Appendix A1: Workbook Instructions for Calculating Retention and Graduation Rates

Many colleges and universities have sophisticated systems for building cohort files, updating student progress, and generating reports. This workbook is designed as an introduction at a very basic level and uses Excel 2007 as a tool for managing and analyzing data. The exercises demonstrate a simple method for producing tables of retention and graduation rates using data required for IPEDS reporting.

The workbook in Appendix A2 contains three worksheets labeled ‘Data’, ‘Pivot’, and ‘Tables.’ The workbook in Appendix A2 is read-only, but you can download it to your computer and follow the instructions on the next page to practice with this example before constructing your own workbook.

Compiling the Data

The ‘Data’ worksheet contains 1054 records of data for first-year students in seven cohorts of students who began college between Fall 2002 and Fall 2008. The data elements in the first seven columns (A – G) are required for IPEDS reporting and must be supplied by the institution:

- **EnterDate**: The month and year the student entered the institution. The date can be in any format, such as month/day/year, but only month and year are used for calculations here.
- **ID**: A unique identifier for each student. A “real” system would include the name of each student.
- **Status**: Enrollment status, where ‘F’ indicates full time and ‘P’ indicates part time.
- **Gender**: ‘F’ is female, ‘M’ is male.
- **Ethnicity**: Race/ethnicity is coded as brief descriptions of IPEDS reporting categories; any codes meaningful to the institution can be used.
- **Return2**: ‘1’ if the student returned the following fall, blank if not.
- **GradDate**: The month and year the student graduated. The date can be in any format, such as month/day/year, but only month and year are used for calculations here.

The data elements in columns H-K are calculated using Excel formulas:

- **GradYears**: Number of elapsed academic years to graduation, calculated with the following formula for students on a semester system:
  
  \( =\text{IF(}\text{ISBLANK(G2),"",}\text{IF(MONTH(G2)=12,\text{YEAR(G2)}-\text{YEAR(A2)}+0.5,\text{YEAR(G2)}-\text{YEAR(A2)})}) \)

  *Translation*: If graduation date is blank, then make years to graduation blank also; if the student graduated in December, subtract the entry year from the graduation year and add 0.5 to calculate the number of years to graduation; otherwise, subtract the entry year from the graduation year.

  *Format*: Number with one decimal.

- **Grad4**: Coded ‘1’ for students who graduated in four years or less, using the following formula:
  
  \( =\text{IF(H2<=4,1,""}) \)

  *Translation*: If the student graduated in 4 years or less, code the cell ‘1’; otherwise, blank.

  *Format*: Number with no decimals.

- **Grad5**: Coded ‘1’ for students who graduated in five years, using the following formula:
  
  \( =\text{IF(AND(H2>4,H2<=5),1,""}) \)

  *Translation*: If the student took more than four years to graduate but graduated within five years, code the cell ‘1’; otherwise, make it blank.
• Grad6: Coded ‘1’ for students who graduated in six years, using the following formula:
  =IF(AND(H2>5,H2<=6),1,””)
  Translation: If the student took more than five years to graduate but graduated within six years,
code the cell ‘1’; otherwise, blank.
  Format: Number with no decimals.

Type these formulas in the proper columns in the first row of data, then format the cells, and copy the
formulas to all remaining data rows. When you append new rows of student data, copy the formulas to
those rows as well so the columns will be automatically updated any time you enter a student’s
graduation date.

Creating a Pivot Table

The worksheet ‘Pivot’ contains a pivot table based on the ‘Data’ worksheet. The instructions below
show you how to create the same pivot table, step by step. You can check the worksheet labeled ‘Pivot’
at any time to see how the final result should look.

1. Click in any cell containing
data in the ‘Data’ worksheet.

Select the ‘Insert’ tab on the
ribbon, then click the
‘PivotTable’ icon.

A pop-up window shows the
defaults: the entire data
range is selected,
and the pivot table will be
placed in a new worksheet.

Keep these defaults and click
‘OK’.

Choose the data that you want to analyze
  Select a table or range
  Table/Range: Data!$A$1:$K$1055

Choose where you want the PivotTable report to be placed
  New Worksheet

Create PivotTable
2. Switch to the new worksheet to design your pivot table (probably labeled ‘Sheet1’). Notice that the cursor is within the cells marked ‘PivotTable’ on the left.

If you move the cursor outside this range of cells...

the ‘PivotTable Field List’ on the right will disappear. To display the list, move the cursor back into the pivot table cells.

3. In the ‘PivotTable Field List’, begin by dragging the field ‘EnterDate’ ...

   to ‘Row Labels’.

   A row appears in the PivotTable area for each of the seven years.
4. Sort the years to put the most recent year at the top: **Click a data cell** in any row of the table.

