achieving specific learning outcomes (acquisition of knowledge, skills, competences, etc.) by a certain target group or organization. An integrated learning solution is a comprehensive solution that includes several interconnected individual learning solutions in face-to-face, distance, and other formats. An educational marketplace is a systematized set of learning solutions (including integrated ones) for selecting and combining forms of implementing learning objectives.

Example: The educational marketplace of Sberbank CU
### Factors in the selection of learning solutions

<table>
<thead>
<tr>
<th>Orientation of learning solutions: Goals (according to CEB/Gartner methodology)</th>
<th>Number of learners per year</th>
<th>Need for customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Strategic programs (solutions)</td>
<td>• Up to 100 people</td>
<td>• Yes, deep customization is required</td>
</tr>
<tr>
<td>• Critical skills development</td>
<td>• From 100 to 1,000 people</td>
<td>• Yes, but customization may be provided at the level of facilitation</td>
</tr>
<tr>
<td>• General skills development</td>
<td>• More than 1,000 people</td>
<td>• No, an open-source/out-of-the-box solution is sufficient</td>
</tr>
<tr>
<td>• Informing/knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Compliance/risks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required time-to-market</th>
<th>Management level</th>
<th>Availability of appropriate open/external content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediately</td>
<td>• Senior</td>
<td>• Not available</td>
</tr>
<tr>
<td>Quickly, within 1 month</td>
<td>• Middle</td>
<td>• Available only in English</td>
</tr>
<tr>
<td>At a normal pace, up to 3 months</td>
<td>• Line</td>
<td>• Available in English and Russian</td>
</tr>
</tbody>
</table>

### Orientation of learning solutions (according to CEB/Gartner methodology)

| Strategic programs (solutions) | Comprehensive programs that are strategic to the company's performance; measurable business results can be associated with the program, and these metrics focus more on the overall performance of the company that differentiates it from competitors  
**Examples:** Senior Executive Development Program, Sberbank 500, Sberbank Mini MBA |
|---|---|
| Critical skills development | Learning solutions that have a strong impact on the work of participants; learning focuses on specific results and improving individual results in key areas of business  
**Examples:** people management, client-centric approach, digital skills |
| General skills development | Learning solutions that have a direct impact on the work performance of participants; however, this impact can vary significantly from employee to employee. It may also include solutions that develop skills in areas that may be of interest to the employee but may not be directly related to the current role or be critical to the business of the company as a whole  
**Examples:** finance for managers, presentation skills |
| Informing/knowledge | Learning solutions providing information that may not be directly related to the employee’s regular work tasks but may expand the employee’s scope of vision  
**Examples:** blockchain for executives in noncore activities, seminars on new, relevant topics |
| Compliance/risks | Learning solutions aimed at risk minimization and compliance with legal requirements are often mandatory  
**Examples:** risk management, compliance |
Lifelong learning

Lifelong learning is the continuous, voluntary, and self-motivated search for knowledge for personal or professional reasons, a key factor in the competitiveness of professionals and companies in the world of VUCA (volatility, uncertainty, complexity, and ambiguity) (p. 44). It may be in the form of formal, informal, or self-learning.

Most people still understand learning as formal learning in a school, university, etc. However, there are many other opportunities to acquire knowledge and develop skills throughout life. Learning is inevitable and continuous. Lifelong learning is aimed at creating and maintaining a positive attitude toward learning both for personal and professional development [90].

Learning can no longer be separated into a place and time for acquiring knowledge (e.g., schools) and a time and place for applying the acquired knowledge (the workplace). Instead, learning can be viewed as continuous and daily interaction with other people and the world.

In a broad sense, lifelong learning may be viewed as blended learning (p. 29) implemented throughout life as flexible, diverse learning available anywhere and anytime—that is, customized (p. 64), adaptive (p. 13), and personalized (p. 193), aimed at developing new skills considered critical for specific individuals and meeting diverse and context-dependent needs in learning without any age-related restrictions.

Jacques Lucien Jean Delors (b. 1925) served as the 8th President of the European Commission. The three terms under his leadership were the most successful periods in the advancement of European integration. He is the President of the association Notre Europe and the UNESCO International Commission for Education in the 21st century. Delors is the author of works on European monetary integration. His memoirs (Delors, Jacques; Arnaud, Jean-Louis (2004), Mémoires, Plon) have been translated into many languages and are a valuable source for the history of Europe and the theory and practice of integration processes.

The future of learning according to J. Delors (1996) [49]:

Learning to know
means understanding the nature of information and mastering learning tools rather than only acquiring structured knowledge

Learning to do means developing a set of skills for the jobs that are needed now and in the future, including innovation and the adaptation of learning to the future working environment

Learning to live together and with others means communicating constructively, peacefully resolving conflicts, discovering other people and their cultures, and strengthening the community's potential, individual competence and abilities, economic resilience, and social integration

Learning to be means education promoting a person's comprehensive and full-fledged development, including the mind and body, intelligence, sensitivity, aesthetic appreciation, spirituality, etc.

Learning to learn and continuing to learn throughout life

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Interrelated aims of lifelong learning in the Memorandum on Lifelong Learning of the European Union (2001)

- Promoting personal development
- Promoting active citizenship
- Social integration
- Promoting employability/improving adaptability
Lifelong learning means learning throughout a person's entire life.

Life-wide learning includes all types of learning and personal development, both in an educational environment and everyday (noneducational) situations. It is determined by interests, subjective value of learning, as well as by individual learning needs manifested only in daily activities. It involves a combination of formal and informal learning.

Lifelong learning is a fundamental principle of the UNESCO Education Strategy 2014–2021[153]

The entire education system is designed to facilitate lifelong and lifewide learning and create formal and informal learning opportunities for people of all ages.

The concept of lifelong learning requires a paradigm shift away from the ideas of teaching and training toward those of learning, from knowledge-conveying instruction to learning for personal development, and from the acquisition of special skills to broader discovery and releasing and harnessing creative potential. This shift is needed at all levels of education and types of provision, whether formal or informal.

Prerequisites for spreading the concept and practices of lifelong learning

In 2016, 93% of millennials (generation Y) were willing to spend their own money on further learning.

Between 1996 and 2015, the share of employees in the United States engaged in routine office work decreased from 25.5% to 21%, which led to the reduction of 7 million jobs.

In 2007–2015, the share of jobs for unskilled routine work decreased by 55% compared to other jobs[6]

According to a report by CBRE (2014), technological innovation will lead to a reduction of jobs by 50% by 2025.

In Singapore, considerable resources are being invested in providing educational loans to citizens that they can use throughout their career development.

The structure of new professions and new jobs is changing rapidly. For example, over the past five years, the demand for data scientists has increased by 372%.

54% of all working Americans find it necessary to develop new skills throughout their career development; among adults under 30 years old, the share reaches 61%[39], [91]
Massive open online course, MOOC

A massive open online course (MOOC) is a type of distance educational program with an unlimited number of participants and open access via the Internet.

**M** stands for a massive, or greater (by at least an order of magnitude) than in traditional distance programs, number of participants (100,000 or more); in a MOOC, the number of participants is essentially unlimited.

**O** stands for open, as it is held in a space accessible to any participant; there is no limitation on reading, viewing, reflection, and comments; registration is also open to anyone without restrictions; the basic elements of courses are free for participants, but there may be a fee for issuing certificates of completion, selection, and employment of graduates, etc.

**O** stands for online, as the course is held purely in a distance format via the Internet; it may use both asynchronous (e.g., self-study of materials) and synchronous (e.g., webinars) methods of e-learning (p. 81).

**C** stands for course, as a MOOC has all the attributes of a course, such as instructors and participants, educational materials, start and end dates, including dates for individual modules and other events within the course; it involves mandatory monitoring (current and final) of educational outcomes; some universities give credits for MOOCs in their educational programs; the workload may be expressed in credits.

Other important features of a MOOC
(a specific course may have all or some of these features)

**Use of multimedia and content curation**—search, collection, and viewing of digital content, coordination of its subject matter in various media formats.

**Geographical distribution** of participants, while the delivery of the course in one place is accessible from anywhere in the world.

**Continuous, multmodule** (including many parts or sessions) learning experience.

**Social collaboration** and contribution of learners to each other’s learning. Interaction is not limited by the learning platform but can take place in forums, chat rooms, blogs, social networks, etc.

**Interactivity** in learners' engagement with the instructor and content.

**Mix of asynchronous** (at the learner’s own pace), synchronous (at the pace of the entire intake), and cohort-based (at the pace of individual groups within the whole group) e-learning.

**No specific entrance requirements**

**Uniform exit requirements**, a strict program schedule, full completion of the course as necessary requirement for obtaining a certificate of completion.

**Participants motivation** using all the available benefits of advanced learning technology (gamification, microlearning, etc.)
Types of MOOCs

**Expert or xMOOCs** are the most common type of MOOCs, where the course is presented by an instructor (or group of instructors) in accordance with a specific curriculum. The instructor acts as the expert provider of knowledge, while the interaction of learners with each other is limited to assistance in some complex issues, completion of small joint assignments, and cross-evaluation of each other’s work. The goal of the course is to acquire knowledge and skills defined by the program.

**Connectivist MOOCs, or cMOOCs**, are based on the principles of connectivist pedagogy [124] that requires that the educational materials for the course should be aggregated (not preselected), flexibly modifiable, used for various purposes, and aimed at further learning. A cMOOC is built on communication between learners to find answers to their learning questions and/or collaborations on joint projects. The goal of the course is to develop joint practices and acquire new knowledge and understanding shared by the participants during the learning process.

Best known MOOC platforms

**Coursera**

The largest commercial platform was founded in 2012 by Stanford University professors Andrew Ng and Daphne Koller

**edX**

A nonprofit platform was created in 2012 by the Massachusetts Institute of Technology, Harvard University, and the University of California, Berkeley

**Udacity**

A commercial platform was established in 2012 by Stanford University professor Sebastian Thrun

Opinion of instructors[108]

**MOOCs vs. general education**

- They complement each other 84%
- They compete with each other 16%

**The MOOC format is good for**

- Continuing education courses 71.8%
- Optional educational programs/nondegree programs 58.6%
- Technical training programs 53.4%
- Elective courses 51.7%
- Remedial classes 46.6%
- All areas of school training 19.0%
- Not good for any of the above types of learning 2.3%

Advantages of MOOCs

- They make it possible to keep pace with new developments in education 44%
- They increase the visibility of a school 35%
- They improve the quality of teaching in regular schools 16%

Weaknesses of MOOCs

- No unified system for assessment and certification 41%
- High cost of development and implementation in the educational process 25%
- Long-term liabilities 15%
- Competition with more profitable courses 15%

2002

Massachusetts Institute of Technology launched the OpenCourseWare project to provide access to its learning materials. This initiative is called the precursor of MOOCs.

2008

Dave Cormier, a professor at the University of Prince Edward Island, first used the term "MOOC" to describe the course on Connectivism and Connective Knowledge taught by George Siemens, a researcher at Athabasca University, and Stephen Downes, a member of the National Research Council of Canada.

The course was joined by 2,200 online participants.

2011

Sebastian Thrun, a professor at Stanford University, held a free online course on Artificial Intelligence for 160,000 learners from 190 countries.
Massive open online course, MOOC

Types of MOOCs

### MOOC modifications/alternatives

#### Restrictions on target audience
- BOOC
- SOOC
- SPOC/MCOC
- TORQUE
- COOC

#### Modifications of design and implementation methods
- DOCC
- SEOOC
- SMOC
- S-POC

### Restrictions on the audience of courses

**A BOOC, or big open online course,** is similar to a MOOC but has fewer participants (usually 50–60).

**A SOOC, or selectively (selective) open online course,** is a MOOC with admission requirements (barriers) of a non-competitive nature aimed at reducing the "unwarranted diversity" of participants. Each requirement (barrier) may be the confirmation of some competence (passing an admission test) or having some kind of qualification (e.g., a diploma in a certain area), membership (e.g., alumni association), etc. The logic of these restrictions is that a more homogeneous audience for the course will better facilitate the collaboration of participants with each other and enhance learning outcomes.

**A COOC, or corporate open online course,** is a MOOC restricted to the target audience of a company. In a corporate environment, COOCs are typically online courses that are open to anyone in the organization and include many different learning strategies.

**A SPOC, or small private online course, or a MCOC, or massive closed online course,** is offered to a specific target audience and has a clearly established procedure for admission to the program and formation of groups (intakes) studying that course. In particular, the SPOC format is used for such mass distance courses of Sberbank Corporate University as Risk Management I, Finance for Managers I, and Compliance.

**A TORQUE, or tiny, open-with-restrictions course focused on quality and effectiveness,** is an online course that was originally created for a limited audience of a single educational organization but later was opened to a larger audience. In an educational organization, the completion of such a course is considered a prerequisite for studying a certain discipline or a tool for outside dissemination of knowledge.

### Historical notes

- **2012**: Proclaimed the year of the MOOC after three major US universities launched platforms for mass online education: Udacity and Coursera (Stanford University) and edX (Harvard University and the Massachusetts Institute of Technology).

- **2015**: Since 2012, the number of applicants to universities had declined by 3.2% a year, while the annual increase of participants in online courses was 3.9%.

- **2015**: Eight Russian universities (Moscow State University, Saint Petersburg Polytechnic University, Saint Petersburg State University, National University of Science and Technology MISiS, National Research University Higher School of Economics, MIPT, Ural Federal University, and ITMO University) founded Open Education, the first national platform in Russia for mass online education.

- **2017**: According to Digital Learning Compass, 30% of American learners (6 million people) have completed at least one online course.
Design and methods of implementation

A DOCC, or distributed collaborative online course, is an online course limited to groups of learners from various universities and independently organized and held by each university for its learners, while the content of course is the same for all, and learners from different universities can interact with each other online.

A SMOC, or synchronous massive online course, is a type of expert MOOC (xMOOC) with live broadcasts (in order to listen to lectures, the learners must connect at specific times).

A SEOOC, or sensitive open online course; or a POOC, or personalized open online course, is a type of selective open online course (SOOC) with technology for the content management and the pace of learning depending on the cognitive and behavioral responsiveness of learners.

A S-POC, or self-paced online course, is an online course with a high degree of flexibility where the learner can individually select the pace of learning and the section of the course at which he wants to start learning.
Microlearning

Microlearning is a set of educational technologies with at least three characteristics:
• Short duration of content units
• Focus on a specific learning outcome, granularity of content
• Multiple formats and multiple platforms

It is important not to focus on any single characteristic but to have a comprehensive approach that creates a new learner experience. Microlearning involves a complete overhaul of the content rather than a mere adaptation of an existing course.

