

INSTRUCTIONAL DESIGN IN EDUCATION

Andreea Elena Trif-Boia

Assist. Prof. PhD, Babeş-Bolyai University, Romania, boia_andreea@yahoo.com

Abstract

Originating in the period of the Second World War, Instructional Design has gained importance in several fields of activity, from education, health, the government or military sector, to industry, business and non-profit organizations. The interest it aroused was mainly due to the effectiveness of its theory and application models, its purpose being the improvement of learning, the support of the acquisition of knowledge and the formation of skills.

The present study is dedicated to Instructional Design and its role in education. The first section provides a brief overview of the evolution of this field from the period of the Second World War to the beginning of the 21st century. We also have here a review of the definitions of Instructional Design identified in the specialized literature. The second section is reserved for Instructional Design models that support teachers in design activities, the Gagné model, developed in the 1970s, and the ASSURE model, developed in the 1990s.

Keywords: Education, Instructional Design, Teaching, Gagné's 9 events of instruction, ASSURE.

INTRODUCTION

Improving the quality of education is one of the demands of contemporary society to which Instructional Design can fully contribute. By proposing solutions for effective learning design, by adapting training to the characteristics and needs of the target group members, Instructional Design promotes quality learning which is achieved through the active involvement of learners in the learning process, by clearly establishing objectives, by adapting the curriculum, methods and didactic materials to the specifics of the class/group of learners and by carefully monitoring the training results.

The present study analyses the importance of Instructional Design in education and details two of the Instructional Design models that can be successfully used by teachers in design activities, the Gagné model or the 9 events of instruction, useful in the development of didactic projects, and the ASSURE model, intended for teachers who want to integrate technology into their teaching activities.

1 INSTRUCTIONAL DESIGN: BRIEF HISTORY AND DEFINITIONS

Instructional design was born in the 40s of the 20th century, during the Second World War. The conflagration brought about a number of training needs too, which is why specialists in psychology and educational sciences, such as Robert Gagné, Leslie Briggs, John Flanagan and many others, made efforts to improve the training of military personnel (R. A. Reiser, 2001, p. 58). After the war, some of them continued to research educational problems, so that in the late 40s and during the 50s of the 20th century, researchers began to perceive education as a system and developed a series of innovative procedures of analysis, design and evaluation (R. A. Reiser, 2001, p. 58). At the time, the new field gained its reliability through contributions of such specialists as B. F. Skinner, "The Science of Learning and the Art of Teaching" (1954), B. Bloom, "The Taxonomy of Educational Objectives: The Classification of Educational Goals" (1956) or D. Kirkpatrick, "Techniques for Evaluation Training Programs" (1959). In the following decade, instructional design methodology took shape through research published by Robert Mager, "Preparing Instructional

Objectives" (1962) and Robert Gagné, "The Conditions of Learning" (1965). Gagné, for example, presents 5 types of learning outcomes - verbal information, intellectual skills, cognitive strategy, attitudes, motor skills - and describes 9 learning events that he considers essential for achieving the desired results. He was, moreover, one of the educational psychologists who worked with the American Air Corps during the Second World War, an experience that led him to continue his investigations in the field.

In the period that followed, a series of instructional design models were developed, such that until the end of the 1970s more than 40 could be identified (R. A. Reiser, 2001, p. 61). In the same period, interest in Instructional Design expanded so as to include the military, academic, business, and industrial sectors (R. A. Reiser, 2001, p. 62).

A decade later, in the 1980s, one of the observable factors in education was an increase in interest in the application of cognitive psychology principles in Instructional Design activities (R. A. Reiser, 2001, p. 62), simultaneously with the expansion of the use of microcomputers for educational purposes (R. A. Reiser, 2001, p. 62). Regarding the use of technology in education, for example, in January 1983, the Center for Social Organization of Schools reported that in the United States more than 40% of elementary schools used microcomputers, while in secondary schools the percentage reached 75% (Yunjo An, 2021, p. 5). Later, in the 1990s, instructional design was pervaded by constructivist principles, and after the year 2000 one could perceive an increase of interest in distance learning programs and the use of learning technology. In the fall of 2008, in USA higher education more than a quarter of students, approximately 4.6 million, were attending at least one online class (Yunjo An, 2021, p. 9), whereas in the spring of 2020, with the pandemic on the background, their number staggeringly increased.

