

District Data Coordinator Toolbox: Implementing Database Connections in SPSS

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Data, data, everywhere

The volume of and the push to make use educational data is growing:

- More people must become data savvy (teachers, coordinators, etc.)
- Leadership may request cyclical reporting to establish and monitor trends
- Little time to document business rules or standardize data storage practices
- Quality control can take time or be difficult to manage

Teachers, principals, administrators and analysts often have difficulty keeping pace.



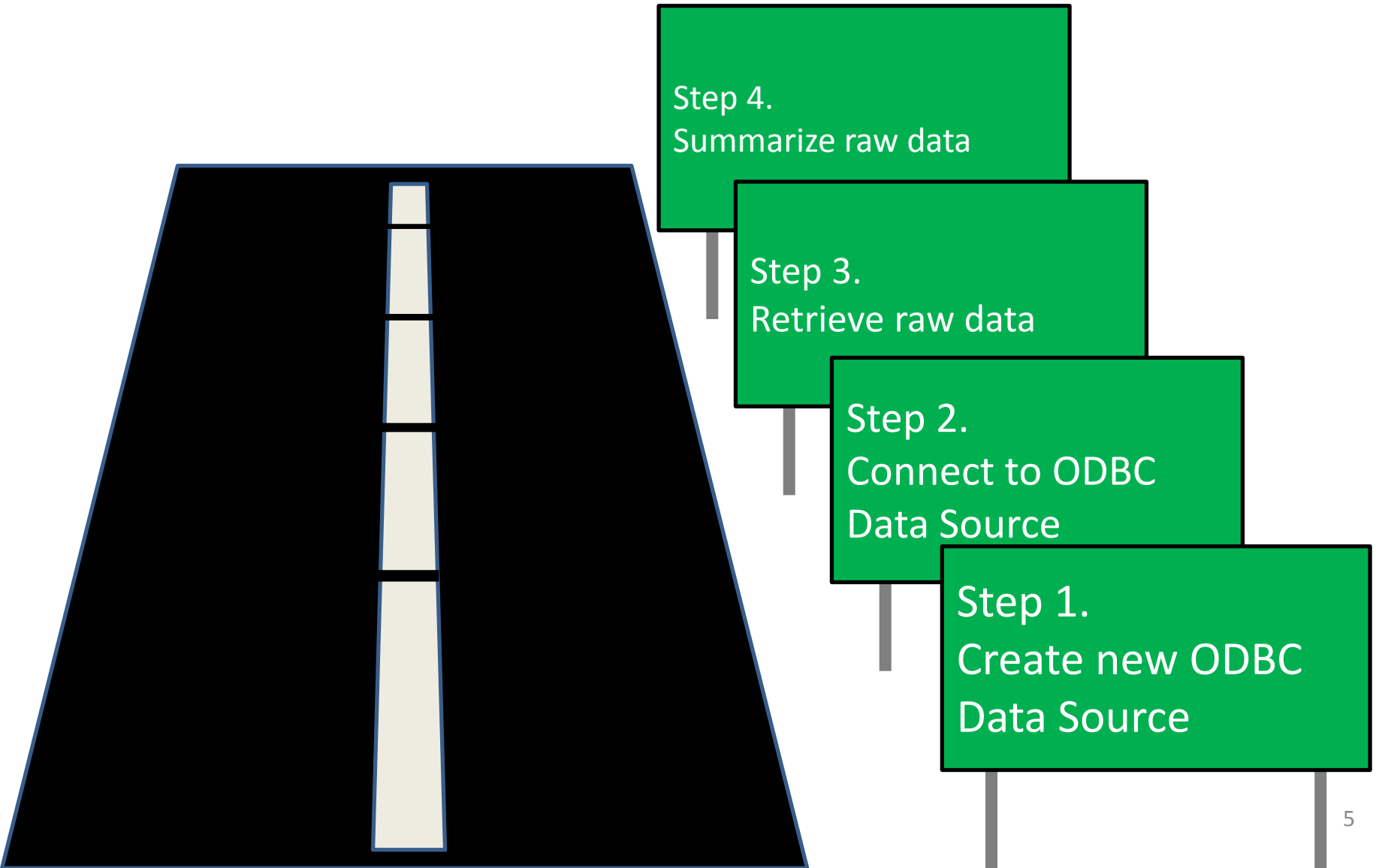
Some familiar scenarios (using data stored in SQL, Oracle, Access, etc.)

