ABET Database Documentation

Database Input: Two Views
There are two distinct views of the data for curriculum evaluation. The most obvious is centered on an individual course and the learning objectives embedded in that course. These data are found in the table input1. Each record in this table contains the following elements:

- Course number (course)
- Semester (semester)
- Objective number (obj_no)
- The contribution of this objective to each curriculum learning outcome (14 variables G1, G2,...G7, IE1, IE2, ...IE7)
- Percent of students achieving this objective (pct_met)
- Assessment metric (assessment)
- The objective (objective)

Each of the entries here is for ie3120 taught during the fall of 2006. Each record (row) corresponds to one course learning objective. The objective number is listed in the third column and the percent of students achieving this objective is in the column labeled pct_met. The next column is the assessment metric computed from the percent of students who have met the objective. Finally, in the right most column is the statement of the objective. For this data the statement for objective 07 is “Conduct ergonomic analysis of physical work.” Finally, the central section of the table contains the strength to which each of the course learning objectives supports each of the IE program outcomes. Here we use the following weights:

- A: course objective strongly supports program outcome;
- B: course objective supports program outcome;
- C: course objective is relevant to program outcome

In this data, IE5 (Apply modern management tools such as Total Quality Management, Continuous Improvement, Lean Manufacturing, Six Sigma, and Team Building) is supported by course learning objective 6, and strongly supported by objective 1.

The second view of the data is from the perspective of the curriculum—that is the IE learning outcomes. This data is found in another input table input2.
Figure 2: Database Table Input2

The data not shaded in green is input to the database. We will discuss the green-shaded columns later. Each record in the database is a row in this table. The first two columns contain the semester and the course. The third column lists the IE learning outcomes addressed by this course. For example, ie3120 taught in the fall of 2006 has 12 records—one for each of the IE objectives this course targets. In this case the course addresses G1, G2, G3, G4, G5, G7, IE2, IE4, IE5 & IE6. If you look back to Figure 1 only two IE program outcomes are not addressed by the 11 course learning objectives. In Figure 1 G6 and are empty columns in the table.

Let us focus on the IE learning outcome G3.

<table>
<thead>
<tr>
<th>G3: “Design and conduct experiments, as well as to analyze and interpret data”</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>Measure and analyze human performance using time studies</td>
</tr>
</tbody>
</table>

Figure 3: Program Outcome Summary Statements

The yellow highlighted entry is called an IE program outcome summary statement. It restates the several course learning objectives in terms of the IE program objective they support. In the case shown in Figure 3, course learning objectives 2, 4, 7, and 9 support the curriculum learning
outcome G3 in the summary statement: “Measure and analyze human performance using time studies”. The creation of such a summary statement will lend insight into the mapping of course learning objectives into the program learning outcomes. Constructing such a statement may also lead to an improved statement of course objectives.

**Course Report-1**

The database report course_report1 provides a summary report for each course by semester taught and course_id. When each course is initialized in the database, a new record is created in the table course_report1. Figure 4 shows a record from course_report for ie3120 for the fall semester 2006. The second column displays the percentage of the class who have achieved the learning outcome. This is computed using student performance (see /course_assment_instr.pdf).

<table>
<thead>
<tr>
<th>Course Report 1: Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>f06 ie3120 The Work Environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>objective</th>
<th>faculty grade</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>G4</th>
<th>G5</th>
<th>G6</th>
<th>G7</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>E6</th>
<th>E7</th>
</tr>
</thead>
<tbody>
<tr>
<td>106.ie3120.01 85% Conduct IE analysis of current methods and operations</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<td>106.ie3120.02 70% Conduct a Time Study</td>
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<tr>
<td>106.ie3120.03 90% Develop a work standard using Predetermined Time Systems</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<tr>
<td>106.ie3120.04 90% Develop standards for indirect labor using Work Sampling</td>
<td>B</td>
<td>A</td>
<td>A</td>
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<td>A</td>
<td>A</td>
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<tr>
<td>106.ie3120.05 100% Compute learning curve parameter and develop a standard using learning curves</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<tr>
<td>106.ie3120.06 85% Develop a business case for methods and ergonomics decisions</td>
<td>B</td>
<td>A</td>
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<td>106.ie3120.07 73% Conduct ergonomic analysis of physical work</td>
<td>B</td>
<td>A</td>
<td>A</td>
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<td>A</td>
<td>A</td>
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<tr>
<td>106.ie3120.08 95% Demonstrate understanding of principles of workstation design</td>
<td>B</td>
<td>A</td>
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<td>A</td>
</tr>
<tr>
<td>106.ie3120.09 75% Evaluate workplace environmental parameters including noise, lighting, and climate</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<tr>
<td>106.ie3120.10 100% Demonstrate the ability to function on multi-disciplinary teams (NS4 e)</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<td>A</td>
</tr>
<tr>
<td>106.ie3120.11 100% Discuss issues of professional and ethical responsibility (ABET - f)</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
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</tbody>
</table>

**Figure 4: Report course_report1**
Course Report-2
This is the second of three reports documenting student performance on individual courses. Here, however, the focus is on the contribution of this course to IE Program Outcomes. In Figure 4 we see that the outcome G3 is mapped from outcomes 2, 4, 7, and 9 with weights A, A, A, & B respectively. We use a linear weighted sum to compute the performance metric for G3 from the components displayed in Figure 4. Course_report2 summarizes the contribution of the IE Outcomes from this course. In addition, the outcome summary statement is displayed. Outcomes not supported by this course are indicated as N/A

![Course Report 2: Support of IE Program Outcomes](image)

Figure 5: Report course_report2
The second column displays the percent of the class that has achieved the IE learning outcome. This is computed by a weighted sum of the several course objectives that contribute to the learning outcome. Relative weights of A=3, B=2, and C=1 are used.