Before presenting some definitions of Instructional Design, we will try to analyze the 2 concepts that form it. According to the dictionary (DEX, 2009), the noun "design" refers to the "outer appearance", to "the way a thing is presented (from an aesthetic point of view)". The term also has the meaning of a drawing or set of drawings that tell us how a building or a product is to be made, how it will look and how it will work (Cambridge Dictionary). The instructional adjective, on the other hand, refers to instruction (Great Dictionary of Neologisms, 2000), respectively the set of "knowledge, skills and abilities, taught to someone or acquired by someone, through which the acquisition of a general culture and a professional specialization is aimed at" (DEX, 1998). We can say, therefore, that Instructional Design is the field interested in the design of training activities, in establishing the stages, the steps that will be taken to achieve them, its purpose being to improve the teaching-learning activities, to better adapt them as much as possible to the characteristics and needs of the target group.

Several definitions of this concept have been imposed in the specialized literature. Robert Gagné and Leslie Briggs (1977) considered Instructional Design as "rigorously planned instruction" (I. Jinga, I. Negreț-Dobridor, 2004, p. 235) and suggested that this approach must meet several characteristics: first, the training planning to be carried out for each individual; then, the Instructional Design should include both immediate and long-term phases; finally, the training design should be grounded on the knowledge of human learning experience (C. Cucuș, *Pedagogie, Polirom*, 2014, p. 312). Gilbert de Landsheere (1979) showed that Instructional Design involves defining learning objectives at one or more levels, proposing activity topics that favor learning in the desired sense, offering the possibility to choose the methods and means of teaching and learning, establishing the tools for the control of teaching and learning, determining the necessary prerequisites for effective learning activities (C. Cucuș, *Pedagogie, Polirom*, 2014, p. 312; I. Jinga, I. Negreț-Dobridor, 2004, p. 235). On the other hand, David Merrill, Leston Drake, Mark J. Lacy, and Jean Pratt asserted that Instructional Design is a technology that incorporates known and proven learning strategies into instructional experiences "that make knowledge acquisition and skill formation more effective, more active and attractive" (D. Merrill, L. Drake, M. Lacy, J. Pratt, 1996, p. 6). At their turn, Patricia Smith and Tillman Ragan defined Instructional Design as "The systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation" (P. L. Smith, T. J. Ragan, 2005, p. 4), while Robert Reiser and John Dempsey referred to the "systematic process that is employed to develop education and training programs in a consistent and reliable fashion" (R. Reiser, J. Dempsey, 2018, p. 28). Reiser and Dempsey highlighted seven characteristics of Instructional Design: 1. Instructional Design is learner-centered, with students and their performance being the focus of instructional activities; 2. Instructional design is a goal-oriented process; 3. Instructional design is a creative process; 4. Instructional design is focused on performance; 5. Instructional design implies measurable, safe and valid results; 6. Instructional design is empirical, iterative and self-correcting; 7. Instructional design is a team effort, and its success relies on the instructional designer's ability to collaborate with the other participants (R. Reiser, J. Dempsey, 2018, pp. 26-28).

2 INSTRUCTIONAL DESIGN MODELS FOR EDUCATION

Research aimed at improving learning design activities has led to the development of instructional design models. These are tools that allow designers to visualize the training needs of learners and describe in detail the stages of supporting materials' creation, comprising true guides for trainers and educators. Referring to their role, Kent L. Gustafson and Robert Maribe Branch, in "Survey of Instructional Development Models", argued that Instructional Design models "help us conceptualize representations of reality". A model, they continued, "is a simple representation of more complex forms, processes and functions of physical phenomena or ideas. Models, of necessity, simplify reality because often reality is too complex to portray. Since much of that complexity is unique to specific situations, models help by identifying what is generic and applicable across multiple contexts" (K. L. Gustafson and R. M. Branch, 2002, p. 1). On the other hand, while speaking about the purpose of models of systematic ID, Dee Andrews, psychologist, and Ludwika A. Goodson, instructional designer, found that these serve four purposes: „1. Improving learning and instruction by means of the problem-solving and feedback characteristics of the systematic approach. 2. Improving management of instructional design and development by means of the monitoring and control functions of the systematic approach. 3. Improving evaluation processes by means of designated components and sequence of events, including the feedback and revision events, inherent in models of systematic instructional design. 4. Testing or building learning of instructional theory by means of theory-based design within a model of systematic instructional design" (Dee Andrews, Ludwika A. Goodson, 1980, p. 164.).

Taking into account the variety of fields of Instructional Design application activities, a taxonomy of design models has also been elaborated in the specialized literature. Gustafson and Branch, for example, indicate three main categories: models developed for classroom use, product development models, and system models (K. L. Gustafson and R. M. Branch, 2002, p. 12).

