

## Learning outcomes - some reflections on their value and potential drawbacks

Derek O. Northwood

University of Windsor  
Windsor, Ontario, Canada

**ABSTRACT:** There has been a worldwide trend to adopt learning outcomes to address a wide range of skills. Professional programmes, including engineering have been the leaders in the adoption of learning outcomes and competencies as part of the accreditation process. By defining learning outcomes, a clear target is established for the instructor to aim for in terms of specific behaviours and the learner has a clear statement of what they are expected to achieve. Despite the very clear *pros* to the adoption of learning outcomes, there has been considerable criticism of their use with some authors going as far as describing them as *corrosive* (F. Furedi). Although it is acknowledged that learning outcomes help in content development, there is not general agreement on whether they help or guide students in the learning process (Z.A. Alsagoff). The most commonly cited disadvantages of the use of learning outcomes is that they kill originality and creativity and that we are shifting our emphasis from learning to outcomes. One can then ask whether one should retain, modify or entirely eliminate the use of learning outcomes.

### INTRODUCTION

Internationally, there has been a growing trend to adopt learning outcomes [1]. These learning outcomes have addressed a wide range of skills including information literacy, creativity, problem-solving, critical thinking, and interpersonal and communication skills [2][3]. One of the primary drivers for the adoption and the measurement (assessment) of these learning outcomes has been as a quality assurance tool [1][4][5]. Professional programmes, such as medicine, business and engineering have been leaders in the adoption of learning outcomes and competencies as part of the accreditation processes [1].

This movement to an outcomes-based assessment from one that had been described as *bean counting* [6] i.e. based on the inputs, can readily be seen in a perusal of the accreditation criteria of the Canadian Engineering Accreditation Board (CEAB) [7] or ABET in the USA [8][9]. Both CEAB and ABET, and other engineering accreditation boards worldwide, require consistent educational objectives, measurable learning outcomes, assessment of student achievement and of programme effectiveness before any programme can receive accreditation [10][11].

Recently, institutions have moved towards university-wide (institutional) learning outcomes in addition to learning outcomes at the course or degree programme level [3]. By defining learning outcomes, the learner has a clear statement of what they are expected to achieve when they have completed the learning [12]. The specific outcomes must be measurable in order to be used as a basis for designing appropriate assessments. As pointed out by Albert Einstein:

*Not everything that can be counted counts, and not everything that counts can be counted* (cited in Ref. [13]).

This has led to what is referred to as authentic assessment [14][15]. With this move to learning outcomes, institutions have moved from a focus on *teaching and learning* to one of *learning and teaching* [4] and a learning- (or learner-) centred university [16].

Despite the very clear *pros* to the adoption of learning outcomes, there has been ongoing, and significant, criticism of their use with various authors describing them as *corrosive* [17] or *killing originality and creativity* [18] and that the very purpose of learning outcomes is *to accomplish a shift in emphasis from learning to outcomes* [17]. This article will first, briefly address learning objectives versus learning outcomes [12] and, then, go on to examine learning outcomes at three levels, namely, course; degree programme; and, institutional (commonly called *graduate attributes*). Through reflective examination of the *pros* and *cons* of retaining the use of learning outcomes, an attempt is made to answer the more general question: Is there a need for student-centred approaches that have both greater degrees of flexibility and truly facilitate the learning process?

## LEARNING OBJECTIVES AND LEARNING OUTCOMES: GENERAL

The terms, learning objectives and learning outcomes, are often used interchangeably, some would say randomly, but it is probably useful to consider learning outcomes as a subset or type of learning objectives [12][19].

*Learning objectives, for example, may outline the material the instructor intends to cover or the disciplinary questions the class will address. By contrast, learning outcomes should focus on what the student should know and realistically be able to do by the end of an assignment, activity, class, or course. The same goals addressed by learning objectives can be equally addressed by learning outcomes, but by focusing on the application and integration of the course content from the perspective of the student, learning outcomes can more explicitly and directly address expectations for student learning [19].*

Bloom's Taxonomy of Educational Objectives (Learning) has been used extensively, and proved useful, in developing learning outcomes [20]. The taxonomy was revised in 2000 and Krathwohl has provided an excellent overview of the revisions [21]. Bloom's Taxonomy is divided into three domains: Cognitive, Affective, and Psychomotor. Those three domains, in terms of learning outcomes, have been more generally described as content (cognitive), skills (psychomotor) and values (affective) [19]. As will be elaborated upon in the section on *pros* and *cons*, much of learning outcomes development has been based on the cognitive domain (content) [18] and has thus been particularly useful in curriculum planning and development [22][23]. However, through the use of learning outcomes and activities, such as the instructional laboratory, all three domains can be addressed [24].