- The same data points are necessary across reporting cycles
- Process to acquire and report data is repetitive across reporting cycles
- A non-technical person may be tasked with reporting responsibility
- Lack of documentation
- Analysts report shortage of storage space on network or external hard drives
- Analysts are maintaining idiosyncratic versions of various data elements (e.g. test score files, student attendance files, etc.)
- Idiosyncratic versions have commonalities across analyst versions
- Separate data requests completed by different analysts yield conflicting results (e.g. a school mean test score)

Database connections

- Databases (e.g., SQL, Oracle, Access, etc.) allow for basic data base connectivity:
 - Open Database Connectivity (ODBC)
 - Object Linking and Embedding Database (OLEDB)
 - These are often standard on computers
- ODBC/OLEDB connections are frameworks to allow data manipulation software (e.g. Excel, SPSS, SAS) to communicate with databases

Road map to data connectivity



Traveling the road by example

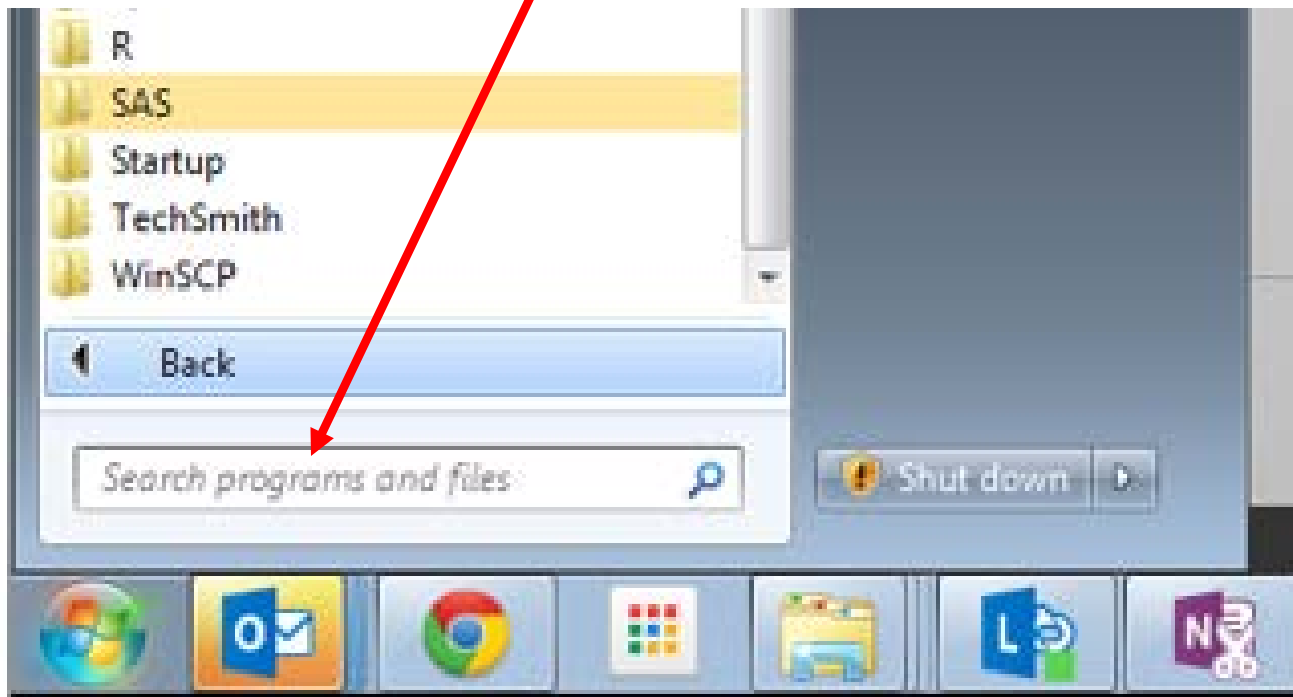
- To follow the steps in our road map to connectivity, let's assume the following example:
 - District leadership has asked us to examine reading achievement as measured by reading assessment achievement levels
 - Leadership is specifically interested in 6th grade student performance
 - They want to examine performance by student Limited English Proficient (LEP) status.
 - The data we need to obtain are stored in an Access database

Creating an ODBC data source

- The first step is to create an ODBC Data Source centered on an existing database such as Access, SQL, or Oracle. ODBC Data Sources are frameworks, or linkages for software packages such as SPSS to communicate with databases

