Chapter 4
A Tabular Approach to Outcome-Based Course Planning and Assessment

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ABSTRACT
Many educational institutions are migrating towards outcome-based teaching and learning. Being true to criterion-referenced assessment, students’ final grades are often determined elaborately on a set of complex rules. The author proposes a tabular approach to help instructors in course planning and assessment. The resulting course plan consists of tables that show learning outcomes, study topics, teaching, learning and assessment activities in rows and columns. Instructors can more easily spot misalignments between items on the tables. Though marks are assigned to learning outcomes, students’ final grades are still assessed criterion-referenced rather than norm-referenced. This mark-based assessment is transparent and familiar to students. The tabular approach may reduce the OBTL migration effort of the instructors and improve the learning experience of the students.

INTRODUCTION
Outcomes are clear, observable demonstrations of student learning (Spady & Marshall, 1994; Towers, 1996). In outcome-based teaching and learning (OBTL), course intended learning outcomes (CILOs) are used to derive the teaching, learning and assessment (TLA) activities. When TLA activities are chosen to support student achievement of CILOs, they are said to be constructively aligned with the CILOs (Biggs, 2003). Constructive alignment is required to realize the benefits promised by OBTL. We advocate a tabular approach to facilitate visual inspection of constructive alignment. We also advocate the assignment of marks to CILOs for the calculation of students’ final grades. Though this mark-based approach differs from the commonly used rule-based approach, it does not necessarily stray from the criterion-referenced assessments endorsed by OBTL purists.

First we discuss one of the challenges to implement OBTL, namely assessment. Our approach is...
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Table 1. Action verbs based on Bloom’s Taxonomy of Cognitive Learning

<table>
<thead>
<tr>
<th>Class</th>
<th>Action Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge</td>
<td>write, state, recall, recognize, select, reproduce, list</td>
</tr>
<tr>
<td>2. Comprehension</td>
<td>identify, illustrate, represent, formulate, explain, contrast, paraphrase, summarize</td>
</tr>
<tr>
<td>3. Application</td>
<td>predict, select, assess, find, show, use, construct, compute, solve</td>
</tr>
<tr>
<td>4. Analysis</td>
<td>select, compare, separate, differentiate, contrast, break down, classify</td>
</tr>
<tr>
<td>5. Synthesis</td>
<td>summarize, argue, relate, organize, generalize, conclude, design</td>
</tr>
<tr>
<td>6. Evaluate</td>
<td>judge, evaluate, support, recognize, criticize</td>
</tr>
</tbody>
</table>

illustrated with a simple example of a software design course. We then create the CILO table with weights assigned to learning outcomes. The weights reflect the relative importance of the various CILOs useful for the final grade determination. We then create the syllabus table to ensure that study topics align with CILOs. The TLA table is the last table we create that ensures the alignment of teaching and learning activities with the CILOs. It shows the marks of assessment activities distributed over the CILOs.

THE CHALLENGE OF ASSESSING STUDENTS IN OBTL

An early task in planning an OBTL course is to write the CILOs. The majority of courses do well with five to seven CILOs. A CILO begins with an action verb of a student’s ability. Verbs like ‘understand’ or ‘appreciate’ are to avoid because their attainment cannot be objectively observed. Table 1 shows a list of verbs that may be used (Bloom, 1956). Note that some action verbs belong to more than one class.

Writing CILOs is actually easier than the subsequent challenge of assessing the students. A student may be better at one CILO but weaker at another. At the end of the course, we need to assign a percentage or a letter grade to every student. How do we amalgamate the performance of multiple CILOs into a final grade?

There are two main grading systems: norm-referenced assessment (NRA) and criterion-referenced assessment (CRA). In NRA, a student is graded in comparison to other students. A grade B performance last year may earn a student a grade A now just because he or she belongs to a weaker cohort. In CRA, a student is graded against predefined criteria. A grade B performance last year will still be grade B this year even if it is at the top of the class. The majority of educationists, most notably the OBTL purists, tend to advocate CRA (Frankland, 2009; Biggs, 2003).

As an example, we shall consider an OBTL course with 5 CILOs. Students may perform each CILO in one of four levels: excellent, good, pass and fail. The following rules may be used to grade a student.

1. Grade D for passing any 4 CILOs
2. Grade C for 2 good CILOs with 2 other passing CILOs
3. Grade B for 1 excellent CILO, 1 good CILO and 2 more passing CILOs
4. Grade A for 2 CILOs at the level of excellent and passing all other CILOs

Consider a student with an excellent CILO and 4 passing CILOs. According to the above rules, the student will only get grade C. If the extra passing CILO can substitute the missing good CILO, the student will get grade B. Should such a substitution be allowed? It is tedious to devise and use a