## LEARNING OUTCOMES: COURSE, DEGREE PROGRAMME AND INSTITUTIONAL LEVEL

Given the space restrictions for this article, this will be a somewhat cursory examination, but it is hoped that the reader will see how the learning outcomes are scaffolded from the course, to the degree, to the institutional level.

Looking at the course and degree programme learning outcomes and, as pointed out by Kenny and Desmarais [3], there is another building block of the *scaffold*; namely, the classroom outcomes, which consist of the teaching and learning activities, assignments and assessment strategies. At the course level, the learning outcomes are course-specific and include knowledge, skills and values. At the degree-programme level, Kenny and Desmarais describe the learning outcomes as *essential, enduring and integrated disciplinary learning of academic programme* [3]. For engineering, this is essentially what the accrediting bodies are looking for.

The Institutional learning outcomes are an *institutional expression of an ideal graduate* [3], i.e. what are often described as *graduate attributes*. These may vary somewhat from institution to institution but contain a set of core attributes. This is illustrated very well by an example from the University of Guelph's 2012 learning outcomes [3]. There are five learning outcomes: Critical and Creative Thinking; Literary; Global Understanding; Communicating; Professional and Ethical Behaviour. Each of these learning outcomes has its associated skills (see Table 1) and detailed rubrics for assessment. Rubrics are a scoring/assessment tool that helps evaluate the student's level of competency on a task, performance or programme characteristics, such as learning outcomes and associated skills.

Table 1: Institutional learning outcomes and associated skills (Adapted from Reference [3]).

Learning Outcome	Associated Skills
Critical and Creative Thinking	Inquiring and Analysis Problem-solving Creativity Depth and Breadth of Understanding
Literary	Information Literacy Quantitative Literacy Technological Literacy Visual Literacy
Global Understanding	Global Understanding Sense of Historical Development Civic Knowledge and Engagement Intercultural Competence
Communicating	Oral Communication Written Communication Reading Comprehension Integrative Communication
Professional and Ethical Behaviour	Teamwork Ethical Reasoning Leadership Personal Organisation Time Management

## PROS AND CONS

The major driver for the use of learning outcomes is to improve learning and, ultimately, student achievement. As noted by Kenny and Desmarais [3]:

*Above all, learning outcomes must first and foremost make clear to students what they are expected to learn and must also support student achievement of the expressed learning outcomes by ensuring a curriculum that is increasingly coherent, aligned and integrated. Established outcomes allow faculty, department, programs and the University to both demonstrate and account for student achievement [3].*

These statements embody many of the *pros* relating to the use of learning outcomes at all levels. Students are provided with a clear statement of what they are expected to achieve (learn) and what they can expect of the instructor or instructional materials [25][26]. It is thus claimed that learning outcomes thereby encourage students to take a self-directed and autonomous approach to learning, as they take responsibility for their studies and actively gauge their progress [3]. They also provide the instructor, or course designer, with a clear target to aim for, expressed in terms of specific and measurable behaviours [25]. Learning outcomes can provide a powerful framework to structure curricula, including helping to provide clarity, integration and alignment within and between sequence of courses and, most importantly, promoting a learner centred approach to curriculum planning [3][27]. The learning outcomes can also be used as the basis for designing appropriate (authentic) assessments [25]. It is also claimed that by analysing the learning outcomes by *domain*, i.e. knowledge, skills and values, it is possible to *formulate instructional strategies for each element of the intervention that are based on good practice* [25].