Course Report-3
It would be convenient to display the full hierarchy:

IE Outcome>Outcome Summary Statement>Course Objectives

Course_report3 provides this view. Each outcome is a separate record. The figure below displays multiple pages from the report.

Figure 6: Report course_report3

Connecting the Data input1 and input2
The data contained in tables input1 and input2 is connected in the table oxo (outcomes by objectives). This table is automatically generated by the script initialize described later in this document.
Each related objective/outcome pair in table 1 is expressed as a level of support given by A, B, or C, in which A indicates strong support and C expresses a relevant relationship. In order to fit Figure 1 across a single page of this document, only a partial view of the data is shown. If you were to count the number of A, B, and Cs in the complete matrix, that count would be 41. Each of these relationships is a record in the table oxo.

![Figure 7: Data in Table oxo](image)

The first record in the table states that in table input1 course learning objective 1 supports program outcome IE32 with weight C. When the initialization script is executed, new data records in oxo are created from the data in input1. The semester, course, objective number, outcome ID and the support weight are copied to the oxo record. In addition, the percent of students meeting the objective is copied from input1.

Each course supports several of the IE program outcomes. In Figure 7 learner performance on objective number 1 influences outcomes IE3 and IE4 (with weights C & B) respectively. If we had a complete listing of the records in the oxo table we would see that outcome IE3 is supported by course objectives 1, 2, 3, 4 & 5; the weights are C, C, A, C & C respectively. How can we translate this into a metric for learner performance on IE3? If we use relative weights of 3, 2, and 1 for A, B and C, then the product of learner performance on any objective multiplied by either 1, 2, or 3 will provide a weighted assessment for the contribution of that objective to the metric for performance on the outcome. Within the assessment framework for the IE program, the best performance is indicated by 100% The asmt_comp is the numerical value assigned to the weight A, B, and C, while the wt_pmet is the product of this with the assessed performance on the metric.

**Report: ABET Outcomes Report** *(This section must be updated with new ABET report)*

The next step in the process is to collect all of the outcome reports from the individual courses and collapse them into a report for each IE Program Outcome. Abet_report provides this evaluation data. Each record displayed in the report corresponds to a course report that supports that outcome (see Figure 6); these data are displayed in the portal which has
headings of Semester, Course, Contribution, and Metric. The evaluation for this program outcome is the average of the metrics for the courses.

We can select a time window that we want to use to report our outcome evaluations. This can be accomplished by using the ABET script described in a subsequent section.

Figure 8: ABET Outcomes Report

The portal is sorted using a “custom sort list” \{“f06”,”w07”,”f’07”,”w08”,”f08”\}. This list will have to be updated after the fall semester 2008.

**Initialization Script**

When initializing the database for a new course, the first thing that must be done is to enter the data summarized on input1 and input2. The faculty spreadsheets have been designed with an interface that matches the data in these two tables and data can be imported from these spreadsheets. We will talk about this later in this report.

Initialization is accomplished by executing the initialization script. This creates all of the records in the ancillary tables needed in the database. For example, the initialization script creates the xox and course_report tables for the new course. Before executing the initialization script make sure that in the input1 table you do a find to create a found set that corresponds to only that course. If this is not done, the script will create redundant records for
the other courses displayed in input1. If this happens, you will see these duplicates in various other reports and you will have to manually delete the redundant tables. One future improvement will be to create a dialog within the initialization script that specifies the course to be initialized, the script would find the appropriate records in input1 and check to make sure that the ancillary tables in oxo, etc. have not already been created.

**Ancillary Reports/Tables**
The database contains other tables which become the basis for reports. For many of these the data need be updated only when major changes to the curriculum are made. These include:

course_data
This table contains records that permit us to provide both a formal and short name for each of the courses in the database.

outcomes
This table and report define the IE program outcomes and track the relationship to ABET outcomes.

Course_offerings
This table/report contains the faculty member responsible for each course offering. In addition, it contains a field abet_choose that allows us to deselect any course from inclusion in the ABET outcomes reports (see abet script below).

**Abet Script**
From time to time the decision may be made to exclude a course assessment from inclusion within the ABET outcomes. This is not a normal occurrence, but it may be important if the curriculum committee believes that there are substantial problems with the assessment data. In this case the field abet_choose in the table course_offerings can be changed and the abet script can be run. Simply changing the data in course_offerings is not sufficient. The abet script must be executed to change the report structure. The way that this is accomplished is that there is redundant information in table input2.

![Figure 8: A Portion of data from input2](image)

The last column in this table is the field outcome_Id_abet. When a course is initialized there is identical data in column 3 (outcome_id) and column 6 (outcome_id_abet). However, if a course
is deselected by running the abet script, the data in the last column is overwritten with an x. In the abet_report table and report the key relationship is between abet_report::outcome_id and input2::outcome_id_abet. Only courses that have not been deselected will be matched and appear in outcome_report.

Running Course Reports for Website
The IE Program website contains three course reports from the database course_report1, course_report2 and course_report3.

1. Select layout: course_report1
2. Select FIND and enter the appropriate semester and course number. Semesters are given by f07 or w08 for example. The course number is iexxxx. There is no space between the ie designator and the four digit number xxxx.
3. Perform the FIND
5. In the dialog box set the target destination. This can be the appropriate folder in ADOBE GO LIVE.
6. SAVE
7. Select layout: course_report2 and repeat the same steps
8. Select layout: course_report3 and repeat the same steps. Unlike the first two reports which are each one page in length, course_report3 has several pages—one page for each of the program outcomes addressed by that course. Before saving the pdf file, sort the records on outcomes_id.

Loading Course Spreadsheets from the Database