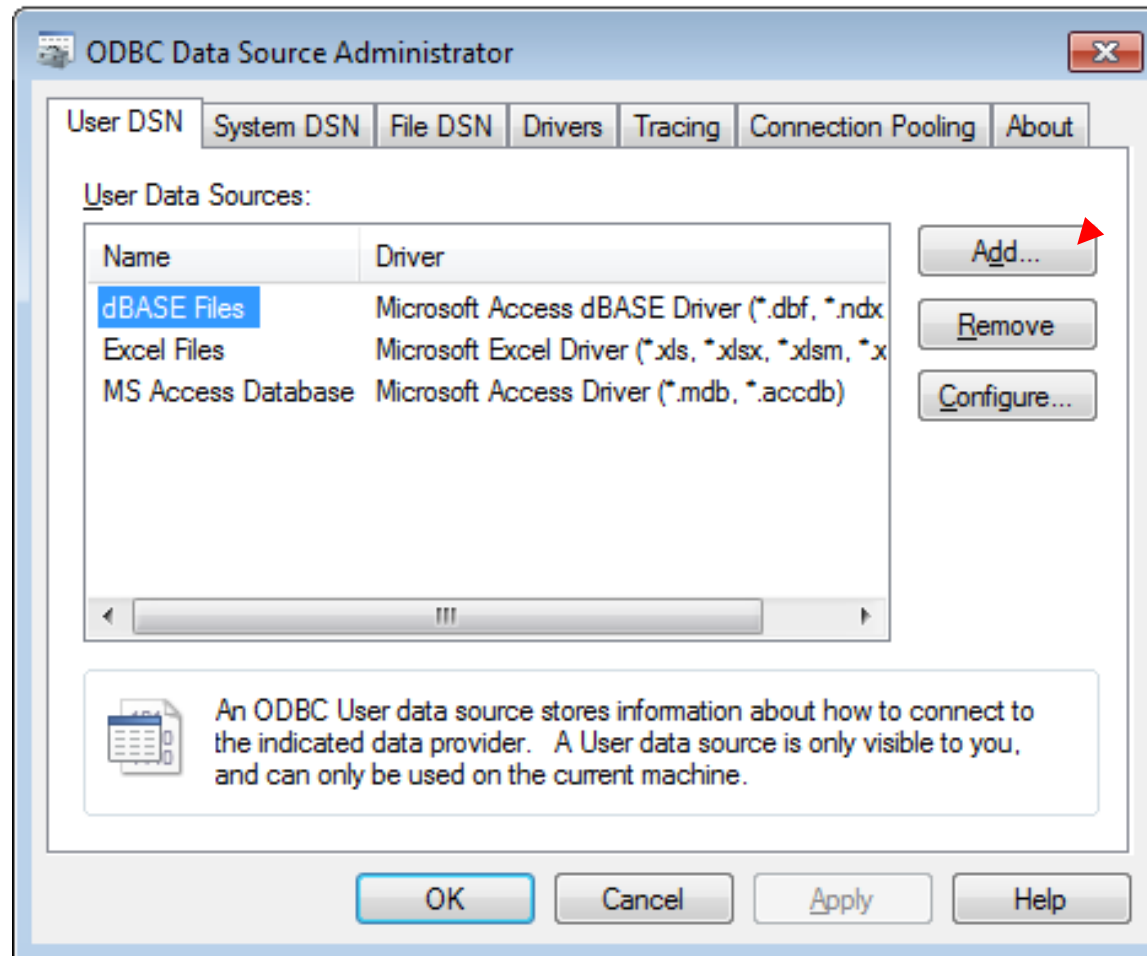
Open ODBC administrator window

- Type 'ODBC' in Search Box and press Enter



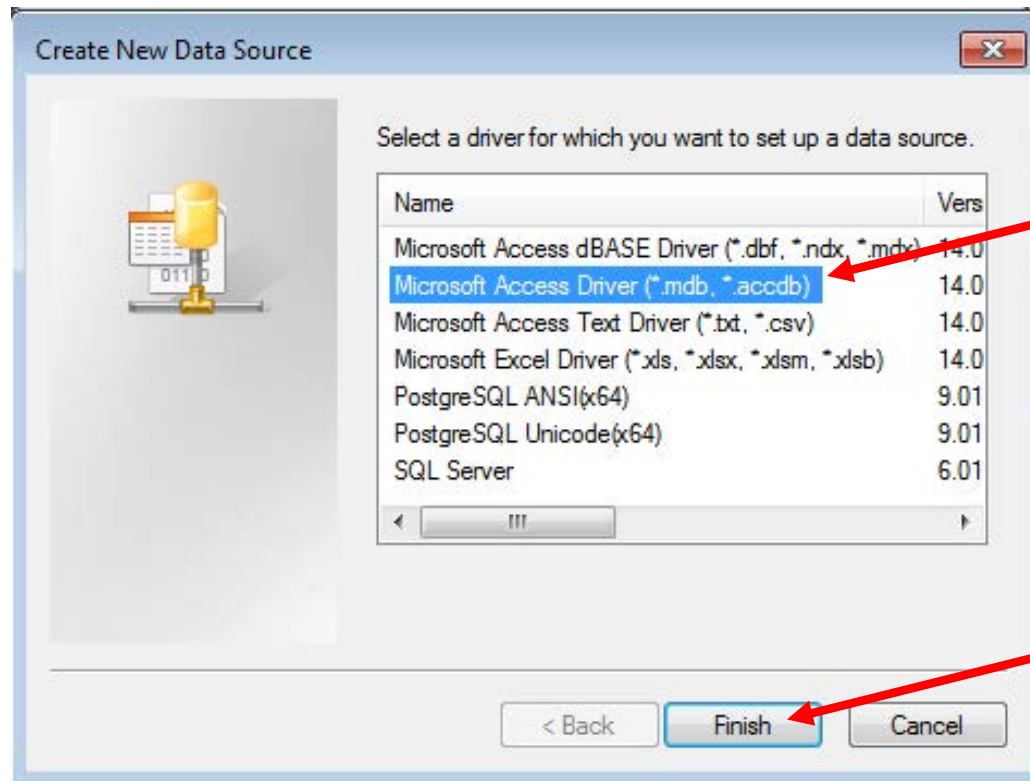
Add a new data source