When looking at the *cons*, one can see both examples of where the real-world application of learning outcomes has been deficient and/or other considerations have come into play. One of the major *cons* is that for learning outcomes to work, specific outcomes must be achieved for all learners or at least most of them [25]. This is patently not the case except for the rote acquisition of knowledge or the performance of routine, rule-based tasks [25]. The learning experience is very different from student to student. One approach for all students, which has been described by Curran as a *sheep-dip* approach, does not work (cited in Ref. [25]). A related *con* is that if learners are presented with formalised outcomes at the commencement of a *lesson*, they are likely to end up bored and/or bottle fed: the learner is not being engaged [25]. Instead of engaging, teachers are merely encouraging the imparting of information [17]. Furedi argues from a point of view of those who are devoted to the Socratic orientation to teaching and believe that dialogue is indispensable to gaining clarity and understanding:

*Since a dialogue cannot be a dialogue if its result is known in advance, the very notion of learning outcomes negates its spirit [17].*

A predetermined outcome through the use of learning outcomes has been seen as killing originality and creativity in students [17][18]. Learning outcomes have also been seen to foster a climate that inhibits the capacity of students and teachers to deal with uncertainty [17]. By not dealing with uncertainty, a rigidity is introduced into the learning process. Richard Hil has described this as a *rigidification of pedagogy*, which:

*involves the attempt by teaching and learning experts and academics to ensure a largely predetermined approach to learning - one that is linked to learning objectives [28].*

The importance of the ability to deal with uncertainty in times of rapid change is a continuing theme of the work of Margot Cairnes [29].

This rigidity, if viewed as a promise of learning outcomes, is seen as potentially disrupting the academic relationship between teacher and student [17]. Furedi views learning as a voyage of intellectual experimentation and discovery where the teacher guides the students [17]. To do so effectively, the teachers must be prepared to yield to new experience and be sufficiently flexible to establish relationships with the students that are appropriate to the circumstances. Furedi points out that students develop their insights in different ways and this cannot be communicated to a predetermined formula. In a similar vein, Furedi considers that learning outcomes devalue the art of teaching, which depends on exercising judgement based on experience. Teachers must have the capacity to respond to unexpected and unpredictable questions and problems that emerge in the course of dialogue [17]. The art of teaching requires a readiness to treat different students differently and not just teach to a prescribed learning outcome for all.

The final point in the *cons* column that requires attention is that Shepherd contends that learning objectives make sense when the learning intervention is driven from the top-down, i.e. at the behest of management [25]. Whether one agrees with his argument or not, one recognises that both the learners and teachers have the choice to participate, or not. With respect to learning outcomes, Harden has recognised three groups of academics: the so-named *ostrich*, *peacock* and *beaver* [27]. The *ostrich* ignores the move to outcomes-based education (OBE) believing it to be a passing or irrelevant concern. The *peacock* displays, sometimes ostentatiously, a specified set of outcomes but stops there. It is only the *beaver* who both prepares a set of learning outcomes and uses it as a basis for curriculum-related decisions. Furedi has

similar concerns and believes that the regime of learning outcomes breeds a culture of cynicism and irresponsibility and that the act of cobbling learning outcomes together represents a performance of *impression management* [17].

A tabular summary of the *pros* and *cons* of using learning outcomes is presented in Table 2.

Table 2: *Pros* and *cons* of using learning outcomes.

<i>Pros</i>	<i>Cons</i>
1) Student is provided with clear statement of what they are expected to learn and what they can expect of instructor [3][25][27]	1) Rigid process that requires specific outcomes to be achieved for all learners or, at least, most of them [25][28]
2) Instructor has clear target in terms of specific and measurable behaviours [25]	2) Does not engage learner - merely imparts information (lack of dialogue) [17]
3) Provides a framework to structure curricula [3][22][23][27]	3) Breeds culture of cynicism and irresponsibility [17]
4) Promotes learner-centred approach to curriculum planning [3][27]	4) Kills originality and creativity [17][18]
5) Provides a basis for authentic assessment (quality assurance) at all levels: course, programme, institution [14][15]	5) Inhibits capacity of student and faculty to deal with uncertainty [17]
6) Encourages a self-directed and autonomous approach to learning (students take responsibility for their studies and actively gauge their own progress) [3][27]	6) Shifts emphasis from learning to outcomes [17]
	7) Disrupts academic relationship between teacher and student [17]
	8) Devalues art of teaching (readiness to treat different students differently) [17]

## THE WAY FORWARD

There seems to be general agreement that learning outcomes help in the content (curriculum) development process but the question seems to be: Do learning outcomes help or guide students in the learning process? [18]. The answer to this question seems to range from a qualified maybe to an outright no. The problems seem to lie mainly in the rigidity of the process.