In the following we will describe 2 of the Instructional Design models that can be successfully used in the design of classroom activities, the Gagné model or the 9 learning events and the ASSURE model.

2.1 The Gagné Model

The model was developed by Robert Mills Gagné (1916-2002), a specialist in educational psychology, and involves several stages. First, Gagné defines and provides 5 examples of learning outcomes within instructional programs—intellectual skills, cognitive strategies, verbal information, motor skills, attitudes—and draws attention to the conditions in which learning takes place, showing that, in terms of the student, they can be external and internal.

Subsequently, 9 training events are detailed. According to Gagné, the latter were designed to help the student progress from "where he is" at the beginning of a lesson, "to the acquisition of the ability identified as the objective of the lesson" (R. M. Gagné, L. J. Briggs, 1977, p. 137). However, Gagné points out that the order of these events is approximate and that it may vary depending on the pursued objective.

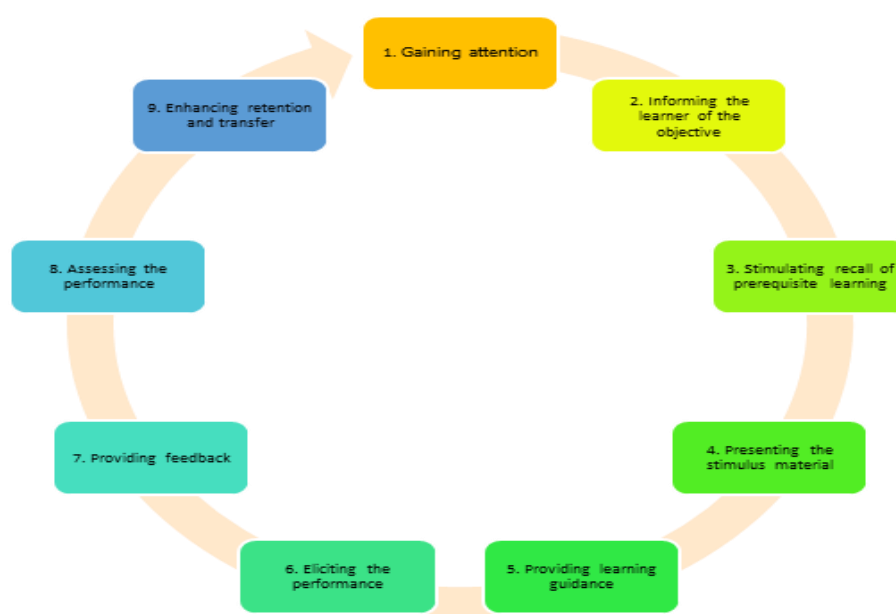


Fig. 1 Robert Gagné's 9 learning events

Training events:

1. Gaining attention: it can be achieved by appealing to the “special” interests of the students: formulating questions that will arouse their interest in the activity, carrying out demonstrations, projecting fragments of films, television scenes, etc. relevant for the proposed topic (R. M. Gagné, L. J. Briggs, 1977, pp. 138-139).

2. Informing the student about the pursued objective: helps the student in directing the effort for the activity; the teacher, for his part, knows from the beginning what he must evaluate at the end of the activity; the presentation of the activity’s objective must be carried out according to the specificity of the students’ age.

3. Stimulating the update of previously learned elements: this is an important stage because it involves making connections with previously assimilated knowledge in order to facilitate the acquisition of new content.

4. Presentation of the stimulus material: stimuli are those involved in performance that reflect learning; in the History discipline, for example, if the student has to learn a sequence of facts, events, then these facts, events, must be communicated orally or in writing (R. M. Gagné, L. J. Briggs, 1977, p. 141).