Similar definitions

<table>
<thead>
<tr>
<th>Bite-sized learning</th>
<th>Subscription learning</th>
<th>Learning nugget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanolearning</td>
<td>Capsule learning</td>
<td>Learning-on-the-go</td>
</tr>
</tbody>
</table>

Attention in the digital age

The ubiquitous use of microlearning in the design, development, and implementation of programs was a natural response of the education industry to a massive change in human behavior and ways of perceiving and processing information.

Globally, humanity is moving from a culture of deep attention when we can concentrate on a single object or information stream for long periods of time without external stimulation to a culture of hyperattention that is characterized by switching focus between multiple information streams, preferring a high level of stimulation, and having a low tolerance for boredom. Today, to focus attention on a particular object, we need extra stimulation and factors that will prevent us from switching our attention to other objects.

Hyperattention and the huge arrays of information processed by modern employees aggravate the following peculiarities of perceiving information [16].

A modern employee:

does not read everything to the end.
On average, an employee spends 20 seconds on viewing a digital document and reads only 25% of the text

does not maintain attention.
While in 2000 the average attention span—the period of time during which we can focus our attention on an individual stimulus or thought—while surfing the net was 12 seconds, in 2013 it was only 8 seconds

quickly forgets what was learned.
80% of what was learned is forgotten within 30 days after the end of learning; 90% is forgotten within a year

Forgetting curve

Discovered by Hermann Ebbinghaus, a German psychologist, in 1885 as a result of the experimental study of memory. Ebbinghaus was fascinated with the idea of "pure" memory, the process of memorizing that is not influenced by thinking. He proposed a method of memorizing nonsense syllables consisting of two consonants with a vowel in between that did not trigger any semantic associations (for example, BOV, GIS, WOF, etc.)

During his experiments, he found that after the first error-free repetition forgetting is initially very fast. Up to 60% of all
information is forgotten within the first hour; 10 hours after memorizing, only 35% of what was learned remains in the memory. After that, the forgetting process slows down, and in six days about 20% of initially learned syllables remain in the memory; the same amount is retained after a month.

Hermann Ebbinghaus (1850–1909) was a German experimental psychologist, the author of Memory: A contribution to experimental psychology [55] and Fundamentals of Psychology [54]. He studied the patterns of memorizing and forgetting information and described a curve showing the nonlinear nature of the forgetting process. Ebbinghaus founded two psychological laboratories in Germany and taught at Friedrich Wilhelm University, University of Breslau and University of Halle-Wittenberg.

Fighting the forgetting curve
Several conclusions may be drawn from Ebbinghaus’ experiments:

- Effective memorization requires many repetitions of memorized materials spread over time (in that case, retention can be increased to 90% in a month)
- Meaningful memorization is 9 times faster than mechanical learning
- Brief information "packed" in logically complete forms is easier to memorize
- Engagement of learners in activities improves the effectiveness of memorization

These ideas formed the foundation for key technologies used in modern education, particularly microlearning, immersive learning, and interactive learning methods.

<table>
<thead>
<tr>
<th>Immediately after class</th>
<th>After 24–48 hours</th>
<th>After 1–2 weeks</th>
<th>After 1–2 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quiz (3–5 questions on key points/multiple choice)</td>
<td>• New quiz (2–3 questions on key points)</td>
<td>• In-depth test (questions that generate ideas on applying material content to work issues/open questions)</td>
<td>• 2nd in-depth test (specific questions on how the studied material is used to improve work results)</td>
</tr>
<tr>
<td>• Video review</td>
<td>• Multiple choice</td>
<td>• A more comprehensive video review</td>
<td>• Assessment of test answers by the supervisor</td>
</tr>
<tr>
<td>• Alternative video on the same topic</td>
<td>• Video quiz</td>
<td>• Using a case—giving the employee a new situation for analysis</td>
<td>• New set of assumptions with video examples</td>
</tr>
<tr>
<td>• Reflection</td>
<td>• Questions-reflection from colleagues</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Knowledge | Understanding | Application |

Fighting not to forget: repeating, reminding, testing
- Spaced repetition
- Repeated retrieval
- Spaced control of learning outcome
Principles of effective microlearning

- Conciseness: the duration of each content unit is determined by the expected learning outcome and content format (video, presentation, animation, etc.) and can vary on average from 1–2 to 5–10 minutes
- Granulation of content units: they are self-sufficient and autonomous but represent a part of something bigger. Attention is focused on a single, clearly defined learning outcome
- Difficulty is reduced to a level sufficient for understanding
- With less content, the role of context increases. Maximal use of stories, associations, and metaphors that can be remembered hold the attention
- Recurrence of the content. Creation of opportunities for repetition to ensure maximum memorization, personal selection of study pace, and individual selection of study sequence
- Immediate practical applicability: focus on how to apply what was learned immediately
- Holistic approach: in the end, the microunits of content must fit together to form a whole comprehensive picture and provide a 360-degree view of the topic
- Content is created quickly, and it is flexible and replaceable
- In micromodules, we "show" and "do" more than we "speak": we use video, graphics, and animation
- Access to learning materials from various (any) devices, including mobile and stationary devices, at any time

Microlearning in the learning cycle

<table>
<thead>
<tr>
<th>Readiness</th>
<th>Discovery</th>
<th>Consolidation</th>
</tr>
</thead>
<tbody>
<tr>
<td>→ Motivational video</td>
<td>→ Decision-making scenario</td>
<td>→ Work assistant</td>
</tr>
<tr>
<td>→ Diagnostic tests</td>
<td>→ Gamification</td>
<td>→ Goal setting wizard</td>
</tr>
<tr>
<td>→ Infographics</td>
<td>→ Video interview</td>
<td>→ Reference tools</td>
</tr>
<tr>
<td>→ Flipped prework</td>
<td>→ Tutorials</td>
<td>→ Result dashboards</td>
</tr>
</tbody>
</table>

Current results

Future results

Example of usage

Compliance program of Sberbank Corporate University [9]
Compliance is a distance program of the School of Risk Management for the development of professional competences. Its basic content includes the internal regulatory documents of Sberbank.

Content characteristics:
- Dry legal texts
- Large amount of information
- Difficult to assimilate and memorize
- Difficult to convert into action

Stages of basic program content processing:
- Analyzing aimed at wording simplification without losing the essence
- Searching for semantic patterns, dividing into sections
- Selecting images and metaphors
- Framing of key ideas into content units (steps) in the form of videos, minicases, tests, etc.

Logic of content arrangement:
A module (topic) is a logically grouped set of lessons (5 modules)
A lesson (subtopic) is a logically grouped set of steps (34 lessons)
A step is an autonomous unit of micro-content. There are 236 steps, including 50 videos, 78 steps with text and/or images, 6 interactive video courses, 95 test assignments (microcases), and 7 minicases.
Mixed reality, MR

*Mixed reality (MR)*, sometimes referred to as **hybrid reality**, is the result of bringing the real and virtual worlds together with the aim of implementing such a combination of conditions and factors that would be impossible or resource-intensive in each of the realities separately. An example would be creating new environments and visualizations where physical and digital objects coexist and interact in real time.

Mixed reality includes **augmented reality** (p. 23) and **augmented virtuality** (p. 25).

The interaction between the types of reality is determined by the **virtual continuum** that stretches from full reality to a fully virtual environment.

Currently, the term "augmented reality" is often used to refer to any of the states of mixed reality.

---

**Virtuality continuum**

A continuous scale lying between a fully virtual environment—that is, virtuality—and a fully real environment—that is, the reality–virtuality continuum—covers all possible combinations of real and virtual objects.

This essentially philosophical concept was described as an application for new media and in computer science, but it can be considered in the context of anthropology. The concept of the virtual continuum was first presented by Paul Milgram[101].

The area between the two extremes, where both real and virtual are mixed, is called mixed reality.

The continuum scale was extended to a two-dimensional plane that enables the classification of reality, virtuality, and mediation [128].

The start of the coordinates R means unmodified reality. The area along the virtuality axis (V) includes reality supplemented by graphics (augmented reality, AR) as well as graphics augmented by reality (augmented virtuality, AV). The plane of the continuum also includes the modification of reality or virtuality or any combination thereof. The modification is indicated by moving up the axis of mediation.

**Mediality** includes, for example, reduced reality (which is implemented in helmets or glasses that block advertising or replace it with useful information), and above on this axis we can find mediated reality, mediated virtuality, or any combination thereof.

---


- **M. Krueger** created Videoplace, a computer-controlled artificial interactive environment
- **Daniel Sandin**, **Richard Sayre**, and a number of other engineers developed the world’s first glove for computer control
- **Steven Mann** began work on the world’s first “digital eye glasses”
- The University of Washington created the first samples of a virtual retinal monitor that generates an image directly on the retina
- The Tranzas company presented the world's first marine simulator for professional training of sailors and other professionals
- **Paul Milgram** and **Fumio Kishino** introduced the concept of "mixed reality" and described the "reality–virtuality" continuum, highlighting augmented reality and augmented virtuality
Mixed reality in business and education

Being a topic of deep research, MR has found many utilization methods evident in the arts and entertainment field and has recently spread to business and education.

Interactive product content management (IPCM)

The deviation from static product catalogs to interactive 3D smart and digital copies. Solutions consist of software with a scalable licensing model.

Real asset virtualization environment, RAVE

3D models of production assets (such as the process of production machinery) are embedded in a virtual environment and are associated with real-time data related to the asset.

Main trends in VR/AR

- Combination of VR and AR technologies in a single device and the emergence of merged reality devices (VR + AR = MR, merged reality)
- Addition of AR functions to native devices (e.g., smartphones)
- Simplification of the creation of VR movies and the achievement of new connectivity quality using VR
- Simplification of VR devices (smart VR) and the addition of interactive services
- Introduction of material reality to VR
- Transition from "passive" VR (watching only) to "active" VR (watching and doing)
- Implementation of a new experience in shopping: VR Mall and AR-tests of shopping
- Penetration of VR/AR into everyday life

According to experts, so far, VR is "ahead" of AR in terms of available solutions, but the latter has greater potential [146].

Military training

Military reality is simulated and presented in complex multilayered data using HMD.

Simulation based learning (SBL)

A move from e-learning toward simulation learning advanced in the transfer of educational knowledge. Simulation/VR-training, interactive experimental learning Software and display solutions with a scalable model for licensing of learning program creations.

The most used devices for displaying MR:

- CAVE
- Windshield indicator
- VR helmet
- Tablet
- Monitor (device)
- Personal digital assistant
- Mobile phone
- Handheld PC

1994

Julie Martin presented the live TV show Dances in CyberSpace where people interacted for the first time with virtual objects.

1999

NASA launched a satellite with a hybrid synthetic vision system that was previously used together with hybrid reality both for pilot training and in-flight control systems.

2010s

MR becomes popular among investors, for example, from 2010 through 2017, Magic Leap collected more than $4.5 billion in investments to launch a project for revolutionary smart glasses.

2016

Meanwhile, Microsoft launched HoloLens smart glasses.

2017

At the CES 2017 conference, Intel showed an example of an autonomous mixed and virtual reality helmet from Alloy project.
Mobile e-learning

Mobile e-learning is a form of e-learning with any type of mobile devices and their inherent features.

It can be implemented using:

- Specially designed mobile apps
- Through content distribution adapted for viewing on mobile devices via SMS/MMS

In this case, mobile e-learning can be considered as a form of native learning (p. 177) that uses native—that is, natural, everyday channels of information

Unlike mobile learning (p. 172), mobile e-learning:

- can be either asynchronous or synchronous
- is structured in a logical, consistent way (that has a beginning and the end)
- has formulated learning outcomes
- has a system for monitoring learning outcomes (formative and summative assessment)
- may have other attributes of educational programs

Mobile e-learning is effective in large organizations for small-volume, mainly knowledge-based required programs, as well as for adaptation programs.

Examples of mobile e-learning

Adaptation mobile app
For Pernod Ricard’s new employee introduction program

- Tamagotchi principle utilization: a game character Ricardo goes through adaptation with the new employee, and the employee must explain to Ricardo what they have learned during the program
- 24 days of game learning that simulates 2 fiscal years of the company
- Each day, the new employee is asked questions in 7 areas, including the HR cycle, corporate culture and values, strategy, company history, processes, communications, etc. To answer these questions, the employee must study the materials in the app or learn the information from colleagues
- The mobile app includes tips and hints

Massachusetts Institute of Technology (MIT) opened the Center for Mobile Learning to explore the potential of mobile technology in education

15% of 411 companies surveyed had implemented mobile learning [72]

34% of 411 companies surveyed had implemented mobile learning

47% of organizations used mobile devices in training. The mobile learning market was estimated at $5.3 billion and is projected to reach $12.2 billion by 2017 [114]
Trends in the use of mobile devices for learning

The number of people working from their mobile devices will triple by 2018. The average user will have 3–4 mobile devices by 2018. The average person checks a smartphone 221 times a day.

From the corporation’s point of view, the main benefits of mobile learning are:
45% time savings without losing productivity
33% more income for the employees who completed their mobile learning

Online interactions between people [144]
14% use only a computer
27% use only a smartphone
57% use several devices
80% use a smartphone and some other device
46% use devices in bed before they go to sleep
52% use devices in bed after waking up

One out of three managers was learning technical skills and business basics through mobile devices, according to the journal Chief Learning Officer [33]

Mobile learning became one of the top three most popular types of learning in a business environment, according to Brandon Hall Group, a research and analyst firm [25]

The mobile learning market is projected to reach $70 billion [144]
Mobile learning, M-learning

Mobile learning (m-learning) is learning through social and content interactions in different contexts using personal mobile devices.

The view prevailing in the early 2000s was that mobile learning is any learning involving the use of mobile devices. Now, it is accepted that there is a difference between mobile e-learning (p. 170) (learning in educational programs converted into a format that is available on mobile devices) and mobile learning that takes advantage of the features that are inherent to mobile devices. Mobile e-learning can be either synchronous or asynchronous; it is "applied" to a specific topic/program and implemented in a formalized and structured way.

Mobile learning is often asynchronous; it is not applied to a specific topic/program, and it is not formalized in terms of its implementation.

