Appendix
Key Terms in the Book

1. A **system** is a combination of more than two interacting and interconnected elements which function as an organic or integrated or coordinated whole.
2. A **learning management system** (LMS) is a Web-based collection of software programs designed to support the management and delivery of learning resources and courses to students. An LMS has tools for registering students, delivering resources (text, audio, and video), tracking user logins, supporting online chatting, calculating grades, administering assessments, and uploading and storing user submissions.
3. A **serious game** or applied game is a game designed for a primary purpose other than pure entertainment. The "serious" adjective is generally prepended to refer to video games used by industries such as defense, education, scientific exploration, health care, emergency management, city planning, engineering, and politics.
4. According to **cognitivism**, learning is not a stimulus-response sequence, but the formation of cognitive structures. The learners do not simply receive stimuli mechanically and react passively, but, rather, learners process stimuli and determine appropriate responses.
5. **Adaptability** for educational technology mainly deals with the diversity of students and their learning preferences.
6. **Adaptive learning** is a computer-based and/or online educational system that modifies the presentation of material in response to student performance. Best-of-breed systems capture fine-grained data and use learning analytics to enable human tailoring of responses. The associated learning management systems (LMS) provide comprehensive administration, documentation, tracking and reporting progress, and user management.
7. **ADDIE**: The ADDIE model is a framework that lists generic processes that instructional designers and training developers use. It represents a descriptive guideline for building effective training and performance support tools in five phases: analysis, design, develop, implement, and evaluate.

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8. An **education system** is a man-made system and can be considered as a subsystem of the society in which it exists. One might think of an education system as taking inputs from the society (e.g., students) and providing outputs to society (e.g., graduates). Moreover, an education system could be conceptualized as a collection of subsystems, such as a school system, a curricular system, a grading system, and so on.
9. An **ICAI** system is a computer program that uses artificial intelligence techniques for representing knowledge and performing an interaction with a student to stimulate and control his learning in a given field. In an intelligent instructional system, the student is actively engaged with the educational environment, and his interests and misunderstandings drive the tutorial dialogue.
10. An **instructional system** is a subsystem within an education system, although one can describe elements and interactions relevant to an instructional system (e.g., resources, assessments, instructors, students, scaffolding, etc.). One can also consider a curriculum as a system within the larger instructional system. In short, one can elaborate on an education system in terms of subsystems.
11. An **intelligent tutoring system** is computer software designed to simulate a human tutor's behavior and guidance. It can assist students in studying a variety of subjects by posing questions, parsing responses, and offering customized instruction and feedback.
12. **ARCS model** is a problem-solving approach to designing the motivational aspects of learning environments to stimulate and sustain students' motivation to learn.
13. **Augmented reality** (AR) involves the addition of a computer-assisted contextual layer of information overlaid on a real-world context or situation, creating an enhanced or augmented reality.
14. **Behaviorism** is a perspective that focuses almost exclusively on directly observable things to explain learning. The major idea of behaviorism is that learning is the stimulus-response sequence.
15. **Bloom's Taxonomy** refers to six levels, sub-domains within the cognitive domain, which are knowledge, comprehension, application, analysis, synthesis, and evaluation. The six levels are classified hierarchically from the simplest action to the high-order thinking actions.
16. **CAI** is the method of instruction in which there is a purposeful interaction between a learner and the computer device (having useful instructional material as software) for helping the individual learner achieve the desired instructional objectives with his own pace and abilities at his command.
17. **Centrality** describes the numbers of ties an actor has. The more ties an actor has, the higher centrality the actor is. When the network has direction, there are two indicators to explain centrality: in-degree and out-degree.
18. **CIPP evaluation model**: evaluation can be adapted in four aspects: context evaluation, input evaluation, process evaluation, and product evaluation.
19. **Cloud computing** refers to expandable, on-demand services, and tools that serve users via the Internet from a specialized data center and that are not installed on users' devices.