   In the ‘Sort & Filter’ group on the ribbon’s Data tab, **click ‘Z-A’**.

   Sep-08 is now the top row.

5. Count the number of students in each entering fall class:

   First, **drag ‘ID’ to ‘Σ Values’**.

   It will appear in the pivot table as ‘**Count of ID**’, with the size of each fall’s entering class in the column.
6. Add a column to count the students who returned the following fall for a second year:

Drag ‘Return2’ to ‘Σ Values’.

It will appear in the pivot table as ‘Count of Return2’.

7. Now ...

Drag the fields ‘Grad4’, ‘Grad5’, and ‘Grad6’ to ‘Σ Values’ to count the students who graduated in 4, 5, or 6 years.
For these fields, you must sum the students instead of counting them because ‘Count’ will count both the 1s and the blanks calculated by the formula. To sum, click the drop-down arrow by ‘Count of Grad 4’ and select ‘Value Field Settings’.

From that menu, choose ‘Sum’ and click ‘OK’.

Repeat the change from ‘Count’ to ‘Sum’ for the values ‘Grad5’ and ‘Grad6’.
Calculating Retention and Graduation Rates

You now have a simple table showing the size of the entering cohort of first-time degree-seeking students; the number of those students that returned for a second year; and the numbers that graduated in 4, 5, and 6 years. Using this pivot table, you can use Excel formulas to create a more informative table beneath it showing percentages of students rather than counts.

1. In cell A18, type ‘=A5’ and copy the formula in that cell to the six rows below (A19 through A24) to replicate the row labels in the pivot table. In A17, type ‘Entered’ for the column heading.

   Select column headings from A16 through F17...

and click ‘B’ in the Font group on the ribbon’s Home tab to bold them; in the ‘Alignment’ group, click the button to ‘align text right’. This will format all your table’s headings at once.

2. In cell B18, type ‘=B5’ and copy the formula in that cell to the six rows below (B19 through B24) to replicate the number of incoming students in each fall cohort. In B16, type ‘Total’; in B17, type ‘Students’.
3. Calculate the percentage of students in the cohort who returned for a second year: In C18, type the formula ‘=C5/B5’. Copy the formula in this cell to C19 through C24. Type ‘Returned Second Year’ in the cells above to label the column.

Select these retention (and what will soon be your graduation rate) cells from C18 through F24.

In the ‘Number’ group of the ribbon’s Home tab, click the button to change the formats to %. By expressing retention as a percentage, the return rates for different years are easy to compare.

4. When this ‘Data’ worksheet was created, the most recent graduation data available was for students who entered in fall 2005. In D21, type ‘=D8/B8’, and copy this formula to the cells below. Title the column ‘Graduated Within 4 Years.’

5. The five-year graduation rate should be cumulative to show the total number of students who graduated within five years – that is, in four or five years. In E22, type ‘=(E9+D9)/B9’, and copy to the cells below. Title the column ‘Graduated Within 5 Years.’
6. Calculate a six-year cumulative graduation rate: in F23, type `=(F10+E10+D10)/B10'`, and copy to the cell below. Title the column ‘Graduated Within 6 Years.’

<table>
<thead>
<tr>
<th></th>
<th>Total Returned</th>
<th>Graduated Within 4 Years</th>
<th>Graduated Within 5 Years</th>
<th>Graduated Within 6 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>160</td>
<td>84%</td>
<td>87%</td>
<td>74%</td>
</tr>
<tr>
<td>18</td>
<td>101</td>
<td>83%</td>
<td>88%</td>
<td>73%</td>
</tr>
<tr>
<td>19</td>
<td>148</td>
<td>89%</td>
<td>86%</td>
<td>73%</td>
</tr>
<tr>
<td>20</td>
<td>155</td>
<td>84%</td>
<td>83%</td>
<td>74%</td>
</tr>
<tr>
<td>21</td>
<td>152</td>
<td>80%</td>
<td>71%</td>
<td>73%</td>
</tr>
<tr>
<td>22</td>
<td>142</td>
<td>82%</td>
<td>62%</td>
<td>73%</td>
</tr>
<tr>
<td>23</td>
<td>135</td>
<td>85%</td>
<td>64%</td>
<td>76%</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td>78%</td>
</tr>
</tbody>
</table>

This table you have just constructed shows retention and graduation rates for seven incoming cohorts of first-time degree-seeking students.

**Saving a Table**

Now the fun begins – you’re ready to do some analysis. But first, save a copy of the table you just constructed in a new worksheet. You’ll be creating and saving a series of tables that can be shared or published – see the worksheet labeled ‘Tables’ for examples.