- Click 'Add' to begin adding a new ODBC data source



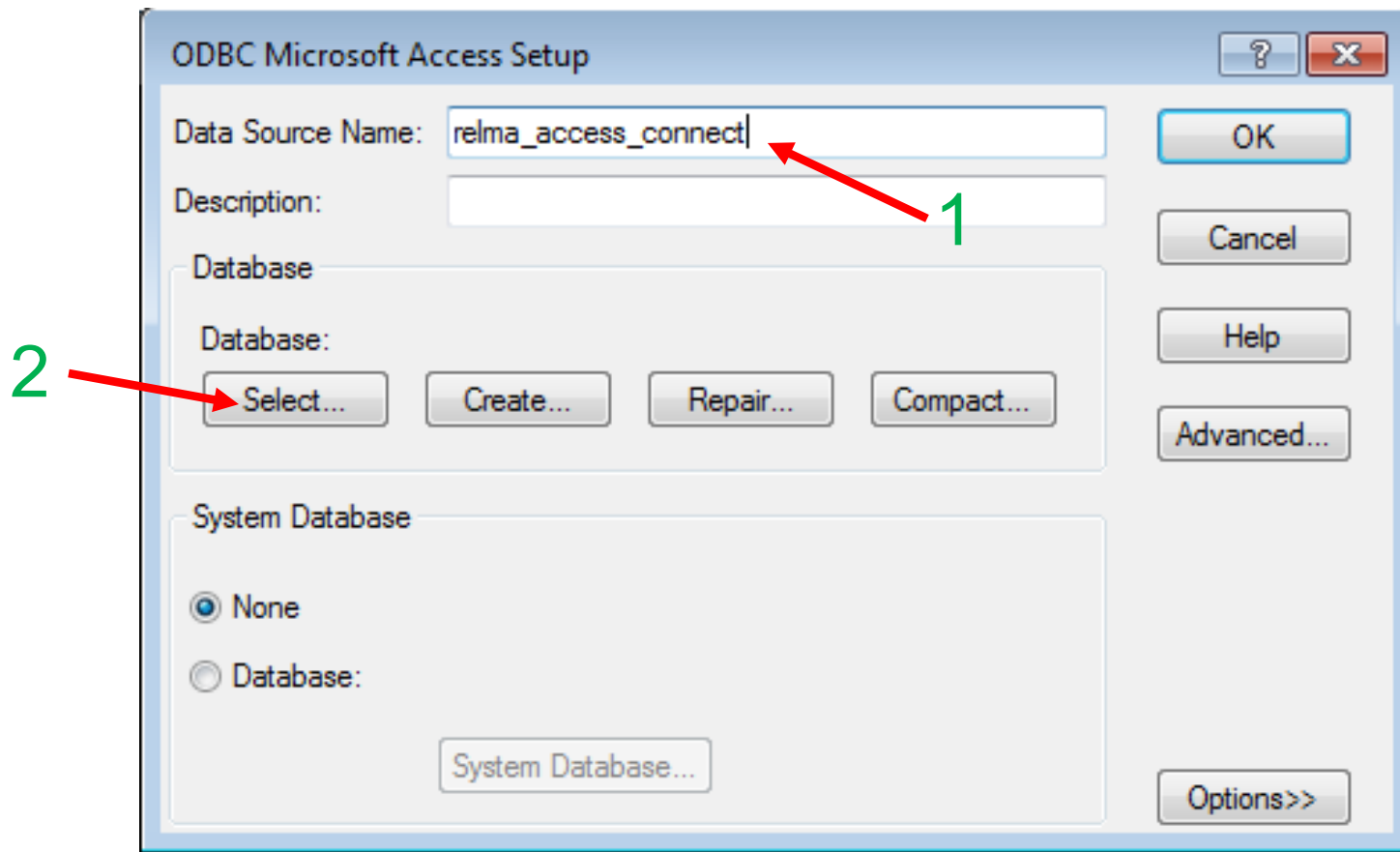
Choose a driver for the data source

1. Choose driver for connection to a source (in this example, we connect to an Access database)
