Original Article

Learning Outcome Objectives

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Summary

The concept of learning objectives is not new. Many teachers and learners, however, remain uncertain about how to use them effectively. When objectives are used appropriately, they simplify and enhance both teaching and learning. After reading this article, the reader will be able to:

- define the term "learning outcome objective"
- list the advantages of using learning outcome objectives for both learners and instructors
- write a learning outcome objective that includes the four key elements of audience, behavior, condition, and degree
- compose a learning outcome objective in each of the three domains of learning and at each of the three levels of learning
- assess a learning outcome objective's effectiveness.

Résumé

La notion d'objectif d'apprentissage n'est pas nouvelle. Beaucoup d'enseignants et d'enseignés ne sont pas certains pourtant de l'utiliser efficacement. Quand les objectifs sont définis de façon correcte, l'enseignement et l'apprentissage en sont facilités. Après avoir lu cet article, le lecteur pourra :

- définir l'expression « objectif de résultat d'apprentissage » :
- établir la liste des avantages qu'il y a à recourir à la notion d'objectif de résultat d'apprentissage :
- formuler un objectif de résultat d'apprentissage comprenant les quatre éléments clés qui sont l'auditoire, le comportement, la condition et le degré :
- mettre au point un objectif de résultat d'apprentissage dans chacun des trois domaines et aux trois niveaux de l'apprentissage :
- juger de l'efficacité de la notion d'objectif de résultat d'apprentissage.

Introduction

Learning objectives enhance learning. They can be used in any learning situation in undergraduate or postgraduate education, in continuing medical education, in patient-teaching in the clinic or at the bedside, and in presentations to committees. Their use should not be restricted to the traditional classroom setting. They can also be used outside professional life in such activities as coaching a sports team or raising children. Objectives do not always need to be written, but to be effective, they must be shared with the learner. On the other hand, simply providing a list of written objectives to learners without using them in all stages of the learning process is ineffective.

In the 1960s, the concept of behavioral objectives was introduced in the education field. Behavioral objectives define what the learner will be able to do at the end of the period of instruction.[1] In the 1970s and 1980s, the focus shifted to the process of learning. Recent years have seen a renewed enthusiasm for a focus on the outcome of learning. This orientation fits well in medical education as outcomes are critical in health-care delivery.

A key concept in the use of learning outcome objectives is that they should be based on the learners' needs, not on the teacher's preferences. For example, a teacher-centred objective is: "During grand rounds, I will cover three common causes of cancer." A learner-based objective for this session would be: "At the end of grand rounds, the learner will be able to discuss three common causes of cancer." This is the paradigm shift that is the essence of learner-centred teaching. A critical tool in learner-centred education is the use of learning outcome objectives. They incorporate two key concepts: the learner's needs and the desired outcome. Objectives and evaluation are also implicitly linked. By defining the learning objectives, the com-

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petencies that the learners must be able to demonstrate are defined.

Several types of learning objectives have been described and the definition of each is different. This article focuses on understanding and writing one type: learning outcome objectives. A learning outcome objective is a statement that describes the intended result or outcome of instruction. In contrast, a goal describes the major purpose of the instruction; while a course description describes the content or process of instruction.[2] For example:

- The goal of this article is to introduce the reader to the art of formulating effective learning outcome objectives for different teaching settings.
- The course description of this self-directed learning article is that it will review the development and appropriate use of learning outcome objectives in a variety of learning situations.
- The learning outcome objectives for the reader of this article are listed in the summary.

There are other types of learning objectives such as process objectives and experiential objectives.[3] These tell the learner what they will do during a period of instruction. A process objective specifies the learning mode (self-directed learning, group learning, problem-based learning), for example, "the learner will read an article from a current medical journal daily." Process objectives and outcome objectives are complementary.

In contrast, an experiential objective describes a new learning experience different from the learner's normal learning environment, for example, "the learner will do a locum in a remote northern community health centre in their area of expertise." In this type of learning, it is assumed that the activities undertaken during a period of instruction have intrinsic value, and that the learners, rather than the teacher, will define the important results.

Benefits of Learning Outcome Objectives

There are many medical-education articles about the different types of objectives. Each type has its own benefits and disadvantages. We like learning outcome objectives as they can be knowledge-, skill-, or attitude-centred; all are important learning outcomes in medical education. We have also found them to be the easiest type of objective for the novice objective writer to begin to use.