One seems to have gone from prescribed inputs to prescribed outcomes. What one should be aiming for is to go from what Klemm has described, for the sustainability of construction materials, as going from *prescription* to *performance* [30]. A parallel can be drawn with learning. One must recognise complexity and uncertainty, and encourage students to think outside the box, so that they have the ability to achieve a sustainable future through informed and effective decision making.

How can one get to true *performance* where students are actively engaged in the learning process? Can one get there using *learning outcomes* as presently formulated, or should *learning outcomes* either be modified, making them more flexible, or entirely eliminated? Furedi is emphatic that nothing will be lost by getting rid of learning outcomes:

*If individual academics want to use learning outcomes, of course, that is their prerogative. But what we need is a genuinely pluralist academic culture where courses are taught in a manner that engages with issues that are integral to their discipline. Academics are grown-up people who do not need the language police to instruct them about what kind of verbs to use. And students should be treated as grown-ups who can be allowed to embark on a journey of discovery instead of directed to a predetermined destination [17].*

A similar opinion was put forth by Shackleton-Jones, although expressed in very different terms:

*You will learn: the learning objectives belong in the catalogue, not in the course.*

*I can't imagine a movie opening with the title in this film you will learn that good eventually triumphs over evil, though it may require car chases and romantic interludes.*

*One of the best learning events attended recently began with a facilitator saying if you learn one thing from this event, it will have been a success - I did, it was, and he didn't say in advance what the thing was (cited in Ref. [25]).*

Furedi's solution, i.e. eliminate learning outcomes is somewhat dramatic [17]. It appears to ignore the value that learning outcomes have been shown to bring to curriculum development, to a learner-centred university where students know better what they are expected to learn, and to quality assurance at all levels. Quality assurance has not been discussed here in any great detail, but it is essential that any assessment is authentic and does not merely involve *ticking boxes*.

Can some aspects of learning outcomes be retained to make them more flexible and still help or guide students in the learning process? The outcome must resonate with the learner: a lot of time is spent on wordsmithing outcomes that mean almost nothing to the learner. How can originality and creativity not be *killed*? How does one make sure that the focus remains on learning?

With respect to originality and creativity, the point has been made that the learning outcomes, particularly at the university level, have focussed on the cognitive domain and the affective/values and psychomotor/skills domains have been overlooked or ignored [18]. A similar point has been made by Curran who questioned whether one needs a more right-brained way to describe the possible range of outcomes from a learning intervention (cited in Ref. [25]).

In the development of learning outcomes and assessment methods for cooperative engineering programmes, which are work-based learning, learning outcomes in all three domains of knowledge are probed, and new reflection and assessment tools have been developed. The application of the newly developed assessment tools has shown positive trends in terms of development of attributes that form part of engineering accreditation criteria [31]. This is a good example of using learning outcomes covering all three domains of knowledge together within the vehicle of work-based learning, to improve learning. For this process to be successful required a constant feedback on the *performance* of students, faculty and industry as seen by the same set of three participants [31].

There are many ways, other than work-based learning, of ensuring student engagement and retaining the focus on learning. Trevelyan asserts that *engineering students need to learn to teach* [32]. Trevelyan argues that if engineering students learn effective teaching skills, engineering education will be improved because:

- Students will acquire social skills that will enable them to be more effective engineers, i.e. improved performance.
- Students will learn the *real technical stuff*.
- Students will amplify the total teaching effort with an engineering school further improving overall learning outcomes [32].

The case for students/learners as teachers has also been made by Alberts:

*Someone who has just learned something can often explain it better than the professor to whom it is all too obvious. The technique also keeps the students alert and motivated. Evaluations of student learning prove that works* [33].

There is a parallel in medicine where residents are identified by medical students as being their most frequent and memorable teachers [34]. Residents do not teach just knowledge and skills: they are also important role models and teachers of values and professionalism [34]. Mann et al [34], in providing advice to residents preparing themselves as teachers, point out that challenges and unexpected occurrences are sure to happen and that teachers are often required to what Schön [35] describes as *reflect-in-action*. Surely, this will assist the student/learner to be able to deal with *uncertainty*?

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