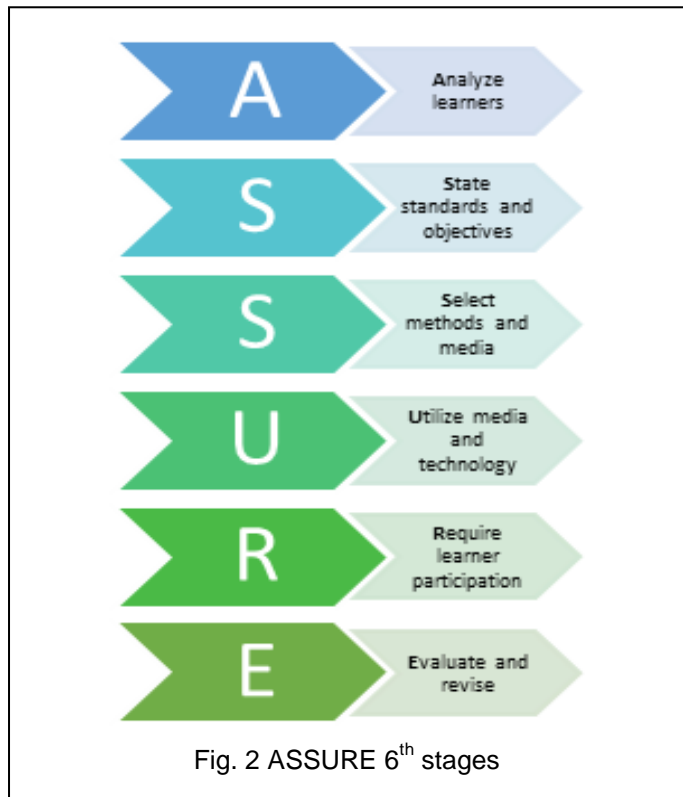
5. Directing learning activities: the strategy used by the teacher to ensure that they succeed in achieving their objectives is recorded in detail.

6. Performance achievement: the extent to which the student has managed to assimilate the new content is verified.

7. Providing feedback for information accuracy: the student is informed about the degree of reliability of the achieved performance; feedback communication can take many forms: “a gesture of approval, a smile or a word” (R. M. Gagné, L. J. Briggs, 1977, p. 141).

8. Performance evaluation: the teacher makes sure that the performance is real and in line with the set objectives.

9. Reinforcement of the retention and transfer process: achieved by means of a discussion on the topic covered and, at the same time, by making a connection with the topics that will be discussed at the next meeting.



2.2 The ASSURE Model

The ASSURE model was developed in the 1990s by Robert Heinich and later refined through the contributions of Michel Molenda, James Russell, and Sharon Smaldino. It is based on the 9 instructional events stated by Robert Gagné and is specifically intended for teachers, with the aim of providing them with support in the realization of lessons, through technology and media resources integration. ASSURE is a logical model and very simple to apply, regardless of the experience of the teaching staff. It is learner-centered and provides a learning environment suited to learners’ needs.

Instructional Media and Technologies for Learning, the paper signed by the 4 authors, discusses the role of instructional media in learning and presents a full range of media formats that can be integrated into instructional activities using the ASSURE model.

The ASSURE model is structured in 6 stages:

1. Learner analysis.

The stage includes the analysis of general characteristics such as, for example, age, level of education, work experience, cultural or socio-economic factors, analysis of the skills that learners already possess and their learning styles—visual, auditory, tactile, logical, etc..

2. Establishing objectives

The stage is very important because it determines what the learner will do at the end of the activity.

In defining the objectives, the authors propose the ABCD model (Audience, Behavior, Condition, and Degree):

Audience: specifies who will reach the goal.

Behavior: describes the learner's behavior and performance at the end of the instruction; it makes use of measurable action verbs.

Condition: specifies the condition under which the behavior is to be performed.

Degree: the performance criterion—the time available, the degree of accuracy, the percentage of correct answers requested, the qualitative standards (R. Heinich, M. Molenda, J. Russell, S. Smaldino, 2002, pp. 59-61).

3. Selection of methods, materials and media resources.

Once the target group analysis has been conducted and the lesson/course objectives have been established, the instructional designer turns his attention to the instructional activity.

According to the authors, this stage involves 3 sequences:

- a. Making a decision about the appropriate methods to teach a certain content.
- b. Choosing a media format to suit the methods.
- c. Selecting, modifying or creating supporting materials suitable for the corresponding media format (R. Heinich, M. Molenda, J. Russell, S. Smaldino, 2002, p. 62).

In choosing the materials, the authors suggest taking into account several criteria: 1. Complying with the curriculum; 2. Being accurate and up-to-date; 3. Clarity and concision of language; 4. Ability to motivate students and capture their interest; 5. Ensuring the participation of students; 6. Good technical quality; 7. Evidence of their effectiveness; 8. Possessing a user guide (R. Heinich, M. Molenda, J. Russell, S. Smaldino, 2002, p. 65).

4. Use of materials.

It includes the preview of the materials and their lessons preparation, respectively the detailed description of the activities and how to integrate the methods and selected materials (lessons, modules). Even now, it is necessary to check the equipment necessary to carry out the activities, arrange the space and prepare the learners. The latter can be done by means of an introduction in which the learners are given a general picture of what they will learn in the lesson, by making connections with the already covered lessons, by presenting what they will gain by paying attention, by giving clues about various lesson aspects.