Using learning outcome objectives has benefits for both teachers and learners. For the teacher, the use of learning outcome objectives:[4]

- helps identify what knowledge, skills, and attitudes the learner needs to acquire
- guides the selection of teaching and evaluation methods
- provides a method of communicating expectations to learners and other teachers
- reflects a contract between the instructor and the learner.

For the learner, the use of learning outcome objectives:[4]

- provides a clear understanding of what the instructor expects and how it will be evaluated

- distinguishes the instructor's and learner's responsibilities
- allows opportunities for self-evaluation
- helps the learner organize his or her efforts toward accomplishing the objectives.

Learning objectives are most effective when students are involved in their determination and when they are shared with students.[4,5] Both teachers and learners need to learn how to use objectives effectively to enhance the learning experience.

Although the use of learning objectives has recently become more widespread, they are often poorly written and of little use to the teacher and the learner. Several studies have identified conditions under which learning objectives may be ineffective,[5] such as:

- if learners ignore the objectives provided, either because they are unaware of them, or because experience suggests that it is unimportant to take note of them
- if the objectives are too general or too ambiguous
- if the objectives are too easy or too difficult
- if the objectives are of interest to only a small proportion of students
- if learners are so conscientious or so highly motivated that they achieve the objectives regardless of whether they are specified.

Many teachers dislike using objectives. Common arguments include "they take too much time to write," "they're just a way to spoon-feed learners," and "they're too restrictive." Education research, however, has shown clear benefits for using learning objectives in teaching.[3] Their use is entrenched in undergraduate curricula and is required in all Royal College accredited postgraduate training programs. Many programs are documenting their objectives and the benefits of their use.[6,7] Most continuing medical education programs list learning objectives in the course outline. The Royal College of Physicians and Surgeons of Canada's maintenance of competence program (MOCOMP®) recognizes the importance of learning objectives by using their existence as a criterion in assigning credits for continuing medical education programs.

Elements of a Learning Outcome Objective

In 1962, Dr. Robert Mager published the first edition of *Preparing Instructional Objectives*, in which he introduced the concept of using four key elements in writing behavioral objectives.[2] This system is still taught in faculties of education across North America, and it still forms the core of an effective learning outcome objective. We have modified the four elements to:

- A=audience (who is to perform the desired behavior?)
- B=behavioral outcome (what will the learner be able to do?)
- C=condition (what are the limitations of resources and time?)
- D=degree (what is the acceptable level of performance?)

Note that the "audience" and "behavioral outcome" elements define what will be learned, while the "condition" and "degree" elements define the expected level of competency.

TABLE 1
ELEMENTS OF A LEARNING OUTCOME OBJECTIVE

Audience: Who is to perform the desired behavior?
Behavior: What will the learner be able to do?

Domain	Knowledge level		Application level		Problem-solving level	
Cognitive (knowledge)	define describe discuss explain identify indicate label list locate name note	recall recite recognize record repeat report re-state review show summarize tell	apply classify compute demonstrate determine employ find operate	perform predict schedule sketch solve use write	analyse appraise assess break down calculate compare compose construct create criticize design diagram differentiate distinguish	establish evaluate examine formulate invent judge organize plan prepare propose rate select synthesize
Psychomotor (skills)	attend demonstrate initiate observe return view watch		demonstrate draw employ illustrate locate measure	operate perform practise record set up use	adjust design experiment master perfect	
Affective (attitudes)	assist attend to be interested in comply with differentiate	listen practise select volunteer	advocate approve be convinced of believe challenge	criticize persuade value voluntarily select	advocate approve assess challenge change characterize defend	formulate judge manage resist resolve revise serve as model

Conditions: What are the limitations of resources and time? after a lecture or demonstration...; given a case study, diagram, clinical problem...; after completing the reading...; with (or without) use of notes, text, manuals...; given a time limit...; when presented with a mannequin...; in a clinical setting...; on a model, classmate, patient...; when provided with certain materials...; upon completion of the assigned task...; when given an opportunity...; given a simulated situation....