Use of mobile learning

- Supplementing formal learning
- Supporting activity at the workplace
- Ensuring connectivity between people
- Contextually specific formats

<table>
<thead>
<tr>
<th>Mobile learning, M-learning</th>
<th>Content</th>
<th>Social interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplementing formal learning</td>
<td>Concepts, examples, and practices: contextually relevant or alternative experience</td>
<td>Explanations, feedback: a catalog of materials or communication with local or contextually well-known experts (mentors)</td>
</tr>
<tr>
<td>Supporting activity</td>
<td>Assistance at the workplace: contextually relevant or supplementary resources</td>
<td>Answers, guidance, tips: a catalog of local or contextually well-known experts (mentors)</td>
</tr>
</tbody>
</table>

Principles of mobile learning

Access
Access to content and ideas on relevant topics, other participants of the group, experts, and credible sources of information

Self-actuated
Independent planning of topics and the sequence of studying materials

Transparent
Immediate opportunity to establish contact with both local and global communities through social media

Asynchronous
At the right time, in the right place, and for a specific person

Metrics
Ability to collect and analyze knowledge acquisition and quality indicators

Curation
Selection and recommendation of content (p. 57)

Always-on
A constant need to access information, engage in cognitive reflection, and use interdependent functions via mobile devices

Lev Kupriyanovich, a Soviet radio engineer, designed an experimental model of a pocket mobile phone.

Motorola, an American telecommunications company (acquired by Google in 2011), released the Motorola DynaTAC, the world's first cell phone.

Nokia, a Finnish telecommunications company, released the Nokia 7110, a mobile phone featuring WAP, a wireless data transmission protocol enabling users to download digital data from the Internet.

Apple, an American consumer electronics manufacturer, presented the iPhone, the first touchscreen telephone with a multitouch feature. During the presentation of the device, Steve Jobs, the head of the company, said that the first letter i in its name stands, among other things, for the "Internet" and "instruct"
Example of mobile learning: SMS training

The format of a mobile program developed by Yord makes it possible to hold SMS training courses based on any messenger and involves dosed delivery of learning materials to a smartphone, which is used as a communication tool between the participant and the moderator host.

SMS training involves all three types of thinking:
- Visual imagery in the form of pictures
- Abstract logic in the form of text
- Demonstrative action in the form of a practical assignment

The course is divided into sessions
One session is one learning day. Each session is about one topic. SMS training can take from three to six days, and there are usually four SMS messages a day. During the day, participants receive theoretical materials, tests, and practical assignments on their mobile devices.

The theory is presented in a condensed form, including definitions, tables, charts, summaries, and techniques. The practice includes cases, affirmations, visual simulators, and creative and practical assignments. A test can take 2–3 minutes, and a practical assignment can take from 5 to 10 minutes. The entire daily SMS training takes no more than 30–50 minutes.

The program participants are divided into groups of 10 people. The number of groups is limited only by the physical ability of the presenter to moderate several groups at a time.

SMS training participants communicate with the presenter and each other using chat. There are also posted correct answers, assignments, questions and answers, and tables of individual results to measure the participants’ progress. The table includes the marks for individual assignments and for the entire course.

Advantages over face-to-face training

- A more efficient method of learning. The greater the number of involved employees, the less expensive it is for the company in terms of costs per learner. SMS training does not require a classroom, equipment, hotels, or tickets, and most importantly the employees do not have to leave their workplace.

- SMS training builds skills more effectively than face-to-face training. First, it lasts longer; second, it is impossible to just "sit it out"; and third, the information learned by learners is immediately tested in practice.

- SMS training ensures better engagement than traditional e-courses, in which on average only 70% of participants perform the assignments and complete the entire course. SMS training does not distract from work as it fills natural pauses and enables one to switch over and go back to work in five minutes.

- The participants of SMS training and the presenter may be located in different geographic locations.

Advantages over face-to-face training

Chat bot implementation in the methodology and dean’s office automation to increase the scale of industrial learning (simultaneous learning involves at least 1,000 people; 100% of employees in the organization simultaneously attend the course).

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Opening of the App store, the first app store for mobile devices</td>
</tr>
<tr>
<td>2010</td>
<td>Apple presented the iPad, a touchscreen Internet tablet, prompting development in this class of mobile devices</td>
</tr>
<tr>
<td>2011</td>
<td>Users of mobile devices downloaded 270 million educational apps over the year [148]</td>
</tr>
<tr>
<td>2015</td>
<td>10% of Americans used smartphones; one-third among them did it for self-study, according to the Pew Research Center, a public opinion and social issues research group [139]</td>
</tr>
<tr>
<td>2017</td>
<td>2.4 billion smartphone users and 3.5 billion people were connected to the Internet worldwide (46.8% of the Earth’s population) [104]</td>
</tr>
</tbody>
</table>
Native learning

Native learning is a format of distance learning (p. 76) that uses natural channels of communication that are familiar to the user and used for business and personal purposes, for example, e-mail, SMS, instant messengers, and other tools for instant messaging and audio and video conferencing.

The goal of native learning is to reduce the level of formalization in the learning process and improve the engagement of insufficiently active participants. Native channels can be used both for asynchronous and synchronous learning, including for informing, consulting, distributing content, sharing files, facilitating remote discussions between users, and providing feedback.

The idea of learning with native channels has been known since ancient times. However, it gained widespread practical use and acquired the features of technology only recently, after the emergence of native advertising. The development of native formats was a direct effect of competition for the attention and time of the user in the face of information overload.

Native channels of communication are used primarily for microlearning (p. 165) to implement the principles of customization (p. 64) and personalization (p. 193) by ensuring the highest quality of operational contact anytime, anywhere, and on any device.

Examples of native learning

UniCredit

To train key executives under the change management program, Unicredit developed a microcourse based on e-mail as its main channel of communication. The executives receive e-mails with three typical content units: a short theoretical unit, an assignment to test the understanding of the theory, and a small practical assignment that must be implemented within the department. The content distribution through a native channel ensures the seamless integration of learning tasks into work processes.

Sberbank Corporate University Risk Fox bot

Developed in 2015 by DepecheBot for the Line Management I and Line Management II learning programs. An additional channel of communication with program learners, as well as a user-friendly space for communication between learners of the same intake (group chats). Users can quickly obtain the information they need in a mobile format. This reduces the organizers’ workload.

The audience size is 17,000 people.

The bot contains general information in a user-friendly format as well as links to the group chats that the user can join. The learner can click the bot’s menu buttons to navigate to the desired information (or to the next menu level). The learner receives the requested information as a message from the bot. One of the most important options in the user interface is the ability to find general information, such as the links to learning materials, the program web page, FAQ, etc.

The goal is to make sure that learners acquire the knowledge and skills required for risk management as a general banking competence. This includes acquiring the decision-making skills and assessing activities based on risks in accordance with one’s position level. It also aims to improve the risk management culture in the Bank.

NL!A

The NL!A EduBot company has presented an innovative educational chat bot on the Russian market that can train and test bank employees on their knowledge of products and answer their questions. Learning takes place as a dialogue with the chat bot via Telegram instant messenger. The chat bot monitors the progress of each employee of the bank.
Neuroscience is an interdisciplinary field of knowledge covering a broad range of research on the brain and the nervous system in general, from molecules and neurons to neural networks and the brain in general, the structure of the brain and nervous system, and the functioning and interaction of their parts in connection with human physiology and behavior. Neuroscience emerged by expanding beyond neurobiology to include methods of neurophysiology, medicine, pharmacology, and genetics.

Research on the relationship between the nervous system and various aspects of human activity has made it possible to incorporate methods of psychology, linguistics, informatics, and cognitive sciences into neuroscience and build a multitude of cross-disciplinary studies including neuropsychology, neuroethics, neuroinformatics, and others.

**Neurotechnology for education**

![Diagram showing bio- and neurotechnology and artificial cognitive systems]

**Sectors of the economy**

- Mechanical engineering
- Health care
- Agriculture
- Education
- Defense industry
- Other sectors
### Potential use of various neuroscience disciplines in education

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Neurophysiology is a division of physiology that studies the functions and interactions of the nervous system and neurons</th>
<th>Cognitive neuroscience is a science that studies the relationship between the brain activity and other parts of the nervous system and cognitive processes and behavior. Cognitive neuroscience focuses on studying the neural foundations of thought processes</th>
<th>Neurolinguistics is a scientific discipline that studies the system of language and the speech mechanisms of the brain</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Scope</th>
<th>Identifying the relationships between physiological factors and the learning process</th>
<th>Studying the impact of external factors and presuppositions on thought processes and decisions</th>
<th>Identifying speech perception characteristics and writing in the context of specific words and word combinations</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Example</th>
<th>Experiments confirm the high level of neuroplasticity in the brains of older people that offsets certain age-related changes in the brain and enables them to solve complex problems more successfully than younger test subjects [38]</th>
<th>According to Daniel Kahneman, a Nobel laureate, people rely on a limited number of heuristic principles that break down the complex tasks of assessing probabilities and predicting values into simpler (superficial) operations of judgment</th>
<th>An eye tracker and magnetic resonance imaging are used to study how a person reads text or watches video, what first draws their attention, and which areas of the brain are responsible for perception, recognition, and awareness of words and images.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Structure optimization of the learning process by taking into account the group and individual characteristics of learners</th>
<th>Identifying the decision-making mechanism indicators in the process of learning</th>
<th>Optimizing educational content to maximize the efficiency of perception by the learners</th>
</tr>
</thead>
</table>

### Neuroscience methods

Neuroscience methods are based on neurovisualization, or recording and direct visualization of how the various parts of the brain and other parts of the nervous system function in certain states of an individual and during the performance of certain actions by that person

- Magnetic resonance imaging (MRI) is a method of obtaining images of internal parts of the brain by using the phenomenon of nuclear magnetic resonance
- Functional magnetic resonance imaging (fMRI) makes it possible to determine the activation of a certain area in the brain during its normal functioning under the influence of various physical factors and in various states
- Positron Emission Tomography (PET) is a radionuclide tomography method for studying the internal organs of humans or animals. The method is based on detecting the pairs of gamma rays emitted at positron-electron annihilation
- Magnetoencephalography (MEG) is a neurovisualization technology that uses very sensitive devices to measure the magnetic fields generated by the electrical activity of the brain
Brain computer interface (BCI), mind-machine interface (MMI), brain-machine interface (BMI), or direct neural interface (DNI) refer to a device creating one- or two-way communication between the human brain and an electronic device.

Neuroplasticity, or neural plasticity, is the ability of the human brain to change under the influence of experience and restore lost links in response to external stimuli.

Alexander R. Luria (1902–1977) was a Soviet psychologist, the founder of neuropsychology in the Soviet Union. He was the first to prove that if a part of the brain is injured, its functions can be assumed by other parts of the brain. Luria’s research laid the foundation for the theory of neuroplasticity. He formulated the basic principles of dynamic localization of mental processes and studied the role of the frontal lobes of the brain in the regulation of mental processes and the brain mechanisms of memory.

Educational neuroscience, or neuropsychology, is a research area that brings together cognitive science, neuroscience, educational psychology, methodology, didactics, and other related disciplines to study the relationship between physiological processes and learning [98].

Educational institutions are starting to establish research centers in the area of educational neuroscience. For example, the Center for Educational Neuroscience in London is a joint project of the Institute of Education at University College London and Birkbeck, University of London.
The International Mind, Brain, and Education Society (IMBES) was created in the area of educational neuroscience and has since 2016 published an eponymous journal [102]. The Harvard Graduate School of Education has launched a master's program in Mind, Brain, and Education [103].

One of the key tasks of the Mind, Brain, and Education Society and educational neuroscience in general is to satisfy the appetite of instructors for information about the latest discoveries in neuroscience and limit the influence exercised on learning by "neuroscience marketers," who seek to promote their products based on neuromyths.

Neurobiology has moved into the phase when it is time to critically think about the form in which research information is provided to instructors so that it can be properly interpreted for practical applications by determining whether specific research outcomes are ready for implementation [26].

### Neuromyths in education [12]

<table>
<thead>
<tr>
<th>Myth</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>An individual uses only 10% of the brain</td>
<td>People always use the entire brain, just with varying degrees of effectiveness</td>
</tr>
<tr>
<td>Learning styles should correspond to predominant channels of human perception</td>
<td>There is no neurobiological evidence supporting such typification. All systems of human perception are interrelated in a complex way. The multiplication of identified &quot;types of learning&quot; simply shows that every learner needs an individual approach</td>
</tr>
<tr>
<td>People are divided into those who prefer watching (watchers), listening (listeners), or reading, writing, and learning by touch (kinesthetic learners). Therefore, in school, it is better to teach children differently (currently, there are several dozen styles)</td>
<td>Neurobiology provides no evidence that there is some &quot;critical period&quot; in the formation of the brain. However, it has been proven that new synaptic connections in the brain are formed throughout the life due to neuroplasticity</td>
</tr>
<tr>
<td>After three, it will be too late</td>
<td>Neurobiology provides no evidence that there is some &quot;critical period&quot; in the formation of the brain. However, it has been proven that new synaptic connections in the brain are formed throughout the life due to neuroplasticity</td>
</tr>
<tr>
<td>By the age of three, the most important systems of the brain, including the synaptic system, have been formed. Many marketing strategies of &quot;early development&quot; are based on this myth</td>
<td>Neurobiology provides no evidence that there is some &quot;critical period&quot; in the formation of the brain. However, it has been proven that new synaptic connections in the brain are formed throughout the life due to neuroplasticity</td>
</tr>
<tr>
<td>Left- and right-brained people</td>
<td>There is no general polarization of personality by individual hemispheres; the hemispheres are constantly interacting with each other in complex ways</td>
</tr>
<tr>
<td>Different mental abilities are managed by different hemispheres, and different people have a pronounced predominance of either the left or right hemisphere</td>
<td>This myth is based on the idea of multiple intelligences proposed by Howard Gardner, an American psychologist. Currently, Gardner himself acknowledges the lack of evidence for his hypothesis. No correlation has been found between emotional intelligence and academic success</td>
</tr>
<tr>
<td>Emotional intelligence</td>
<td>This myth is based on the idea of multiple intelligences proposed by Howard Gardner, an American psychologist. Currently, Gardner himself acknowledges the lack of evidence for his hypothesis. No correlation has been found between emotional intelligence and academic success</td>
</tr>
<tr>
<td>By managing our emotions, we can &quot;advance&quot; our thinking and even achieve significant academic success</td>
<td>This myth is based on the idea of multiple intelligences proposed by Howard Gardner, an American psychologist. Currently, Gardner himself acknowledges the lack of evidence for his hypothesis. No correlation has been found between emotional intelligence and academic success</td>
</tr>
</tbody>
</table>
Omni-learning

Omni-learning is an approach to learning that encompasses all channels of communication with learners in a seamless and consistent way aligned with learning experience (p. 141).
It is today's client-centric model of service in the area of education (very similar to omni-channel marketing in retail trade).
In the context of learning, it is important that learners can interact effectively with the learning content, regardless of the time and entry point (any place, any device, always).