20. **Cognitive load theory**: the theory that short-term memory limitations are a primary consideration in designing effective instruction, while intrinsic cognitive load is inherent in a learning task and cannot be manipulated, extrinsic cognitive load due to unnecessary distracters ought to be minimized.
21. **Collaborative learning** is a situation in which two or more people learn or attempt to learn something together. Unlike individual learning, people engaged in collaborative learning capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.).
22. **Comfortability** with educational technology relates to providing or experiencing educational technology's physical well-being.
23. **Competitor analysis**: Its main purpose is to provide references on functionality, usability, key technologies for product design, to help designers to explore the core demands of the target users, and learn how the competitive products meet the requirements of the target users.
24. **Connectivism** is a hypothesis of learning which emphasizes the role of social and cultural contexts. It is the integration of principles explored by chaos, network, and complexity and self-organization theories. The central aspect of connectivism is the metaphor of a network with nodes and connections.
25. **Constructivism** holds that learning is the process of constructing internal psychological representation in the process of interaction with the environment. Helping learners involves helping them to understand nature, regularity, and the inner connections among things.
26. **Content analysis** is the method to analyze the procedures with text. The text usually includes chats, discussion boards, and log file data. The content analysis method includes three steps: (1) adopting a coding scheme, (2) coding the text, (3) analyzing the results.
27. **Cooperative learning**, sometimes called small-group learning, is an instructional strategy in which small groups of students work together on a common task. The task can be as simple as solving a multi-step math problem together, or as complex as developing a design for a new kind of school. In some cases, each group member is individually accountable for part of the task; in other cases, group members work together without formal role assignments.
28. **Density** describes the connection degree of a network. It refers to the number of ties an actor has, divided by the total possible ties an actor could have.
29. **Design methodology** is a robust methodology for innovation that has emerged, which integrates human, business, and technological factors in problem-forming, solving, and design.
30. **Design-based research** is a systemic approach to the planning and implementing of innovations that emphasizes an iterative approach to design with ongoing involvement of and collaboration with practitioners.
31. **Desirability** in an educational technology refers to the attractiveness and engagement of the activities in educational technology or the pleasing perception from teachers and students.

32. **Educational project** is a planned effort to bring about desired educational outcomes, which has a budget, resources, a definite beginning, a duration, and reasonably well-defined goals and objectives.
33. **Educational technology** is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources.
34. **Function list** is the integration of functions that is designed to satisfy certain demands, which also includes the correlation, level of importance, and remarks of the functions.
35. **Gagné's types of learning**: (a) verbal information (e.g., facts), (b) intellectual skills (e.g., using rules to solve a problem), (c) cognitive strategies (e.g., selecting a process to address a problem situation), (d) motor skills (e.g., riding a bicycle), and (e) attitudes (e.g., dislike of mathematics).
36. **Humanism** focuses on human's overall development, emphasizes human dignity and value, and pays attention to the health and integrity of people.
37. **Inquiry-based learning** approach is a method with which students learn knowledge driven by specific questions or a complex problem. The teacher scaffolds and helps students as they make contributions, identify questions, and gather relevant data from the Web. The setting of the problem is crucial during this process.
38. **Interactive whiteboard** (IWB) is a large interactive display in the form factor of a whiteboard. It can either be a standalone touchscreen computer used independently to perform tasks and operations or a connectable apparatus used as a touchpad to control computers from a projector. They are used in a variety of settings, including classrooms at all levels of education, in corporate boardrooms and work groups, in training rooms for professional sports coaching, in broadcasting studios, and others.
39. **Knowledge gain/*building***: the production and continual improvement of ideas of value to a community that involves individuals and groups coming to a deeper understanding through interactive querying, discussing, and continuing improvement of ideas.
40. **Learner-centered design (LCD)** emphasizes the importance of supporting the learners' growth and motivational needs in designing software.
41. **Learning analytics** involve data-driven approaches that use large data sets and dynamic information about learners and learning environments for real-time modeling, prediction, and optimization of learning processes, learning environments, and educational decision making.
42. **Learning experiences** represent the user experience from a learner's specific perspective in the interaction with an educational product or learning environment
43. **Learning** is defined a persisting change in human performance or performance potential. The changes could include one's abilities, attitudes, beliefs, knowledge, and skills.