Degree: What is the acceptable level of performance? to a degree of accuracy for example, 90 per cent...; within a given period...; according to the information given in the text, manual, lecture...; in compliance with criteria presented by the instructor...; to a standard of clinical acceptability...; within a given number of trials...; consistent with the institution's goals...; in accordance with recommendations of external organization or authority...; in keeping with a code of ethics...; in accordance with the evidence given...

Audience

In composing a learning outcome objective, the audience must be defined. For example, the audience may be a homogenous group of learners with the same level of knowledge and expertise. When teaching a heterogeneous group, different objectives may have to be developed for each type of learner. The use of audience as the first key element of a learning outcome objective reminds us that it should describe the outcome of the learning experience for the learner.

Behavioral Outcome

A good learning outcome objective states what behavior or performance the learner will be able to do after the instruction, for example,

- the knowledge that will be gained
- the skills that will be acquired
- the attitudes that will be explored
- the practice that will change.

Drafting learning outcome objectives for the development of desirable feelings, beliefs, attitudes, or values is difficult. You cannot peer into another person's mind to determine whether they possess these unobservable qualities. Instead, the instructor must make inferences about these internal states. These inferences are based on the circumstantial evidence of visible or audible human behavior.

You can often observe a desired learning outcome directly, as for example, when you watch someone tie a suture knot, examine a fundus, or draw arterial blood gases. But when you are teaching abstract states such as attitudes, you can only know whether you have succeeded by observing learners doing something that represents the meaning of these abstractions.

Conditions

A good learning outcome objective describes the conditions under which the behavior is to be shown. For example, the objective "the student will be able to start an intravenous line in a patient's arm," indicates that the learner will start an intravenous line on a real patient rather than talk about it or answer multiple-choice questions about the skill.

Sometimes, the easiest way to make an objective communicate more about the conditions under which the performance should occur is to add a test item, for example, "using standard equipment, the learner will be able to start an intravenous line in the arm of a patient."

Degree

Wherever possible, a learning outcome objective describes how well the learner must perform the behavior to be considered acceptable. Setting a criterion for performance is called criterion-referenced performance. This contrasts with norm-referenced performance, which compares a learner's performance to that of other members in the group. Education in the health-care professions generally uses criterion-referenced performance levels for learning objectives since the learner is usually expected to master a competency rather than compete with other group members.

Possible performance standards adapted from Kibler[1] include:

- minimum number: "must list four steps in the...." "write 10 positions for...." "distinguish three types of..."
- per cent or proportion: "75 per cent of the problems correct...." "three out of four reasons for...."
- limitation or departure from fixed standard: "to the nearest per cent...." "within a range of two units..."
- distinguishing features of successful performance (quality): "giving evidence from...." "as viewed by a panel of peers...." "according to clinical standards..."
- speed: "within 60 minutes...."

If the degree is not stated, then the learner is expected to accomplish 100 per cent of the objective!

An example of a learning outcome objective is "Using a classmate as a patient, a first-year student will measure brachial systolic and diastolic blood pressure with an accuracy of ±5 mm Hg." The audience is "the first-year medical student"; the behavior is "measure brachial systolic and diastolic blood pressure"; the condition is "using a classmate as a patient"; and the degree is "with an accuracy of ±5 mm Hg."

Domains of Learning

The next step in composing a learning outcome objective is to define the domain and level of learning. Educational theorists have defined the following domains of learning:

- cognitive domain: the acquisition of knowledge[8]
- psychomotor domain: the acquisition of skills[9]
- affective domain: the acquisition of attitudes, values, and beliefs.[10]

In each of these domains of learning, there are three levels of learning:[1,4]

- knowledge level: the comprehension of facts, procedures, and affective phenomena with their extension to implications in various situations
- application level: the integration, execution and employment of principles, values, and procedures in particular and concrete situations
- problem-solving level: the analysis of information or situations to develop adaptations or courses of actions, and to make judgments about their impact or value.

Examples of learning outcome objectives for the "cognitive" domain are:

- knowledge level: "At the end of the presentation, the physician will be able to list at least four risk factors for coronary artery disease."
- application level: "At the end of the presentation, the physician will be able to counsel a patient with a history of a myocardial infarction (MI) on how to modify his or her risk factors for coronary artery disease."
- problem-solving level: "At the end of the presentation, the physician will be able to design a cardiac rehabilitation program for post-MI patients aimed at decreasing their risk for future cardiac events."