Relevance of omni-learning [71]

- Sharing information is the basic operation of learning. Information is the raw material for new knowledge and skills. Digital technology makes it possible to create a user-friendly infrastructure for sharing information flows
- Widespread changes in the role of the learner (MOOCs (p. 161), flipped classroom (p. 91), etc.) require educational institutions (including corporate ones) to be competent in marketing, understand educational needs, and being deliberate when designing the educational experience
- Native (p. 177) e-learning channels and tools facilitate experiential learning (p. 86) and ubiquitous learning
- Omni-channel infrastructure integrates learning into the work environment
- Companies that build omni-channel infrastructure to work with end consumers translate this experience into learning solutions (p. 154)

Omni-channel approach

The omni-channel approach is a marketing term referring to the mutual integration of disparate communication channels into a unified system to ensure seamless and continuous communication with customers [111].
The omni-channel approach is the basis of today's customer service, one of the main principles of operation and architecture in modern contact centers.
In omni-channel customer service, information on the customer is collected and stored to enable a more personalized approach to service.

Required tools

A single platform for handling all types of interactions, including audio, video, IP telephony, e-mail, web chats, SMS, queries from mobile devices, etc.

- Deep integration of study modules with corporate systems and each other
- Multichannel service makes it possible to achieve results related to the level of service, including cost cutting and compliance with SLAs
- General information on users, their needs and history of interaction
- Intelligent speech and text analytics modules route queries to the relevant experts
- Real-time general statistics on the workload of contact center employees
On-the-job learning

On-the-job learning is a common form of experiential learning (p. 86) in the regular work process.

Benefits of on-the-job learning

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Relevance</th>
<th>Adaptivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively low costs compared to off-the-job learning</td>
<td>Learning skills that are used in one's main job</td>
<td>The learner is immediately immersed in the working environment and will subsequently find it easier to adapt to the environment and colleagues</td>
</tr>
</tbody>
</table>

Drawbacks of on-the-job learning [110]

- Distraction from one’s main job
- The learner runs the risk of inefficiently allocating time and failing to perform their main job on time
- High risk of error
- Learning takes place under potentially stressful conditions, and the learner may be afraid of making mistakes

On-the-job learning

Structured

- Coaching
- Mentoring
- Tutorship
- Training others (leaders teaching leaders)

Unstructured

- Sharing knowledge in work-related communications
- Shadowing
- Observing
- Social learning

Structured learning

Coaching

Coaching is a set of learning/development technologies and forms of psychological influence/support; a synthesis of methods used in sports coaching, neurolinguistic programming (NLP), and psychotherapeutic practices aimed at intensifying self-learning, self-development, and responsibility acceptance processes rather than the transfer of knowledge and development skills.

It is implemented in the form of coaching sessions, or regular and periodic interactions between the client and the coach, in the process of joint analysis of situations, tasks, and problems along with the provision of continuous feedback. An essential condition for successful implementation is dividing responsibility, which is usually governed by an oral or written contract prepared in accordance with certain rules (this may vary depending on schools and coaching standards). In particular, unlike mentoring (p. 188), in coaching, the responsibility for formulating goals and achieving them lies with the client, while the coach focuses on facilitating the thinking process/reflection in accordance with the contract and within the framework of the specific problem to be solved. Coaching in accordance with the standards of the International Coach Federation is the most common in corporate practice. ICF defines coaching as "partnering with clients in a thought-provoking and creative process that inspires them to maximize their personal and professional potential."
ICF principles of coaching

**Focusing on a solution:** the coach helps the client achieve the relevant goals instead of focusing on past experience and looking for the reasons for failures.

**System approach:** the coach supports the integrity of client's personality and focuses on how the changes in one professional area affect all work-related activities of the client.

**Focus on the client** (learner): the coach and client do not question the assumption that the client has all the resources and skills to achieve their goals; they respect their action plans and the outcomes that they want to achieve.

**Developing awareness:** during transformational coaching, the client expands self-awareness and awareness of his/her goals and the ability to achieve them, which creates the foundation for further development.

**Tutorship**

*Tutorship* is a method of learning in which a more experienced employee (master) transfers their knowledge and skills to a less experienced employee (learner) by demonstrating examples and models of action, while observing the mentee's work and providing feedback. Ideally, tutorship should be continuous [92].

The tutor relies primarily on promoting existing knowledge or professional skills—that is, they teach what they know.

**Tutor/assistant**
- Develops a relationship model of partnership and friendship
- Shows attention and empathy, supports, and inspires
- Asks questions
- Cultivates trust

**Tutor/manager**
- Develops the relationship model of the Way of the Samurai
- Presents information
- Proposes metrics
- Demands clear and high-quality performance of work
- Provides honest feedback

**Learning/development stages**

**Unconscious incompetence (UI):** the individual acts freely and spontaneously—they do not know what they do not know/are not able to do and have no idea of what they need to know/should be able to do to solve the problem.

**Conscious incompetence (CI):** the individual recognizes that they do not know/are not able to do something, want to learn, and learn with a goal in mind.

**Conscious competence (CC):** the individual receives acknowledgment of their knowledge/ability/competence/qualification and applies the knowledge/skills in strict accordance with their ideas of "the right things to do."

**Unconscious competence (UC) (mastery):** the individual acts freely and spontaneously; their knowledge/skill is implemented at the level of motor skills.

**Goal of the tutor (master):** is to guide the learner along the path from unconscious incompetence to unconscious competence.
Mentoring is a comprehensive method of learning that combines coaching (p. 186) and teaching activities. A more experienced employee (mentor) shares their knowledge, habits, and skills with an inexperienced novice for a specific period of time and in accordance with a specific plan: the mentor first describes theoretical concepts; then provides an example, after which the learner performs the assignment and receives feedback.

Shadowing is a method of on-the-job learning in which the learner employee follows a more experienced colleague "like a shadow" and observes them performing their professional duties. The learner themselves does nothing else. They do not make comments, ask questions, or interfere in the process in any way. This method is often used in combination with other methods of learning for orientation of new employees or interns as well as for training ("nurturing") those who are nominated for a higher position within the company or are changing their specialization when moving from one department to another. Shadowing is often used as an internship option where a new employee is "attached" to more experienced supervisor and participates in all their activities, including meetings, conferences, etc.

Mentor (from ancient Greek "Μέντωρ") is a character from ancient Greek mythology, a friend of Odysseus. Before leaving for Troy, Odysseus instructed Mentor, who was staying in Ithaca, to take care of his house and farm. In his absence, Mentor not only protected the house but also became the tutor of Telemachus, the son of Odysseus. The name Mentor is often used as a common name for someone who guides and leads young people.

<table>
<thead>
<tr>
<th>Mentoring Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal mentoring</td>
<td>One mentor guides one employee</td>
</tr>
<tr>
<td>Group mentoring</td>
<td>One mentor guides a group of employees</td>
</tr>
<tr>
<td>Collective mentoring</td>
<td>Several mentors guide one employee or group of employees</td>
</tr>
</tbody>
</table>

**Unstructured learning**

**Shadowing** is a method of on-the-job learning in which the learner employee follows a more experienced colleague "like a shadow" and observes them performing their professional duties.
Shadowing is based on the primacy of the visual perception channel. However, the visual channel is not primary for all people. This is why, when implementing shadowing, the individual characteristics of the learner should be taken into account [93].

**Benefits of shadowing:**
- Efficiency
- Simplicity
- Quick adaptation and transition to practical action

**Drawbacks of shadowing:**
- Effectiveness of shadowing directly depends on the learner: whether they are engaged in the process, distracted by external factors, or interested in adopting all necessary skills
- Not all executives are willing to be constantly observed at work
- Instead of engaging in work-related tasks, the learner spends time on observation

**Observation**

Observation is a method of learning that involves the study, recording, and subsequent analysis of the actions taken by more experienced colleagues or a manager to address specific problems.

**Capturing observation** means capturing the details, sides, and parts of a process

**Fluctuating observation** is the holistic capturing of a process

**Direct observation** means that the learner deals directly with specific actions

**Indirect observation** means that effects of actions, not actions themselves, are perceived

**Methodological requirements for observation as a method of on-the-job learning**

**Activity** is not contemplation but the search and recording of specific actions that can help the learner solve problems

**Goal orientation** means that the attention of the learner should be focused only on a relevant action

**Planning and intent** means following a predefined plan to achieve specific goals/solve specific problems

**Other types of unstructured learning at the work place** [10]

**Discussions** are conversations aimed at clarifying the position of colleagues or managers on specific issues

**Experience sharing** is a procedure that involves the sharing of specific knowledge, skills, or practical experience to solve various problems

**Work in project teams** is the participation of the learner in project-based activities, through which he/she can gain new valuable experience or consolidate existing skills

**Process improvement** is the activity of the learner aimed at researching, testing, and proposing ways to optimize a specific business process of the company

**Change of job duties** means expanding the area of responsibility of the learner and allowing him/her to be responsible for the achievement of new goals and results or to perform more complex tasks within his/her function

**Rotation** is a full or partial change of the learner's job duties to acquire new experience or professional qualifications

**Delegation** is the transfer of decision-making authority to the learner within an established task
Personalization of learning

**Personalization of learning** is learning in which the learning objectives, learning approaches, learning content, its sequence, pace of presentation, forms of presentation, and delivery channels are optimized and can vary depending on the needs of each learner [130].

In the context of the education market, personalization is the highest form of **customization** (p. 64) implying that in today's world the learner is the end client and the customer of the learning solution not only in general but indirectly in corporate learning as well.

**An individual educational path** is an educational path customized for a particular individual by taking into account their characteristics and needs. In this case, the learner can select what they will study, how this process will be organized, and what the learning schedule will be.

**A learning journey** (p. 113) is a personalized, thematic (not always individual) learning path.

**Active and passive personalization**

Dan Buckley identified two areas of personalization in learning: personalization for the learner, in which the learning is tailored for a specific learner, and personalization by the learner, in which the learner tailors their own learning. In 2006, this distinction was adopted in Microsoft’s Practical Guide to Envisioning and Transforming Education [28].

### Forms of personalization of learning

<table>
<thead>
<tr>
<th>Differentiated learning</th>
<th>Greater autonomy of learners</th>
<th>Self-education</th>
<th>Adaptive learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividing learners into groups/categories and selecting particular educational methods and techniques for each of them in accordance with the interests, abilities, and motivation of the participants</td>
<td>Especially popular in in massive introductory courses, in professional orientation, and selection of disciplines for in-depth study</td>
<td>Complete freedom and responsibility of learners in selecting objectives, the content of learning, and didactic tools to achieve the educational goal. In this case, the role of the educational institution is to provide services. This may include, for example, providing infrastructure for social and collaborative learning</td>
<td>Dynamic, data-driven formation of an optimal individual learning path that takes into account the preparation, abilities, goals, motivation, and other characteristics of the learner to ensure the effective learning of new concepts instead of enhancing memorization</td>
</tr>
</tbody>
</table>

**Benefits of personalized learning** [30]

- Planning of learning becomes an active process based on real data
- The difficulty level of learning is in line with the individual characteristics of the learner; the existing level of training is taken into account, and the specific ways of achieving a positive outcome are streamlined

- Improved motivation of learners
- Opportunity to select peers (in terms of learning abilities and needs) to study together
- Lower share of learners dismissed for poor grades
Disadvantages of personalization as a scenario (based on the example of e-learning)

- Risk that the learning needs of learners may be wrongly interpreted on the basis of data provided by learning analytics systems (p. 129)
- High costs associated with the creation of the adaptive learning systems and learning analytics systems
- At the current level of technology, no system can fully reflect the diversity of personal user characteristics
- Use of average values identified by learning analytics and used to build standard learning paths conflicts with the individual approach to the learner
- Use of adaptive systems reduces the self-organization of learners

<table>
<thead>
<tr>
<th>Individualization of learning [35]</th>
<th>Personalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same goals for all learners</td>
<td>Different goals for each learner</td>
</tr>
<tr>
<td>Using different didactic approaches to achieve the key competences of learners</td>
<td>Using different didactic approaches to develop the personal potential of learners</td>
</tr>
<tr>
<td>Syllabus is determined by the instructor</td>
<td>Learners are actively involved in creating their own syllabus (p. 193)</td>
</tr>
<tr>
<td>Focusing on the cognitive aspect of the learner's personality</td>
<td>Focusing on all aspects of the learner's personality rather than only on the cognitive side (emotional, social, life experience, etc.)</td>
</tr>
<tr>
<td>Focusing on knowledge and competences</td>
<td>Focusing on knowledge, competences, life and work skills</td>
</tr>
<tr>
<td>Self-directed learning as an additional skill</td>
<td>Self-directed learning as a fundamental skill</td>
</tr>
<tr>
<td>Instructor plays a key role</td>
<td>Tutor plays a key role (p. 187)</td>
</tr>
</tbody>
</table>

Example of implementing personalization as a learning solution

iLIME, a virtual campus module at Universidad Internacional de La Rioja (UNIR) [30]
An automated and adaptive system to assist instructors in preparing personalized educational and methodological recommendations that take into account the knowledge level and ability of a particular individual for formal and informal learning.
Proctoring

Proctoring means following up on and monitoring the learner.

Structure of proctoring [73]

- Proctors and their ability to communicate with learners
- Identification of learners by proctors
- Monitoring of learner activities, including via webcam, desktop
- Sorting and storing of collected data for further analysis by the LMS (p. 142)

Benefits of proctoring [73]

Easy access for instructors
Online proctoring tools integrated into the learning platform enable instructors to access the test system, learner lists, and grades with a single click. Learners just need to log on to the learning platform and undergo a one-time authentication through the proctoring system.

Accessibility
Online proctoring facilitates access to educational programs for learners with disabilities. They can learn and receive official certificates and diplomas in a maximally comfortable environment.

Understanding the skills and learning models of each specific learner for the purposes of content curation (p. 53)
Minute-by-minute reports on the behavior of each learner during online testing provided by the proctoring systems make it possible to identify the peculiarities of this behavior and specific problems. For example, it is possible to determine that a mistake made by a learner was caused by incorrect actions during the test, or that this mistake is typical for most learners and results from errors in the presentation of materials, the wording of the question, or other shortcomings of those who prepared the test.

