Learning Outcomes for Your Course

Nandita Madhavan*, Smita Srivastava#, and Edamana Prasad*

*Department of Chemistry, IIT Madras; #Department of Biotechnology, IIT Madras

Learning outcomes describe the teacher's expectations regarding the learner's performance in a course through observable action verbs. The verbs represent the right cognitive challenges faced by the learner during the course work. Recent research has shown that designing learning outcomes for a course and providing them to the learner group *a priori* would result in significant enhancement of the learning process.[1] Designing learning outcomes *not only* helps the students to get their goals clearer, but immensely assists teachers in the conduct of the course also.

Quite often, a teacher expresses his/her expectations regarding the learner performance as follows: 'I want my students to understand what is taught in the class". Here, the teacher uses the word 'understand' in a broader sense, where he/she expects that the learner will be able to perform easy cognitive challenges such as 'remembering' or 'recollecting' the factual details in the course, as well as relatively difficult cognitive exercises such as 'apply the knowledge', 'justify the result', 'analyze the data' or 'design a process'. Since various courses demand various types of thinking challenges, it is almost impossible for the learner to comprehend the teacher's expectations (outcome) regarding a course. Syllabus also fails to convey this message since it contains a list of topics, without any description of the corresponding cognitive challenges involved in the course. In short, in the current practice, the learner is kept in dark regarding the various cognitive challenges required in a particular course him /her plans to enrol.

In this context, designing learning outcomes for course offered in an Institute becomes very relevant for effective teaching-learning process. Learning outcomes will have the following advantages from the student point of view:

Learning outcomes will help the students to:

- Get clarity in their course goals
- Provide framework for measuring their success (self-evaluation)
- Reduce their anxiety (they get better clarity regarding the cognitive level in which they have to perform)
- Learn effectively

As mentioned above, learning outcomes will have advantages from the faculty point of view also. Learning outcomes will help the faculty to:

- Prepare classroom material in a better way (class notes, session plans, discussion topics etc.)
- Keep the focus on specific end results (teaching is focused to achieve learning outcomes)
- Create homework, assignments (selecting appropriate assignments to meet learning outcomes)
- Design appropriate questions in the tests (teaching and assessment will be at par)

How do you design learning outcomes for your course?

In any assessment, the extent of learning is verified by an observable action verb. For example, if the instructor wants to check whether an undergraduate learner 'understands' the first of law of thermodynamics, the student will be asked to '**Write** the mathematical expression for the first law of thermodynamics', or '**Solve** a problem based on first law of thermodynamics'. While writing the expression of a law requires only the ability to memorize, solving a problem using a law requires the ability to apply the law appropriately. In other words, t*he cognitive challenge is higher for the latter task*. Designing learning outcomes involves judicious selection of such observable action verbs (shown above in bold letters), describing the cognitive challenges in the course.

Benjamin Bloom has classified thinking process in to six domains, based on the cognitive challenges involved.[2] This is known as Bloom's taxonomy, which is a fairly good guideline to identify the observable action verbs for designing their learning outcomes. According to Bloom's taxonomy, there are six levels of cognitive

challenges. They are: Remembering, Understanding, Applying, Analysing, Evaluating and Creating (in the order of increasing cognitive complexity). A search on the internet for Blooms taxonomy will provide several examples of observable action verbs matching with each of the six levels. The faculty can easily judge which observable action verb is suitable for a particular topic in the syllabus of his/her course. As a reference, a pictorial representation of Blooms classification of thinking, along with some 'observable action verbs' are given in Appendix I. Once the teacher identifies the action verbs essential for the course, he/she can list them before the students. A typical example for a learning outcome (LO) in the undergraduate thermodynamics course can be:

LO: The student should be able to **SOLVE** problems based on thermodynamics laws.

Advanced courses will normally have learning outcomes in the higher order thinking domains such as 'analysing', 'evaluating' and 'creating'. The learner can easily identify the cognitive effort required from their side by reading the action verbs given in the learning outcomes and this information significantly helps them to prepare better for the examinations.