Examples of learning outcome objectives for the psychomotor domain are:

- knowledge level: "After watching a demonstration of cardiopulmonary resuscitation (CPR) on an adult

TABLE 2
EASILY UNDERSTANDABLE BEHAVIORAL OUTCOMES

Words open to many interpretations	Words open to fewer interpretations
to know	to write
to understand	to recite
to really understand	to identify
to appreciate	to sort
to fully appreciate	to solve
to grasp the significance of	to construct
to believe	to compare
to have faith in	to contrast

(Adapted from Mager RF. Preparing instructional objectives. Belmont: Lake Publishing Company. 1984.)

manikin, the physician will be able to return the demonstration in accordance with the steps in the instructor's demonstration."

• application level: "Using an electronic manikin, the physician will be able to perform CPR according to the criteria of the American Heart Association."

• problem-solving level: "Given a variety of typical situations and patients' conditions, the physician will demonstrate his or her ability to make necessary changes in the CPR procedures."

Examples of learning outcome objectives in the affective domain are:

• knowledge level: "After the course, the physician will be able to assist a patient to seek help for being in a physically abusive personal relationship."

• application level: "After the course, the physician will of their own volition develop a patient-education poster describing why they believe physical abuse is unacceptable in today's society."

• problem-solving level: "After the course, the physician will serve as a role model to show that physical abuse is not harmonious with a loving relationship."

Words that we have found useful in composing learning outcome objectives in each domain of learning and at each level of learning, and the four key elements are summarized in Table 1.

Characteristics of an Learning Outcome Objective

There are five characteristics of an effective learning outcome objective. These are summarized as "RUMBA."[11]

R=Relevant

A good learning outcome objective tells the learner why he or she needs to be able to do something. Good objectives discriminate between "need to know" and "nice to know" information. For example, if a specialist is asked to speak to a group of family physicians on the current management of diabetes mellitus, the most common causes of diabetes should be re-

viewed. It would not be relevant to the audience to focus most of the talk on the diagnosis of the rare secondary causes of diabetes.

U=Understandable

A good learning outcome objective is clearly written so that its meaning is understood by everyone who uses them. In writing learning objectives, try to avoid words that are open to interpretation. We call these broad terms "fuzzies" (Table 2).

M=Measurable

A good learning outcome objective is measurable and indicates how the learner will demonstrate that they have achieved the objective. It is more difficult to evaluate learning for the objective "at the end of the talk, the family physician will understand how to diagnosis diabetes" than for the objective "at the end of the talk, the family physician will be able to state the three diagnostic criteria for diabetes." It is impossible to measure how much the family physician will "understand." It is the condition and degree elements of the objectives that determine the final evaluation of the success of the learning session.

B=Behavioral

A good learning outcome objective is behavioral — the learner should be able to do something that they could not do before.

A=Achievable

A good learning outcome objective must be achievable. This usually means within the time frame of the education experience. An example of a common learning objective that is not achievable for postgraduate trainees is "By the time of my oral examinations, I will know everything."

Conclusions

Although we encourage readers to start using learning outcome objectives in their teaching, it is important to remember that this is just one part of effective adult learning. Robert

Mager summarized the adult learning loop well: "First you decide where you want to go, then you create and administer the means of getting there, and then you arrange to find out whether you arrived." When preparing an education experience, the teacher must start with a needs assessment to determine the learners' perceived and unperceived learning needs. Developing learning outcome objectives that address these needs is the next step. This helps the learner and teacher clarify what is important for the learner to learn. In turn, the objectives help determine the teaching strategies and learning activities that will enhance the learning. After the session, the learner's ability to meet the objectives must be evaluated, and appropriate feedback given in a timely fashion. Information gained from the evaluation should be used to design the next teaching experience.

In evaluating the success of our article, have our original learning outcome objectives been met? Are you able to:

- define the term "learning outcome objective"
- list the advantages of using learning outcome objectives for both learners and instructors
- write a behavioral learning outcome objective that includes the four key elements of audience, behavior, condition, and degree
- compose a learning outcome objective in each of the three domains of learning and at each of the three levels of learning
- assess the effectiveness of a learning outcome objective?

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