Identification of learners
By using online proctoring, including a webcam and verification technology with biometric indicators, the learner creates a virtual ID and profile that make it possible to verify their identity each time they log into the system. The instructors can quickly identify the learner and their appearance, skills, and learning models.

Confirmation of grades by the instructor
Online proctoring includes more than just automatic algorithms. In some systems, the results of online tests are audited by an experienced instructor. This helps eliminate any inaccuracies that reduce the objectivity of assessment.

Fraud prevention
The online proctoring system uses algorithms and machine learning to prevent fraud during online testing by automatically identifying behavior patterns that resemble cheating.

Relevance
In 1940, only 20% of college learners admitted that they cheated at least once in their studies; however, by 2015, this figure increased to almost 85% [1].

Procedures of online proctoring [53]

Different proctoring systems vary by the sets of procedures used for identity authentication and monitoring of learner behavior during the assessment. The use of each subsequent step increases the cost of the system.

Autoauthentication
Before the exam, the learner submits a photo of their ID and their online photo to the system, answers several test questions, and enters an electronic/biometric signature.

Authentication by the instructor
After self-authentication (but with no online photo), the identity of the learner is verified directly by the instructor via the online camera.
**Autoproctoring**
After establishing the identity of the learner, the environment is monitored for outside sounds, movements, or changes in the testing equipment.

**Procedure for video recording and review**
After completing authentication, the entire exam is recorded from start to finish. Later, the instructor reviews the video and prepares a report on the extent to which the work of the learner was independent.

**Scenario of learner and proctor interactions with the system**

Steps taken by learner before the exam/test
- Authorization in the proctoring system by using a login and password via the LMS or by following a unique link
- Viewing the exam schedule and either immediately starting the exam or selecting a time for the exam
- Completing the profile, uploading a picture of one’s face and a scanned copy of one’s ID (optional)
- Testing the connection and installing the browser extension

Steps taken by the system and proctor during the exam/test
- Downloading the exam/test from the LMS to IFRAME
- Recording video from the webcam (with sound) and computer screen, automatically monitoring violations, and continuously verifying/identifying the learner
- The proctor can monitor the learners: the system suggests which learners to pay more attention to in real time
- Interactions between the proctor and the learners via chat or video conference and the ability to terminate the procedure early in the case of gross violations

The completion of the exam/test is followed by an assessment of confidence in the results of the exam and a video report with minute-by-minute details of violations.

**Online proctoring experience**
In 2012–2017, the number of companies offering online proctoring services doubled. Many educational resources and platforms have established their own online proctoring services. The range of proctoring services is extremely diverse and covers the entire price scale [15].

**The University of North Carolina**
17 units of the University conduct a total of up to 40,000 online exams and tests a year using an online proctoring system. At the same time, for some online courses, there is a need for face-to-face exams in classrooms or test centers.

**Western Governors University** (Utah, USA)
Established in 1997 specifically for implementing distance learning. Online proctoring systems are used for almost 30,000 online exams a month.

**Russian online proctoring systems**

**ProctorEdu**
The system received support from the Internet Initiatives Development Fund and has joined the European Association of Proctoring. It is integrated with Moodle, a course management system, and with such platforms as Open Education and Stepic.org

**Examus**
Skolkovo resident. Its partners include Sberbank CU, MIPT, HSE, Ural Federal University, and Saint Petersburg State University
Proctoring

Learner

Proctoring

Proctor

Authentication

Verification

Start of the exam

20/30

Data collection, analytics

LMS
Roles in modern corporate learning

Roles in modern corporate learning are a set of professional competences of specialists ensuring corporate learning process. The right balance of positions and roles for each specialist can ensure harmony between functionality and competences both in the case of an individual employee and for the entire team responsible for organizing corporate learning.

Over the past two decades, there has been a significant rethinking of key roles in corporate learning. The traditional approach to corporate learning divides this process into two categories: for mass specialties and for executives.

<table>
<thead>
<tr>
<th>Learning for employees in mass specialties</th>
<th>Learning for executives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provided by T&amp;D units (p. 62), whose employees specialized in the learning process organization, and trainers, who could be part of these units (in large companies) or invited from outside.</td>
<td>Conducted in executive education programs of business schools or open programs by training companies. The T&amp;D unit task is to provide administrative support for such learning in accordance with the program selected by the participant (or their supervisor)</td>
</tr>
<tr>
<td>The functions of T&amp;D employees include:</td>
<td></td>
</tr>
<tr>
<td>• Finding trainers for a program specified by the business (for example, organization of sales by the sales function in the company)</td>
<td></td>
</tr>
<tr>
<td>• Group planning</td>
<td></td>
</tr>
<tr>
<td>• Preparing reports on the completion of learning by employees</td>
<td></td>
</tr>
</tbody>
</table>

Key trends of evolving roles in corporate learning and their underlying causes

Transformation of T&D departments
The rapidly changing nature of the business requires the transformation of T&D from a support unit into a business partner that has its own competences in order to offer educational solutions for supporting the company's strategy implementation. The expert review of educational technologies, and often the expert review of its content, is transferred to the company from previous outsourced solutions (transformation of T&D from a training center into an L&D function acting as a business partner).

Development of a professional and expert training system
An increase in the share of employees on "expert" career tracks (as opposed to mass specialties or executives) requires the development of a professional training (hard skills) system for these employees. Learning the company values and processes will not be sufficient to maintain the relevance of their knowledge and skills, which are becoming critical to ensuring the competitiveness of the company.

Including learning in the company EVP
Opportunities for continuing learning are becoming an essential part of the employer value proposition (EVP) as competition in the labor market for the best employees requires the building of an internal learning system and provision of content-related support for learning outside the company (strengthening the role of L&D as the curator of external educational content).

In-house expertise on solutions in the area of e-learning
Radical change in education technology and the development of digital solutions require expertise in this area within the company.
A new role-based system in corporate learning

The transformation of L&D into an expert function serving internal customers brings the system of roles in corporate learning closer to the system in professional service companies, primarily in consulting. Flexibility along with the accuracy of combining the role of specialist with its position is becoming increasingly important.

Learning partner

Functions:
Ensuring regular communication between the L&D unit and business units and acting typically as a one-stop-shop for internal customers of learning. Is responsible for:
• Receiving an order for learning or creating educational solutions in the area of self-education
• Transferring the order to those who will develop the educational solution
• Working together with the developers to create a solution that will maximally meet the client needs

Role
The proactive approach of L&D means that the manager for the group of clients communicates directly with the heads of business units who are the internal customers of learning, including by attending the regular meetings of the unit, participating in the development of the strategy implementation plan and annual plans of the unit.

Program director

Functions:
Supervising the development of the program (both the content and selection of technology solutions to ensure the effectiveness of learning).

Role
Ensuring the monitoring of program implementation, transforming it on the basis of feedback, selecting faculty, and supervising their work while remaining in direct contact with the official responsible for the program content on the part of the customer.

In traditional business schools, this role is often referred to as the "client director" and involves searching for and following up on client companies, including by selecting an academic program manager within or outside the school, organizing the work of learning support managers, and addressing issues related to contracts and financing (settlements).

Faculty

Functions:
Creating educational and methodological materials for the program and conducting classes in the program (in the case of distance learning, checking completed assignments, conducting webinars, etc.).

Role
He or she ensures mutual communication and feedback with learners and consumers of educational materials and educational programs.

In business schools, this role is often referred to as the "academic program director." On the one hand, this emphasizes responsibility for the program content as opposed to responsibility for its general administrative support and working with the client, and, on the other hand, it reflects the fact that the program directors were usually from the faculty of the school. Currently, in leading business schools, the full-time faculty is almost completely focused on research and development and teaching their own courses, while freelancers or practicing professors with experience in the client's industry can perform the program academic director functions.

Changes in the role of the faculty allow them to participate in defining the program content in the group under the program director’s supervision.
Subject matter expert

**Functions:**
Participating in the creation of the program under the program director supervision.

**Role**
Ensuring the compliance of programs and the educational process with best practices and trends in subject areas. If the program focuses on learning or mastering skills in one subject, this is the duty of the program director. If the program is of complex nature (includes courses/modules from various subject areas), the program director works with several experts in different subjects/knowledge areas or with different skills. This role can be played by former or current employees who are familiar in detail both with the processes of this function within the company and with best practices and global trends. They differ from faculty/trainers, who are more involved in the learning process than in the development of the program and trend monitoring in the development of the subject area (a similar difference can be observed in university business schools between the cutting-edge subject area expertise of *research-track/tenured faculty* and the *teaching-track faculty*).

Learning technology expert/learning solution expert

**Functions:**
Selecting technology/solutions for implementing a program with the specified characteristics. The most common experts are in digital learning solutions (p. 81), digital platforms, and new technology (*virtual reality* (p. 217), etc.).

**Role**
Synergy of technical/IT and educational expertise. The creation of this role as well as the formation of this profession is associated with the emergence of complex digital educational platforms (Blackboard, Moodle, etc.) and *MOOCs* (Coursera, edX, etc. (p. 161)).

Learning analytics expert

**Functions:**
Preparing and reviewing *learning analytics* (p. 129) and *learning outcomes* (p. 150).

**Role**
Embedding learning into the talent development process, including by using predictive analytics to forecast what programs taught to which employees will generate maximum return for the business.

This role has emerged recently and is associated with big data processing. In terms of the learning process, the analysis is based on information about the frequency of reference to the content unit, the speed of its assimilation, the quality of questions (by their ability to differentiate between learners with different training levels/*learning agility* (p. 127)/learning success), etc. The purpose of this analysis is to raise the quality of learning and methodological materials to improve the *learning effectiveness* (p. 135). Data on learning outcomes is presented in the form of testing/assignment results or learner projects, surveys of learner satisfaction, surveys of their supervisors about changes in the observed skills and behavior of former learners, etc.

Program coordinator

**Functions:**
Providing organizational support for the learning process (enrollment and dismissal of learners, technical assistance to learners and faculty in the learning process, preparation of classrooms and equipment, etc.)

**Role**
Supporting relations at the basic level of learning.
Social learning

Social learning is the information and experience exchange, collaboration, and joint content creation between and within networks (both employees and external people) using interactive discussions and debates, social media, and digital technology learning.

Concepts that formed the latest ideas about social learning [127]

Networked learning is a relatively new paradigm of educational activity based on the idea of mass cooperation and the ideology of open educational resources in combination with the network organization of participant interaction.

The correspondent network and learning objects in education by Célestin Freinet

The theory of labor education of the French teacher Célestin Freinet meant that "individual labor" under supervision was replaced by cooperation. The main idea: to teach learners to interact, you need to maximize their circle of communication. To solve this problem, a school correspondent network was created. The learners were in correspondence with learners from other schools; they exchanged information, toys, and photos. This work was considered as a way of a context of "live communication" development.

Constructionism

Learning ideas as a process of experience restructuring were supplemented and developed by Seymour Papert, an American mathematician, scientist-programmer, and teacher, and were called constructionism. Papert talked about the importance of learning environment creation in communities where newcomers become significant participants in joint activities. Special attention is paid to the development of "the language tools that learners use to better express the type of assistance they need". The key constructivist's idea is based on the communities where participants share and discuss the results of their activities.

John Dewey's Instrumental pedagogics

John Dewey, an American philosopher and educator committed to the theory of pragmatism, assumed that the mechanisms of socialization and learning are inherent to any community. The decisive factor is not just a joint activity but the corresponding interaction. Each community has a certain culture and own mechanisms for socialization that ensure sustainability. Dewey's second important idea mentioned that knowledge is created in the process of acquiring and understanding experience. As a result, the main purpose of learning is the "continuous restructuring of experience" that leads to "an increase in the ability to choose the direction to find new experience and the ability to manage it".

Ivan Illich's "learning web"

The ideas of renouncing the dictates of certified teachers and grid institutional structures underlay the developments of Ivan Illich, an Austrian philosopher and social critic. The "learning web" of Ivan Illich embodied an ideal educational system, which would:

- provide access to all available resources for all interested persons at any time and irrespective of their age
- support the efforts of all people who are willing to share their knowledge and skills in searching for those who would like to be taught by them
- allow all interested persons to publish the results of their study and to bring them up for discussion to the public

Connectivism

is a young theory which studies typical characteristics and specific aspects of the learning process in the age of digital technology. Fundamental principles were developed by George Siemens, a Canadian writer, theorist, speaker, and researcher on learning in the digital environment. Siemens proceeds from the idea that exponential growth of knowledge requires nonlinear models for learning (process) and knowledge (state). The key postulates are associated with the idea of dynamism, for example, a person cannot fully control the learning process; the key skill is not to have knowledge but to be able to see the meanings between concepts and ideas; cognition is the process of linking sources of information, etc.

1940–50s

Social learning theory appeared. According to this theory people learn while watching other peoples’ behavior.

1984

Forums of engineers and software developers in FIDOnet may be considered as a social learning prototype in the modern sense.

early 1990s

With the development of the Internet technology, news groups and forums of experts, mostly in the field of IT, started to appear.

2003–2004

Leading business schools create private Intranet networks for their graduates, among other things, for postgraduate learning and exchange of learning information between students and graduates. The first project in Russia was implemented in 2003 by the Stockholm School of Economics based on U-Journal [152]
### Social learning in the company:

- Speeds up creation and delivery of learning content to learners (*time-to-market*) significantly and therefore makes learning more flexible
- Allows learning when it is necessary, not only when the program is scheduled (*just-in-time learning*)
- Provides informal opportunities for learning

- Contributes to employees’ extensive collaboration
- Involves all employees in the learning process effectively
- Saves costs on other learning methods
- Provides coverage of a larger learners’ audience than is possible with the help of other learning implementation methods

### Social learning implementation optimizes the work of learning departments and makes it possible to focus [123]

Microsoft Learning Department case study

<table>
<thead>
<tr>
<th>It is no longer our job:</th>
<th>Our job is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• To manage trainers</td>
<td>• To use technology for scaling</td>
</tr>
<tr>
<td>• To hold hundreds of training sessions with 30 people in the classroom</td>
<td>• To provide easy access to advanced knowledge</td>
</tr>
<tr>
<td>• To support passive learning</td>
<td>• To teach &quot;learning by doing&quot; and to share experience</td>
</tr>
<tr>
<td>• To be experts...</td>
<td>• To comply with the goals of business and its transformation</td>
</tr>
<tr>
<td>• ... And to coach everyone...</td>
<td>• To set the framework and to become obsessed with quality</td>
</tr>
<tr>
<td>• ... On each topic</td>
<td>• To organize communities of coaches and trainees</td>
</tr>
<tr>
<td>• To create all the content on our own</td>
<td>• To organize a community of authors</td>
</tr>
<tr>
<td>• To allow anyone to publish anything in any format</td>
<td>• To identify the essentials on the basis of data</td>
</tr>
<tr>
<td>• To measure the number of views and downloads</td>
<td>• To do less but do it qualitatively</td>
</tr>
</tbody>
</table>

### Social learning efficiency assessment metrics [89]

- 37%: frequency of references to individual learning aids
- 28%: activities in online communities of learners
- 24%: popularity of user-generated content
- 23%: relation to business goals and KPIs
- 21%: variety of user-generated content types
- 20%: frequency of addition of content
- 20%: frequency of using individual social media tools
- 20%: behavioral characteristics of users who share content
- 16%: surveys of employee satisfaction with social learning
- 12%: relation to individual goals

### Limited implementation and competitiveness

According to ATD (December 2016), only 54% of large and major companies use social learning (SL). The main reason for avoiding its utilization is that learning is not supported by the organizational culture. However, a company’s effectiveness in the market and the effectiveness of learning correlates with the use of SL: companies that do not use SL are less competitive.
Social media and networks

_Social media and networks_ are the technologies used to facilitate social interaction and communications (blogs, forums, social networks, user-generated content aggregators, collaborative platforms etc.).