It is worth mentioning here that designing learning outcomes for a course invariably motivate the instructors to think about different activities for the learners in order to achieve the learning outcomes. For example, if the LO for a course is 'student should be able to **analyse** the data', the instructor should encourage the learner to actually **DO** the data analysis, after providing the basic understanding of the field and <u>assists the learner in the analysis part</u>. This is a different approach from the conventional lecture based teaching, where instructors deliver the contents and leave the learner at that point. Thus, in the new approach, instructors are normally encouraged to think and design suitable in-class activities, once LOs are designed for their courses.

As a first, but significant, step towards a better teaching-learning environment in our campus, the Teaching Learning Centre (TLC), IIT Madras appeals to all faculty
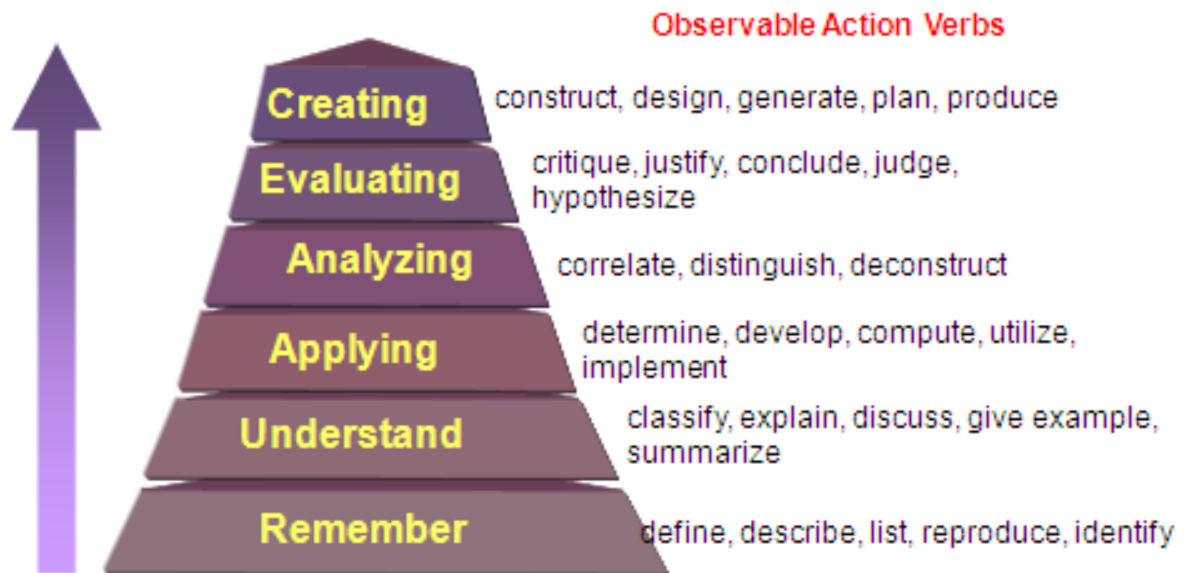
colleagues to write learning outcomes for their courses and share this with the students during the first class of every semester. Some of our faculty colleagues have been practicing this for the courses they offered, and the response from students is encouraging. Should require any assistance in designing learning outcomes for the CORE courses, please contact TLC, Vth floor of Central Library, IIT Madras.

Reference

1. Michael, J. (2001). In Pursuit of Meaningful Learning. *Advances in Physiology Education, 25*, 145–158
2. David R. Krathwohl (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice, 41, 212-218.*

Appendix I

Levels of Thinking – Bloom's Taxonomy

Observable Action Verbs

Creating — construct, design, generate, plan, produce

Evaluating — critique, justify, conclude, judge, hypothesize

Analyzing — correlate, distinguish, deconstruct

Applying — determine, develop, compute, utilize, implement

Understand — classify, explain, discuss, give example, summarize

Remember — define, describe, list, reproduce, identify

How do you use this information to design learning outcomes for your course ?