1. Add a new worksheet: at the bottom of the workspace, click the ‘Insert Worksheet’ icon.

2. Return to your pivot table worksheet. Select all the cells containing your constructed table (A16 through F24). Right-click and choose ‘Copy’.

3. Click the tab of your new worksheet (probably Sheet2), place the cursor in A4, right-click and choose ‘Paste Special’...
choose ‘Column widths’, and click ‘OK’.

Then right-click again, choose ‘Paste Special’, choose ‘Values and number formats’, and click ‘OK’.

You’ll have to bold and right-justify your column headings as you did in Calculating Retention and Graduation Rates (Step 1), but the values for your rows are preserved in this copy.

4. Insert a row that describes this group of students:

Place the cursor in A6, right-click,

choose ‘Insert’,

choose ‘Entire Row’, and click ‘OK’.

Place the cursor in A6 and type ‘All Students’. Use buttons in the Font group on the ribbon’s Home tab to **left justify** and **italicize** this heading. You can **color the row** by selecting A6 – F6 and choosing a ‘Text Highlight Color’ from the Font group.
5. **Add a title** for your table, like the one in rows 1 – 2 of the ‘Tables’ worksheet.

Calculating Rates for Specific Populations

To calculate the retention and graduation rates for different subgroups of the cohorts, you will use the filtering capability of the pivot table.

1. Return to your pivot table worksheet and insert several blank rows above the pivot table to make space for filters: Select A1 – A6, right-click, choose ‘Insert’, choose ‘Entire Row’, and click ‘OK’. You should have several blank rows above the pivot table.

2. Move your cursor to any cell in the pivot table to display the ‘Pivot Table Field List’.

3. Drag the field ‘Status’ down...
to the ‘Report Filter’ area.

Note that ‘Status (All)’ appears above the pivot table. **Click the drop-down menu arrow.** Status has two codes, F (full time) and P (part time), plus a code ‘(All)’ to select all cases. **Click F and ‘OK’** and notice that the values in both the pivot table and the constructed table change to show retention and graduation numbers for full-time students.

Save the constructed table in **Sheet2**, below the table for all first-year students, **by repeating Step 3 in ‘Saving a Table’ above**, but **copy only the rows containing numbers (A24 – F30) and paste the values and number formats in A15**. In Row 14, add the header ‘Full Time’.

4. **IPEDS also requires retention rates for part-time students.** **Return to the pivot table** and click ‘P’ in the drop-down menu for ‘Status’. **Copy A24 – F30 and paste the values and number formats to A23 in Sheet2.** In Row 22, add the header ‘Part Time’.
5. Return to the pivot table and click (All) in the drop-down menu for 'Status' to reset the table to its original values.

You now have a set of tables that shows you at a glance the retention rates for all first-time students and how the rates compare for full-time and part-time students. In this data set, there are very few part-time students, and the retention rates are much more variable than those for full-time students. We'll continue the analysis by adding Gender as a second filter.

1. Move your cursor to any cell in the pivot table to display the 'Pivot Table Field List',

and drag the field 'Gender' down to the 'Report Filter' area.

Now 'Gender (All)' appears in the pivot table below 'Status'. Click the drop-down menu arrow. Gender has two codes, M and F. Click F and 'OK' to see the retention and graduation info for females.
Save the data to Sheet2 and add a header.

2. Return to the pivot table and switch to males by clicking ‘M’ and ‘OK’ in the drop-down menu. Save this table also.

With these two filters, you can calculate the rates for full- and part-time men and women by clicking the appropriate codes in the filters above the pivot table. Add the field ‘Ethnicity’ to ‘Report Filter’ and you can calculate the numbers by race/ethnicity for the IPEDS GRS report. You can also calculate rates for any combination of codes available in the three filters. You can set the filters back to ‘All’ at any time to restore the original table.

With ‘Ethnicity’ and other fields with multiple codes, you can filter on code combinations. Click the drop-down menu, check the box ‘Select multiple items’, and click ‘OK’. Now there are checkboxes next to each code. You can calculate the retention and graduation rates for all minority students: Click ‘All’ to clear the checkboxes; check ‘Asian’, ‘Black’, ‘Hispanic’, and ‘Indian’; then click ‘OK’. Remember, you can save a table at any time by copying the values and number formats to another worksheet.

This workbook has given you an introduction to the basics of setting up a data file, creating a pivot table, and using the pivot tables for analysis. By adding more fields to the data file, such as those discussed on pages x-y, you can calculation retention and return rates for characteristics beyond IPEDS that reflect the mission and programs of a particular institution. After you add rows of student data or new columns of characteristics to the ‘Data’ worksheet, go to the pivot table, right-click within the table, and choose ‘Refresh.’ This will bring the new data into the pivot table and make it available for analysis.