### Social media and networks in learning areas of utilization

- To support learning within individual groups (e.g., team work, interaction under individual projects, knowledge exchange)
- For learning throughout the company (e.g., collaboration, exchange of knowledge and files, communication on organizational initiatives)
- As a component of formal educational programs developed by the L&D department

### User-generated content in learning

Information created by learners for use by other learners may include, for example, text, video, presentations, long-format texts, etc.

### The policy of companies that are using social learning toward user-generated content [6]

- We encourage employees to share content
- We give employees instructions on how to create and share content
- We have formal policies defining what is the appropriate user-generated content
- L&D/KY employees monitor and control the user-generated content
- L&D/KY employees curate and archive the user-generated content
- We reward employees who regularly share content
- We formally track user-generated content
- We do not allow employees to share content

### Learning communities

Communities of employees in which they interact, exchange their ideas and opinions, and share content they have generated.

Learning communities may be:
- Either **public** (for all company employees) or **private**
- Either **topic-based** (relating to a certain broad managerial topic or to a narrow functional/professional topic) or **program-based** (relating to a certain educational program)

Depending on the community participants’ goals and level, they may be divided into:
- **Communities of practice** where the main goal is to exchange best practices and solutions and to resolve specific work situations
- **Communities of knowledge**, or **communities of learning**, where the main goal is to create and distribute new knowledge, inter alia, based on the generalization of company practices
Examples of successful implementation

Open platform

Coursmos is a complex and full-fledged solution for instructors, companies, universities, and schools that unites over a hundred tools for knowledge creation, distribution, and monetization.

Anyone may record and upload a paid or free micro course up to 3 minutes long for a wide audience on various topics. There is no courses pre-moderation.

Over 37,000 online courses
Over 2,000,000 students

Corporate solutions

Ericsson and Ericsson Academy, the Ericsson Play platform, is a corporate analog of the Coursmos platform.

• Over 10,000 video courses

Any employee may upload their video in a special interface, share their experience, ask their colleagues for help, and learn right here and right now. The content is not subject to pre-moderation. The courses are rated by participants (likes, comments, shares).

Workplace@Danone

Workplace communities
For all
Dedicated to topics of interest to everyone: leadership, management, personal efficiency. Employees have created communities for change management, project management, etc. Danone Academy—the encyclopedic section

Expert (functional)
Communities by functional expertise. Employees share best practices, and in particular, those based on the experience of other producers

For CU alumni
Instructors publish postprogram content, allowing the alumni to discuss completed topics and post additional learning materials. The page enables continuous learning. The next step is to create a knowledge management system, a special platform that will make it possible to collect knowledge and will become a medium for communication and collaboration between employees

Sberbank CU, InSberra

InSberra (short for inspired by Sberbank, or a combination of Instagram and Coursera) is a social educational platform integrated into the Virtual Platform of Sberbank CU for the informal social learning of the executives and employees of the Bank.

• Identifies leaders in terms of creating new knowledge and disseminating best practices through the elements of gamification
• Transfers knowledge from individual to individual so that everyone can learn from everyone
• A participant’s status in each thematic community depends on the level of expertise:
  A practitioner can create their own content or browse and evaluate the content of others
  An expert participates in content filtering
  A guru has the highest priority, can control the content on the platform and publish materials bypassing moderation

• Allows anyone to create their own learning product using tools for designing and posting materials (videos, presentations, tests, long-format texts, etc.)
• Provides a system for verification and knowledge preservation in the organization (information blockchain)
• Builds various levels of communities for learners and instructors to provide a framework for social learning
• Makes it possible to monetize one’s own learning product and to acquire new knowledge in various forms and formats (educational marketplace)
Knowledge and innovation management system, Gazprom Neft

Includes 5 key tools

1. **Community of practitioners**: a group of people united by common professional interests, objectives, or projects. The communities play a key role in preserving and disseminating knowledge and selecting and implementing innovations and best practices.
   • 25 communities created on the initiative of employees
   • The most active communities are Production, HSE, Hydrodynamic Well Testing, and Geological Simulation

2. **Learning** is the most important tool for knowledge distribution in the company; the key instruments are internal or social learning (when we learn from colleagues).
   Formats: tutorship, internal coaching, distance learning.
   • The database includes 110 e-learning courses
   • 30,298 person-courses completed in 2016 (500% growth)

3. **Employee profile**: simplifies the search for experts within the company.
   • 66,779 records (including 26,101 records for production personnel)
   • 2,355 employees have completed their profiles
   • 320,955 "barrels" (internal game-playing currency) earned

4. **Knowledge base**: structured storage of formalized information (documents).
   • 824 wiki pages
   • 1,476 documents on the Knowledge Portal and 5,000 in the Knowledge Dissemination System

5. **Idea bank**: tools for collecting and implementing initiatives and best practices.
   • 724 messages in the forums
   • 272 posts in the blogs
Virtual classroom

Virtual classroom is a technology for distance learning (synchronous e-learning) (p. 76), where the participants of learning events and the instructor can communicate, transmit, and analyze information using the Internet or corporate information systems.

Virtual classroom simulates all types of face-to-face activities, and analytical tools used in e-learning (data sharing, feedback, collaboration, assessment and analytics, etc.) can be added.

Virtual classroom can be implemented using either the integrated electronic platforms or a set of various solutions for individual features.

This technology is being developed in two areas.

- Using virtual reality (p. 207) to create virtual classrooms
- Combining virtual classrooms for individual programs into virtual campuses: participants can attend different virtual classrooms in accordance with a schedule of classes

Features of the virtual classroom

- **Video broadcasting**: broadcasting the images of the presenter, participants, and other information, including graphics
- **Multiparty voice conferencing**: that enables broadcasting of the speech of the presenter and participants
- **Virtual whiteboard/flipchart**: makes it possible to make notes or visualize presentations, thoughts, and ideas individually or jointly. For example, drawing tools may be implemented as follows: Each participant has their own color, and the instructor and/or other participants can make edits.
- **Asking questions**: the instructor can ask a specific participant questions and receive the answer (by voice and/or text)
- **Working in small groups**: the ability to divide participants into small groups and ensure that participants of these groups collaborate separately from others
- **Surveys, tests**: conducting various forms of knowledge assessment, obtaining the opinions of participants, individually or in focus groups, collecting statistical information
- **Tools for viewing and commenting on presentations in various formats**
- **Chat**: any of the event participants can ask questions, express opinions, and send other information for general viewing in a text chat. In the chat, the participant/instructor may write either public messages seen by all or private messages to specific users.
- **Analytics tools**: analytics of participation in classes and activity of participants, including participation in chats or collaboration, assessment of results, etc.

**Raised hand and emotions of participants**: a participant in the event may at any time call for the attention of the instructor (and, in some cases, of another participant) by "raising a hand" (clicking the appropriate button) or selecting an emoticon that matches their feelings about what is occurring. The instructor can see all raised hands and emoticons.
Examples of implementation

Virtual classroom interface by Websoft

The HBX Live virtual classroom in material reality is the first full-fledged virtual classroom. It was launched at the Harvard Business School at the end of 2014. HBX Live enables simultaneous synchronous learning for 60 people from anywhere in the world.

Virtual classroom in virtual reality
Microsoft virtual classroom

Home page of Ericsson Virtual Campus
Virtual reality, VR

Virtual reality (VR) is artificial reality, a synthetic world (objects and entities) created by technical means and transmitted to humans through their senses, including sight, hearing, smell, touch, and others.

Virtual reality simulates both an impact and response to this impact. To create a convincing sense of reality, the computer-based synthesis of properties and responses of virtual reality takes place in real time. The objects of virtual reality usually behave in a way close to the behavior of similar objects in material reality.

The user can act upon these objects in accordance with the real laws of physics (gravity, the properties of water, collision with objects, reflection, etc.). However, the users of virtual worlds are often allowed to do more than it is possible in real life (e.g., to fly, create any objects, etc.).

Characteristics of virtual reality:

**Derivative nature**
Virtual reality is derived from another reality which is external to it.

**Immediacy**
It exists in real time, at the moment of observation, here and now.

**Autonomy**
It has its own laws of existence, time, and space.

**Interactivity**
It can interact with other realities while retaining its independence.

Virtual reality should not be confused with augmented reality. The fundamental difference is that virtual reality constructs a new artificial world, while augmented reality (p. 23) only submits some artificial elements to the perception of the real world and is a form of **mixed reality** (p. 168) along with augmented virtuality.

Using virtual reality in learning

Given the high requirements for investments in hardware and software, the main principle for the use of virtual reality in learning is expediency: virtual reality tools in learning should provide additional value that cannot be provided by other more traditional means of learning.

Benefits for learning purposes

**Engagement**
With its immersive experience, VR transforms the learning process, making it much more interesting.

**Interactivity**
Training simulators with interactive 3D scenarios make it possible to solve different business cases in practice.

**Immersion**
In contrast to online simulators, the extent of conventionality in VR is reduced to a minimum. The employees find themselves in a 3D space where they can interact with realistic avatars and objects rather than with flat pictures on a screen.

**Focus**
VR provides complete isolation from external stimuli and allows the instructor to control the focus of the learner.

Jaron Zepel Lanier (born 1960) is an American expert in the field of data visualization and biometric technology. He enrolled at the University of New Mexico at the age of 13. In 1978, Lanier received a research grant from the National Science Foundation to study "digital graphical simulations for learning." In 1984, he founded VPL Research, a company that brought VR goggles and gloves to the market. In 1989, Lanier introduced the term "virtual reality." The Encyclopedia Britannica included him in the list of the 300 greatest inventors in the history of mankind.
Advantages in training and assessing the competences of an employee

- The unprecedented level of immersion enables rapid learning of material and neutralizes external distractions
- Risk-free opportunity to understand how the employee behaves (will behave) at work and how they translate their usual behavior into interactions with a bot
- Detailed analytics provide a new level of data representation

Virtual reality can be used for the following:

- Teaching skills in areas where the operation of real devices and mechanisms is associated with higher risks or costs (airplane pilot, train engineer, dispatcher, vehicle driver, mine rescue worker, etc.)
- Developing skills for action in emergencies and other unforeseen situations (for example, how to act in case of fire at a warehouse)
- Developing emotional intelligence and empathy skills when experiencing strong emotions (for example, walking a tight rope or facing a conflict situation in a team)
- Removing psychological barriers and developing individual social skills, including through self-training (for example, overcoming fear and developing public speaking skills)
- Supporting collaboration (p. 46) of learners through joint assignments in virtual reality

Formats and examples of using virtual reality in learning

Playing with a machine

Virtual simulators (trainers):
the learner is immersed in virtual reality and acts in accordance with a set of scenarios included in the program either initially or in the process of machine learning

- KLM airlines: a simulation of a hangar: what to do when a plane that is being repaired in the hangar starts filling with smoke

1958
The translation of “Le Théâtre et son double,” a book written by French author Antonin Artaud, used the term virtual reality for the first time in English

1960
Verne L. Hudson and William Fetter from Boeing created an animated computer model of a human body and introduced the term "computer graphics".

1962
The first VR system was patented. Morton Leonard Heilig presented a prototype of a multisensory simulator, which he called "Sensorama".
Steve Russel, Martin Graetz, and Wayne Wiitanen released Spacewar, the first computer video game.

1966
Development of GAF View-Master, a 3D stereoscope
Playing with reality

Facilitated virtual simulations: the learner acts in virtual space under the supervision and/or monitoring of a facilitator and/or other participants remaining in material reality

• Professor J. Bailenson, the head of the VR lab at Stanford University, facilitates a simulation for developing emotional intelligence.

• SberSpeak is a facilitated simulation from Sberbank CU for developing public speaking skills.

Playing with others

Virtual collaboration: the learner acts in a virtual space together with other participants who are also in virtual space

Holoporation is a new technology from Microsoft Research for virtual interaction between participants.

Trends

By 2025, the global market for VR and AR technology will be $80 billion, including $3.2 billion for the entertainment market and $700 million for the education market. Over the last two years, investments in VR and AR amounted to $3.5 billion [24].

According to experts, so far, VR is "ahead" of AR in terms of available solutions, but the latter has greater potential [33]. In the near future, the most rapid development will occur in the Business to Consumer segment; companies will provide the technology for the process and sell services to users through their sites [24].

1968

Ivan Sutherland described and built the first VR head-mounted display system for images generated by a computer. He called this device the "Sword of Damocles".

1970s

Computer graphics completely replaced the video previously used in simulations.

1977

MIT created Aspen Movie Map, the first implementation of virtual reality. This was a computer program that simulated a tour through the city of Aspen, Colorado.

1980s

The appearance of new systems which allow users to manipulate objects on the screen with the help of their own hand movements.
Virtual reality, VR

Promising VR cases

AR & VR Center for training the employees of the Cash Collection Service at Sberbank
Learning to act in specific situations, such as an attack on a cash collection vehicle or loading money into ATMs.

Designing premises and surrounding areas
AR or VR models for making decisions on appearance, layout of cable routes, finishing works, arrangement of furniture, etc.

"360 View" macromuseum
Display of various exhibits, such as rare or lost ones. Reconstruction of distant places of the universe. Creating a sense of presence at a significant event (e.g., in the middle of the Battle of Kulikovo). Fully virtual museum spaces that have no physical exhibits.