5. Requesting student participation

It presupposes the realization of activities that lead to the active involvement of students throughout the educational process, the establishment of topics for dialogue, discussion or debate, the clear formulation of problem situations.

6. Evaluation/Review

It involves evaluating the performance of the learners, the adopted strategy, and the instructor's teaching style with a view to improving future efforts. Evaluation is done before, during and after the instruction completion. Based on its results, the used materials must be revised, which is why the evaluation is also seen as a new beginning.

In evaluating methods and media format, the ASSURE model supports instructional designers by providing them with some guiding questions: Were the presentation cost effective (time and money)? Were the instructional materials effective? Do they need to be modified? Did media resources help participants in achieving the objectives? Did media materials and format support students' involvement in teaching activities? Did selected materials arouse participants' interest? (R. Heinich, M. Molenda, J. Russell, S. Smaldino, 2002, p. 78).

3 CONCLUSIONS

Aiming at making training activities more efficient, Instructional Design is one of the viable ways to solve the

problems faced by education in contemporary society. Through its specific principles and models, it manages to offer ways to adapt training activities to the learner's specifics, thus making learning more attractive and adapting it to the real needs of students/learners. Its use in the field of education is important because education, by its nature, represents a complex act which involves a lot of responsibility and therefore requires a certain programming, a detailed prescription of specific actions (C. Cucoş, 2014, p. 311).

The two models presented in the study, Gagné and ASSURE, respectively, can be successfully used in education, regardless of the teaching level or of specialization field. These are systematic models, intended for designing one or more hours of activity, and with their help teachers can obtain a clear and coherent picture of the lessons/courses to be taught. In particular, they are useful for beginning teachers who need to plan their activities in order to have a teaching overview. Of course, they can also be used successfully by experienced teachers, supporting them in updating teaching materials and integrating technology and media into the classroom.

REFERENCE LIST

1. An, Yunjo, A History of Instructional Media, Instructional Design, and Theories, in International Journal of Technology in Education (IJTE), 4(1), pp. 1-21.
2. Cambridge Dictionary. See <https://dictionary.cambridge.org/>. Address accessed on June 23, 2022.
3. Cucoş, Constantin, Pedagogie, Polirom, Iaşi, 2014.
4. Dee Andrews, Ludwika A. Goodson, A comparative analysis of models of instructional design in Journal of Instructional Development 3(4):2-16, June 1980, DOI:10.1007/BF02904348.
5. Dicţionarul explicativ al limbii române (ediţia a II-a revăzută şi adăugită), Academia Română, Institutul de Lingvistică, Editura Univers Enciclopedic Gold, 2009.
6. Dicţionarul explicativ al limbii române, ediţia a II-a, Academia Română, Institutul de Lingvistică, Editura Univers Enciclopedic, 1998.
7. Gagné, Robert M; Briggs, Leslie J., Principii de design al instruirii, trad. E. P. Noveanu, C. Preda, Editura Didactică şi Pedagogică, Bucureşti, 1977.
8. Gustafson, Kent L.; Branch, Robert Maribe, Survey of Instructional Development Models, ERIC, 2002.
9. Heinich, Robert, Molenda, Michael, Russell, James, Smaldino, Sharon, Instructional Media and Technologies for Learning, 7th Edition, Merrill Prentice Hall, Upper Saddle River, New Jersey, 2002.
10. Jinga, Ioan; Negreţ-Dobridor, Ion, Inspekţia şcolară şi designul instrucţional, Bucureşti, Aramis Print, 2004.
11. Marcu, Florin, Marele dicţionar de neologisme, Ed. Saeculum, 2000.
12. Merrill, David; Drake, Leston; Lacy, Mark J.; Pratt, Jean, Reclaiming Instructional Design, în „Educational Technology”, Vol. 36, No. 5 (September-October 1996), pp. 5-7.
13. Merrill, M. David; Drake, Leston; Lacy, Mark J.; Pratt, Jean & the ID2 Research Group, Reclaiming Instructional Design, in „Educational Technology”, Utah State University, 1966, 36 (5), pp. 5-7.
14. Reiser, Robert, A History of Instructional Design and Technology, Part II: A History of Instructional Design, în ETR&D, Vol. 49, No. 2, 2001, ISSN 1042-1629, pp. 57-67.
15. Reiser, Robert; Dempsey, John, Trends and Issues in Instructional Design and Tehnology, 4th Edition, Pearson Education, New York, 2018.
16. Smith, P.L.; Ragan, T.J., Instructional Design, 3rd Edition, John Wiley & Sons Inc., 2005.