44. **Learning objectives**are sets of knowledge, skill, or behavior that learners are expected to know, understand, and/or perform as a result of learning. Learning objectives can be measured to determine the knowledge (cognitive) or skills and behaviors (affective) that learners have gained over time.
45. **Learning spaces** are designed to support, facilitate, stimulate, or enhance learning and teaching. Learning spaces encompass formal, informal, and virtual environments.
46. **Learning type** refers to the kind of knowledge and skills learners have to acquire.
47. **Logic model**: This is a visual representation of the theory of change for a particular effort that depicts (a) key aspects of the current situation, (b) activities associated with the effort (inputs), (c) the anticipated results of those activities (outputs), and (d) short-, medium-, and long-term outcomes of the effort.
48. **Makerspaces** are open community laboratories where people of similar interests come together to make all kinds of objects or things. Makerspaces typically have various kinds of fabrication technologies along with 3D printers. Students of all ages have made and shared various kinds of designs.
49. **Mayer's principles of multimedia learning**: The cognitive theory of multimedia learning centers on the idea that learners attempt to build meaningful connections between words and pictures, which they learn more deeply than they could have with words or pictures alone. It contains twelve multimedia learning or instructional principles which were developed from nearly 100 studies over the past two decades.
50. **Original requirements analysis** refers to the unprocessed requirements or demands proposed by the originator at the launching stage of the project.
51. **Primary users** are those persons who actually use the artifact.
52. **Problem analysis:** a structured investigation of the negative aspects of a situation in order to establish the causes and their effects.
53. **Project** is a series of activities or a structure aimed at bringing about clearly specified objectives within a set time and a given budget.
54. **Scenario analysis** is a process of analyzing possible future events by considering alternative possible outcomes (sometimes called "alternative worlds")
55. **Secondary users** are those who will occasionally use the artifact or those who use it through an intermediary.
56. **S*ocial learning***: a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks.
57. **Social *network:*** a social structure made of individuals (or organizations) called "nodes," which are tied (connected) by one or more specific types of interdependency.
58. **Sociogram** is the visualization to show the situation of the whole or the part of the social network. In the sociogram, the node represents the actor, the line represents the relationship between actors, and the arrow direction represents the information flow.

59. **Stakeholder** is a person such as an employee, customer, or citizen who is involved with an organization, society, etc. and therefore has responsibilities towards it and an interest in its success.
60. **Target user** is the intended audience or readership of publication, advertisement, or other messages.
61. **Technology**: According to Rogers, E.M. (1995), technology is " a design for instrumental action that reduces the uncertainty in the cause effect relationships involved in achieving a desired outcome." A technology usually has two components: (1) a hardware aspect, consisting the tool that embodies the technology as a material or physical object, and (2) a software aspect, consisting the information base for the tool.
62. **Technology-enhanced inquiry learning** refers to the use of educational technologies to support student learning in inquiry settings. This entry provides (a) a definition of inquiry learning, (b) a discussion of educational technologies that can support information access and cognition in inquiry learning, and (c) a discussion of implications of technology-enhanced inquiry learning for education.
63. **Tertiary users** are persons who will be affected by the use of the artifact or make decisions about its purchase.
64. The **value** of learner experience refers to the positive or negative quality that renders the changes of the classroom, such as classroom furnishings and layout changes, the use of equipment, desirable or valuable for the learners.
65. **Usability** refers to the ease of use and learnability of educational technology, which is composed of learnability, efficiency, memorability, satisfaction.
66. **User experience (UX)** refers to a person's perceptions and responses that result from the use or anticipated use of a product, system or service.
67. **User-centered design (UCD)** is a broad term to describe design processes in which end-users influence how a design takes shape.