1984
Development of the first full-fledged RB2 (Reality Built for Two) VR controllers, which allowed users to see themselves in VR and interact with the virtual environment. The basic version of RB2 cost $50,000 and, as a result, did not become popular.

1989
Jaron Lanier popularized the term "virtual reality" [80].

1990
Sega announced the release of the Sega VR headset for arcade games and the Mega Drive console.

1992
CAVE, the first projection system that made it possible to track a person's movement, including the positions of their hands, feet, head, and even eyes in the virtual reality room, was designed. Release of the cult film "The Lawnmower Man," which was a breakthrough in demonstrating the possibilities of virtual reality in learning.

2007
Google presented Street View, a technology that provides panoramic views of streets in many cities of the world from a height of about 2.5 meters.
Virtual reality, VR

Trader workstation
Visualizing a multitude of monitors in VR or AR with the ability to manipulate them (freely position them in space, etc.) Visualizing critical points for stock trading

Virtual reality for developing corporate competences:

The Elderly Person and Person with Disabilities simulations in the programs of Sberbank CU

Created by Sberbank CU with the support of the Severo-Zapadny Bank of Sberbank of Russia. They are used in such programs as Sberbank 500 and Design Thinking: from Insight to Innovation in a mass demo mode and on a regular basis in the ISU Manager Workshop: Retail Business, a program of the Retail Business School.

The use of authentic audiovisual recordings allows the employees to "live" the experience and see the world through the eyes of their customers.

Goal: To develop empathy in bank employees toward their customers by immersing them into a situation of extreme discomfort experienced by a person with disabilities.
Appendices
Appendix 1. Global professional associations in corporate learning

The Association for Talent Development (ATD), formerly the American Society for Training and Development (ASTD)
A global nonprofit association of professionals in the field of corporate learning and professional development

Founded in 1945
Headquarters: Alexandria, Virginia, USA
https://www.td.org

Mission
The association supports specialists in talent development by developing and providing specialized content in the form of research, academic literature, webcasts, and training programs. The organization regularly holds international conferences for specialists in the field.

Representative Office
Members of the organization are professionals in the field of human resources development from more than 120 countries, including company managers, trainers, instructors, consultants, customer service managers, etc. The organization includes 122 representative offices in the United States, 26 worldwide communities, and 12 global partners.

Membership
Various professional organizations and government agencies, as well as independent consultants and service providers, can be members of the organization.

Competence model
ATD has developed its own competence model that includes three levels: core competences, competences in the field of staff development (learning design, improving staff efficiency, training, staff assessment, adapting organizational changes, learning management, coaching, organizational knowledge management, career planning and talent management), as well as role models.

ATD Certification Institute
The Association has its own Certification Institute that trains certified professionals in learning and performance (CPLP). Learning is carried out on the basis of the ATD competence model.

Conferences
ATD holds annual conferences: the international ATD conference and exhibition, the ATD TechKnowledge conference, the Telling is not Training conference, and the LearnNow conference. Every autumn ATD holds the ATD Chapter Leaders conference in Washington for the heads of the American branches of ATD.

In addition, ATD provides special services for career development and conducts certification programs and seminars. The Association annually gives awards to companies and individual industry representatives for their contribution to the development of corporate learning.
Forum of corporate learning managers  
ECLF (Executive Corporate Learning Forum)  
The association of heads of major international organizations responsible for developing a corporate learning strategy and promoting the transformation of education and business  

Founded in 2005  
https://www.eclf.org

Mission  
The creation of an intellectual and socially-inspiring environment conducive to the deep and high-quality elaboration of key problems that large organizations are facing today.

Representative Office  
Top managers and the senior management of global and national companies, research and public organizations from 13 countries are ECLF members.

Membership  
ECLF membership is granted only to L&D and corporate university managers as well as to the heads of large nonprofit organizations. Representatives of business schools, consulting companies, and other service providers may not become ECLF members. This approach makes it possible to maintain a culture of openness, trust, and objectivity. To become a member of the Forum, the recommendations of ECLF members and a personal invitation are needed.

Over the past 10 years, the Forum has become one of the world’s leading associations facilitating strategic dialog on the future of transformational leadership and learning. Today, ECLF is a community of managers who share their experience, support each other in solving practical problems, and jointly explore and create new corporate learning opportunities that are adequate to the time and the requirements of business.

Types of the Fund’s activities  
• Regular meetings to exchange experiences, discuss topical issues, and stimulate new initiatives  
• Annual Summit on Strategic Planning  
• Meetings focused on the exchange of practical experience between Forum members  
• Meetings focused on developing leadership and the ability to think more broadly  
• An annual survey of L&D managers of 200 major organizations dedicated to key areas of corporate training development  
• Projects and initiatives of ECLF members contributing to the implementation of the Forum mission

For the collaboration of Forum members and notifications on news and events, as well as quick access to the archive of all conducted research and adopted initiatives, ECLF uses its own virtual platform.
Appendix 1. Global professional associations in corporate learning

European Foundation for Management Development (EFMD)
A global nonprofit representative organization uniting various creators and participants of learning in management

Founded in 1972
Headquarters: Brussels, Belgium
https://www.efmd.org

Mission
EFMD supports and develops a unified international approach to organizing, promoting, and assessing the quality and effectiveness of manager training. The Fund is recognized all over the world as the most significant professional accreditation body of business schools, corporate universities, individual educational programs, and online courses.

Representative Office
The Fund's members are almost 900 educational, public and commercial organizations from 86 countries worldwide, including 62 leading world companies as of January 1, 2019.

Membership
Business schools, corporate universities, other educational and academic organizations, as well as large companies, small business support centers, state organizations, chambers of commerce and industry, consulting firms, retraining centers, and employers' associations can become Fund members.
EFMD offers three types of membership: full, affiliate, and associate membership, with different sets of services.

Accreditation services
Accreditation according to the international EFMD system of quality assessment (standards) of business schools, corporate universities, educational programs, and online courses.
- EQUIS (EFMD Quality Improvement System) is the institutional accreditation of business schools by the EFMD quality improvement system.
- EPAS (EFMD Program Accreditation System) is the accreditation system for educational degree programs in the field of management implemented by universities and business schools
- EOCCS (EFMD Online Course Certification System) is the system of certification of management programs implemented by universities, business schools, and CUs
- CLIP is the Corporate Learning Improvement Process

Programs
- EDAF (EFMD Deans Across Frontiers) is a mentoring program with the participation of experienced managers, former deans of business schools, and top managers of companies
- BSIS (Business School Impact System) is a system for enhancing the role of business schools in public life at the local and regional level

Other activities
EFMD holds annual conferences for its members (including the deans and directors' forum and the conference of all EFMD members) and a series of seminars on the development of selected business education areas: bachelor's, master's, and postgraduate courses in management, MBA programs, and Executive Education. Members of the organization can participate in various networked educational communities and working groups. EFMD also conducts research and has a program of publications and conducts contests of case studies, successful practices, and projects.
Appendix 1. Global professional associations in corporate learning

Global Council of Corporate Universities
GlobalCCU (Global Council of Corporate Universities)

Founded in 2005
Headquarters: Paris, France
http://www.globalccu.com

Mission
To integrate corporate universities into a global worldwide network for the exchange of experience, support, and interaction and establish corporate learning as part of the lifelong learning of every person. The Council was created under the influence of ideas and with the direct participation of the renowned specialist in corporate education, Annick Renaud-Coulon.

Representative Office
Heads of corporate universities as well as key managers for learning and development of the world's leading companies from more than 50 countries.

Certification services
Worldwide certification of corporate universities that is one of the most authoritative in the field of corporate education and compliant with world standards.

Certification levels

- **Compliance**
  - *the Corporate University Compliance Certification*
  - *Compliance with the level of a real corporate university*
    - Evaluation of the maturity level of the corporate university
    - Compliance of the corporate university brand with the official brand of the company
    - Compliance with the image of a modern, effective, and stable corporate university
    - Long-term basis of operation
    - Support of the sense of community and trust of employees toward the future of the university
    - Support of employees' confidence in their skills and competences, recognition, and motivation for critical transformational changes

- **Performance**
  - *the Corporate University Performance Certification*
  - *Confirmation of the effectiveness and influence of the corporate university*
    - Confirmation of the leading position of the corporate university, its competitiveness, and its ability to support and implement transformational changes
    - Development of collective intelligence and innovation
    - Strengthening of relationships between employees, customers, providers, and other external partners, creation and support of a balanced ecosystem

- **Excellence**
  - *the Corporate University Excellence Certification*
  - *Confirmation of the stability and responsibility of the corporate university toward employees and partners*
    - Recognition and trust of the corporate university in its employees, creation and reinforcement of a sense of community and interdependence
    - Stability of the corporate university and provision of a well-founded confirmation to external partners and business appraisers, nonfinancial rating agencies, governmental and nongovernmental organizations

Other activities of the Council
- An annual competition in various professional categories of the GlobalCCU Awards, which selects the top 20 corporate universities in various disciplines and programs, such as "Impact on Business," "Culture and Brand," "Corporate Responsibility," "Innovations," "Leader of the Year," etc.
- Support and development of the unified social platform GlobalCCU Platform that brings together specialists from various corporate universities around the world and is designed to share best practices and experiences among leading professionals in corporate education
Appendix 2. Accreditations and certifications in corporate learning

Accreditation (from Latin accredo, to trust) is a procedure for formal recognition by an independent entity of a set of necessary competences (p. 47) and knowledge of an organization or an expert for performing some specific tasks.

Most widespread in the provision of professional services (in particular, in education) the quality of which the consumer usually does not have sufficient competences to assess.

Certification (from Latin certifico, I certify) is the confirmation of the conformity of the quality characteristics of a product/service to a standard specified by an authorized provider of this standard. Certification confirms that the organization or its individual products have reached a certain level of compliance with the standard in a given area. Certification is usually, but not always, performed through external evaluation, assessment, or audit.

Classification of accreditations

State accreditation of an educational organization is the procedure for granting an educational organization the right to conduct educational activities related to higher education and/or additional qualifications in accordance with the conditions of higher education standards and state requirements for personnel and scientific, methodological, and logistic support.

State accreditation is carried out in Russia by the Federal Service for Supervision in Education and Science or by the executive authorities of the subjects of the Russian Federation in accordance with the procedure established by the Law of the Russian Federation "On Education" and the Regulation on State Accreditation of Educational Activities.

State accreditation allows corporate universities to issue documents to students confirming advanced qualifications as well as to apply for certain forms of tax relief.

In the case of public accreditation, standards are developed by independent organizations, which creates a difference between state and public accreditations. In the field of corporate learning, the most commonly known are such professional associations as the European Foundation for Management Development (EFMD) and Global CCU (the Global Council of Corporate Universities). Unlike universities, where public accreditation is primarily a symbol of recognition, in corporate learning accreditation services are more of a consultative nature since the main value of such accreditations is the exchange of experience and the determination of subsequent areas for the development of the corporate university.

Educational institutions in general can be the objects of accreditation/certification, for example, institutional accreditations, while individual programs and even courses may be the objects of program accreditations.

Program accreditations, as well as the certification of individual courses, focus on their requirements for the content of the program/course, the quality of the services provided to the learners, the quality of teaching and educational materials, and, if applicable, the graduates' careers. Undergoing all stages of accreditation/certification usually takes from six months to one year.

Institutional accreditations are intended to assess the quality not only of the implementation of the full range of programs, but also the management processes at the university level in general. Such managerial processes usually include strategic planning and the management of the financial resources of the organization, the management of faculty, scientific research, etc. Thus, it is much more difficult to obtain institutional accreditation, but it is more valuable than having a set of program accreditations. In most cases, undergoing institutional accreditation takes about one to two years.
Appendix 2. Accreditation and certification in corporate learning

The accreditation process

Regardless of the specific features of each accreditation system, it is possible to distinguish the general stages of such a process:

- The entry of the educational organization into the accrediting organization/association
- Application and preliminary assessment of the school’s readiness for the accreditation process (eligibility stage)
- Preparation of a self-examination report
- Visit of the expert commission and preparation of a report with an opinion concerning the degree of compliance with accreditation standards
- Decision making, recommendations, and awarding accreditation for a certain period (usually up to five years)
- Preparation of interim reports by the school concerning the implementation of the commission’s recommendations
- Reaccreditation (cl. 3–6)

An example. CLIP Accreditation

(Corporate Learning Improvement Process

The CLIP accreditation system has been operating since 2003 for corporate members of the EFMD (The European Foundation for Management Development). The CLIP Accreditation Committee include leading international experts on corporate training, including HR directors and learning directors of the largest global companies and leaders of Executive Education programs of the world’s leading business schools. The expert opinion of the Peer Review Team, consisting of executives of already accredited corporate members, is the basis for the final decision of the CLIP Accreditation Committee.

Essentially, the CLIP system is a mechanism for benchmarking, collaborative learning, and the exchange of best practices. CLIP accreditation also helps position a corporate university as a strategic partner of the company’s business units.

CLIP standards & criteria

Chapter 1: Strategic Positioning

Standard 1. Mission
The Corporate Learning Organization’s mission should be clearly stated and understood throughout the company. It should be formulated at the level of top management and regularly reviewed to ensure its continual relevance. It should be explicitly aligned with the mission of the company.

Standard 2. Clarity of Strategy
In pursuit of its mission and the objectives assigned to it, the Corporate Learning Organization should have a well-defined strategy that is understood by all stakeholders.

Standard 3. Alignment with the Company’s Strategic Objectives
The interface between the Corporate Learning Organization and the company as a whole should be effectively managed to ensure continuous alignment with the company’s strategic objectives

Standard 4. Governance
The Corporate Learning Organization should have an appropriate system of governance to ensure effective supervision, control, and strategic decision making. The system of governance should ensure adequate linkage to the company’s central decision-making structures and should allow an interface with key stakeholders in the company.
**Standard 5. Quality of Management**
The Corporate Learning Organization should have adequate managerial processes for effective decision making and operational control.

**Standard 6. Positioning of the Corporate Learning Organization**
The Corporate Learning Organization should be clearly positioned within the company or organization of which it is a part. It should be perceived as credible and legitimate within the company or organization.

**Standard 7. Design and Operating Model of the Corporate Learning Organization**
The Learning Organization’s internal structure (departments, subunits, schools, academies, ...) and the operating model (processes, business model, ...) should be appropriate to this positioning and to the strategic objectives being pursued.

**Standard 8. Brand Image of the Corporate Learning Organization**
The Corporate Learning Organization should project a distinctive and broadly recognized image within the company. The image should convey standard-setting quality and an innovative, forward-looking spirit that underpins the Learning Organization’s legitimacy throughout the company.

**Standard 9. Linkage of Learning and Development to HR Processes**
The Corporate Learning Organization’s L&D provision should be effectively aligned with mainstream HR-processes such as management development, performance management, succession planning, etc.

**Standard 10. Linkage to Talent Management Processes**
The Corporate Learning Organization’s L&D provision should be effectively aligned with the company’s talent management processes.

**Standard 11. Adequacy of Resources**
The human and financial resources available to the Corporate Learning Organization should be adequate to enable it to fulfill its mission and achieve its strategic objectives.

**Chapter 2: Target Markets, Marketing, and Participant Management**

**Standard 12. Clear Definition of the Corporate Learning Organization’s Target Markets**
The Corporate Learning Organization should be able to define the target markets that fall within the scope of its competence. These should be well segmented, and the learning objectives for each group, clearly differentiated.

**Standard 13. Understanding of the Market**
All those involved in the organization and delivery of the learning provision should have an understanding of the Corporate Learning Organization’s internal and external markets.

**Standard 14. Quality of the Customer Relationship Management**
The Corporate Learning Organization should have processes in place to ensure high-quality management of the relationship with its clients within the company (corporate functions, divisions, business units, geographical regions).

**Standard 15. Participant Selection**
The Corporate Learning Organization should have effective processes for the definition of the target groups for which programs are being designed and for the selection of the participants within those programs.

**Standard 16. Participant Relationship Management**
The Corporate Learning Organization should have staff and processes to ensure that participants are provided with attentive support services before, during, and after each program.

**Standard 17. Marketing**
The Corporate Learning Organization should be properly equipped to market its products and services within the company and, where appropriate, outside the company.
Chapter 3: External Suppliers

Standard 18. Criteria for Decisions to Outsource
The Corporate Learning Organization should have clear criteria on which to base decisions to outsource. It should maintain an appropriate balance between outsourcing and in-house provision.

Standard 19. Criteria and Processes for Selecting Suppliers
The Corporate Learning Organization should have well-defined criteria and processes for selecting suppliers when it outsources its offerings.

Standard 20. Management of Supplier Relationships
The Corporate Learning Organization should have processes in place to ensure high-quality management of supplier relationships.

Chapter 4: Human Resources: The Corporate Learning Team

Standard 21. Quality of the Corporate Learning Organization’s Core Staff
The Corporate Learning Organization should operate with high-quality staff of L&D professionals with the diverse skills required to run its portfolio of activities.

Standard 22. Interface with the Business
The Corporate Learning Organization should have well-structured processes in place to manage its interface with the various parts of the business. This may take the form of a Learning Business Partner system that allows it to support its clients directly in the identification of L&D needs and in the proposal of viable solutions.

Standard 23. Ability to Mobilize High-Quality Resources outside the Corporate Learning Organization Itself
The Corporate Learning Organization should be able to mobilize a wide variety of resources from across the company to support its activities: members of the company’s senior management team, line managers from the business units, managers, and functional experts to act as facilitators.

Chapter 5: Programs, Services, and Activities

Standard 24. The Portfolio of Programs, Services, and Activities
The Corporate Learning Organization should offer a well-balanced portfolio of programs, services, and activities that is coherent with its strategic mandate and relevant to the needs of its target markets.

Standard 25. The Program Design Process
The Corporate Learning Organization should have effective program design processes in place. Program design should be based on careful needs analysis and fully aligned with the company’s strategic priorities. The Learning Organization should have the capacity to renovate program content on a continuous basis, to react quickly to new requests for strategic learning, and to innovate in its provision of such.

Standard 26. Program Delivery
The Corporate Learning Organization should have the resources and the pedagogical know-how to deliver high-quality training and learning. It should be able to combine a variety of delivery modes, including face-to-face training, action learning, tutoring and coaching, distance learning, e-learning, etc. It should be able to orchestrate both formal and informal learning.

Standard 27 Learning Outside the Classroom
The Corporate Learning Organization should be able to offer a wide variety of learning opportunities that do not require physical attendance in programs. These will range from highly-structured online offerings to the orchestration of informal on-the-job learning.

The Corporate Learning Organization should have effective systems for the management of its programs with appropriate processes for monitoring, evaluation, and review. It should have systems in place for the measurement of the effectiveness of its activity.
Standard 29. Measurement of Impact
The Corporate Learning Organization should have effective instruments and processes to measure the longer-term impact of its offerings within the company.

Chapter 6: Innovation and Development

Standard 30. Capacity for Innovation
The Corporate Learning Organization should be a force of innovation and creativity within the company, irrigating it with new ideas and playing a lead role in corporate learning.

Standard 31. Capacity to Engage in Creative Partnerships with External Organizations
The Corporate Learning Organization should be capable of maintaining constructive and mutually beneficial relations with external institutions such as consulting companies, research institutes, business schools, and universities as part of its function to keep the company up-to-date in its thinking.

Chapter 7: Physical Resources and Administration

Standard 32. Quality of the Learning Environment
The Corporate Learning Organization should possess or have access to adequate physical facilities and equipment to provide a high-quality learning environment.

Standard 33. Efficient Administrative Processes
The Corporate Learning Organization should have adequate administrative staff and processes to ensure efficient logistical support for its programs and to provide a high level of service to its customers.

Standard 34. Efficient Financial Management Systems
The Corporate Learning Organization should have an efficient budgeting and control system. It should have a transparent reporting system.

Chapter 8: Global Outreach

Standard 35. Ability to Support the Company’s International Strategy
The Corporate Learning Organization should be structured and staffed to support the company’s globalization agenda.
20 corporate learning functions/corporate universities are currently participating in the accreditation scheme, including only one in Russia—Sberbank Corporate University:

- Akademie Deutsche Genossenschaften ADG
- ArcelorMittal
- BBVA—Banco Bilbao Vizcaya Argentaria
- Capgemini University
- EDF Group
- EDP—Energias de Portugal
- ENGIE University
- Gas Natural Fenosa
- Grupo Santander
- Mazaris
- MLP Finanzdienstleistungen AG
- OCP S.A.
- Pertamina Corporate University
- PSA Peugeot Citroën
- Repsol
- Sberbank Corporate University
- Siemens AG
- Swiss Reinsurance Company Ltd.
- Telkom Corporate University
- UniCredit Group
The EOCCS system was launched in 2016 and is aimed at developing online education and implementing quality standards that guarantee the international comparability of online courses and programs and the practical applicability of knowledge and skills as well as training methods and the availability of a continuous quality improvement system. According to the standards of the European Foundation for Management Development (EFMD), both individual online courses and online programs of universities (including those implemented in a blended format), corporate universities, and other educational organizations may be certified.

EOCCS standards & criteria

Standard 1. The Institutional Context

The Institution should have a defined and coherent strategy for online courses that relates to its overall learning strategy. The strategy should reflect the Institution’s market positioning, resources, and any given constraints. The online course must be sustainable regarding the qualifications and experience of the teachers and the technical infrastructure of the Institution. There should also be an IT-strategy that describes the technology currently used and its sustainability for at least the duration of the certification sought.

The Assessment Criteria
  • The Institution in its environment
  • Strategic planning
  • Resources and facilities
  • Course team

Standard 2. Course Composition

The content of the course is meaningful, of high intellectual quality, and up-to-date. To develop participants for an international management career, the course should develop a contemporary perspective. The Intended Learning Outcomes (ILOs) must be aligned with the content of the course, the delivery, and assessment methods. The course should be designed inclusively and be accessible to all participants. The choice of technology is based on their appropriateness for the learning design (not vice versa) and takes into account both learners and teachers.

The Assessment Criteria
  • Target groups
  • Design for learning
  • Design of course layout
  • Design of course content
  • Design of course delivery
  • Applied technology
  • Qualification

Standard 3. Course Delivery & Operations

Course participants must be provided with comprehensive and sound information about the course objectives, assignments, and assessment methods. Any required prerequisite knowledge must be clearly stated. Participants must be advised where to find academic and technical support at all times. Their performance is monitored and conveyed to them regularly. Feedback on both the participants’ assignments and their questions is constructive and provided swiftly. The Institution is responsive to any complaints concerning the course in a timely manner.
The Assessment Criteria

- Course participants
- Course presentation
- Interaction with partners from the corporate world (where applicable)

Standard 4. Quality Assurance Processes

The Institution uses sound and effective assessment methods and can demonstrate reliably how the course's ILOs are achieved. The quality of the assessed participants' work must reflect the ILOs. Participants should be given the possibility to evaluate the course and its teachers. It is expected that the Institution's major stakeholders (such as persons responsible at the management level) and in particular the course participants be involved in the quality assurance process.

The Assessment Criteria

- Institutional system
- Course review
- Assessment of participants
- Monitoring of teaching
- Monitoring of learning

Main stages of EOCCS certification

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- Application
- Statistical report
- Report on self-assessment of the course
- Assessment by the expert commission
Stage 1: Enquiry
This is the first direct contact between the Institution and EOCCS. Typically, it takes place through participation in EFMD events and a meeting with the Quality Services Team. Documents on the EOCCS certification process are available on the EFMD Global Network website (http://www.efmdglobal.org/EOCCS), and after discussing the expectations with the EOCCS team, the organization can proceed to the next stage—the application process.

Stage 2: Submission of the application
The institution sends an application form to the EFMD (EOCCS Application Form; the total length should not exceed 15 pages) for each applicant course or suite of courses. After receiving the documents, an EOCCS expert commission is formed, which evaluates the application and invoices for the certification.

Stage 3: Review
The Review takes place online using the Zoom platform, normally within 5 weeks. Within the next three weeks, the Chairman of the Review Panel drafts the Review Panel Report (RPR) and sends it to the other reviewers for suggestions and amendments before fact-checking. The organization coordinates the final version of the report before sending it for consideration at the next meeting of the EOCCS Certification Council.

Stage 4: 3-year certification
The EOCCS Certification Council reviews the report as well as the recommendations of the expert commission and decides whether to award the certification. The Council’s decision is communicated by telephone or e-mail to the Institution within 48 hours. The Institution will also receive a letter from the Chair of the EOCCS Certification Council formally communicating the decision. In the case of a positive decision and after the expiry of three years, the organization may submit a new application for renewal of the certification.

35 courses in 10 international higher education institutions and Sberbank Corporate University have been certified (as of the end of 2017)

- ABMS Open University Switzerland, Switzerland
- BI Norwegian Business School, Norway
- Grenoble Ecole de Management, France
- HEC Paris, France
- Henley Business School, UK
- Hult International Business School, UK
- IE Business School, Spain
- OBS Business School, Spain
- The Open University Business School, UK
- The University of Liverpool Management School, UK
- Sberbank Corporate University (the only one in Russia, and the only one in the corporate sector worldwide):
  - "Risk-management" (I, II),
  - "Finance for Managers" (I)
Appendix 3. Professional magazines in corporate learning

**CLO (Chief Learning Officer) Magazine**
Publisher: Cliff Capone  
Editor in Chief: Mike Prokopeak  
First published in: 2002  
Publication frequency: 12 times a year  
Publishing formats: print and electronic  
Website: www.clomedia.com

*CLO (Chief Learning Officer) Magazine* is one of the leading resources in corporate learning and employee development. CLO Magazine is an up-to-date guide for specialists in the areas of organizational development, learning, and staff efficiency improvement. In the publications, the main focus is on positive achievements and the importance of proper training of personnel within the organization.

Target audience: managers responsible for training in the company, specialists in the fields of HR and L&D.

Key areas covered by the magazine:
- Developing leadership skills
- Strategic development
- Organization efficiency management
- The learning process
- Talent Management
- Measurement of learning results
- Technologies

**Global Focus Magazine**
Publisher: European Foundation for the Development of Management (EFMD)  
Responsible editor: Matthew Wood  
First published in: 2007  
Publication frequency: 3 times a year  
Publishing formats: print and electronic  
Website: www.globalfocusmagazine.com

Global Focus is a professional business magazine of the European Foundation for the Development of Management (EFMD) created to improve the interaction of EFMD with its members. This magazine was conceived as more than just a communication tool. It is a platform for discussing key trends in management education, including in a corporate format, as well as for formulating and consolidating new ideas and exchanging views on managers' learning based on the international experience and values of EFMD. Global Focus magazine articles are available in English, Chinese, and Spanish.

Target audience: heads and experts of leading business schools and EFMD member companies worldwide, professionals in the fields of HR and L&D. They are the authors of the articles in this magazine as well.

Key areas covered by the magazine:
- Analysis of global trends in management
- Analysis of trends in management education, including corporate learning of managers
- Evolution of management models for business schools and corporate universities
- Technologies and methods for management education, including in a corporate format
- Knowledge management
- Analysis of trends in the development of labor markets and the formation of a new work world
- Assessment of corporate learning effectiveness
- Issues related to the introduction of modern methods for manager training
- Educational quality management systems in business schools and corporate universities; experience of institutional and program accreditations based on EFMD quality standards
- Experience of joint educational projects of business schools and corporations
- Experience in the formation of a modern educational environment in learning centers for managers
The monthly TD Magazine highlights new trends and best practices in the fields of professional development and personnel education. The objectives of the magazine are as follows:

- Providing practical information on best practices and trends in corporate learning
- Conducting case studies
- Description of new technologies in the industry and their practical application in organizations

Target audience: qualified professionals working in various areas of personnel development—staff education, talent management, coaching, efficiency improvement, leadership development, organizational change, informal and social learning, etc. The magazine is available to all members of the ATD as well as through a special subscription.

Key areas covered by the magazine:

- Career development
- Higher Education
- Human capital
- Learning and development (L&D)
- Technologies in education
- Learning science
- Management and leadership

The key goal of Corporate Universities magazine is to help companies organize the training and development of employees effectively. The magazine team’s idea is that learning and development are not an expense item but an investment that yields an economically measurable result. The magazine is an active participant in many professional conferences dedicated to corporate learning.

Target audience: professionals in the fields of HR and T&D from corporations, business schools, training and consulting companies. The magazine contains expert articles by HR and T&D specialists with case studies and methodological advice, authoritative opinions of practitioners and theorists of learning, and analytical materials on a whole range of topics important for the successful work of a personnel training department, a learning center, or a corporate university.

Each issue of the magazine is devoted to a specific topic. Examples of such thematic issues of the magazine for 2015–2016:

- Training of employees during the adaptation period
- The candidate pool
- Electronic corporate university
- HR brand and learning center
- Psychological aspects of learning and development
- Standards and certification
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