2. Click Finish



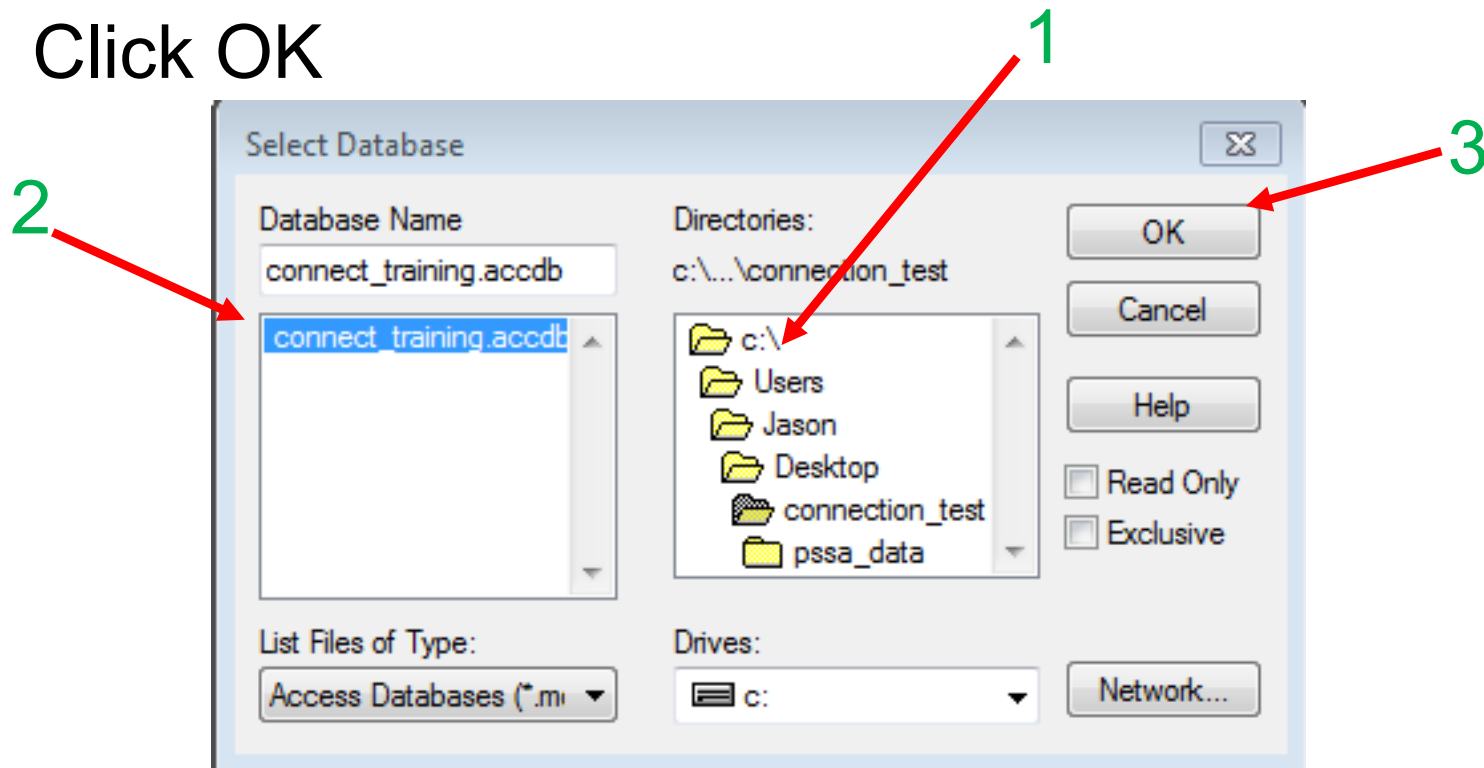
Name the database connection

1. Name the connection to the database
2. Click 'Select' button under Database



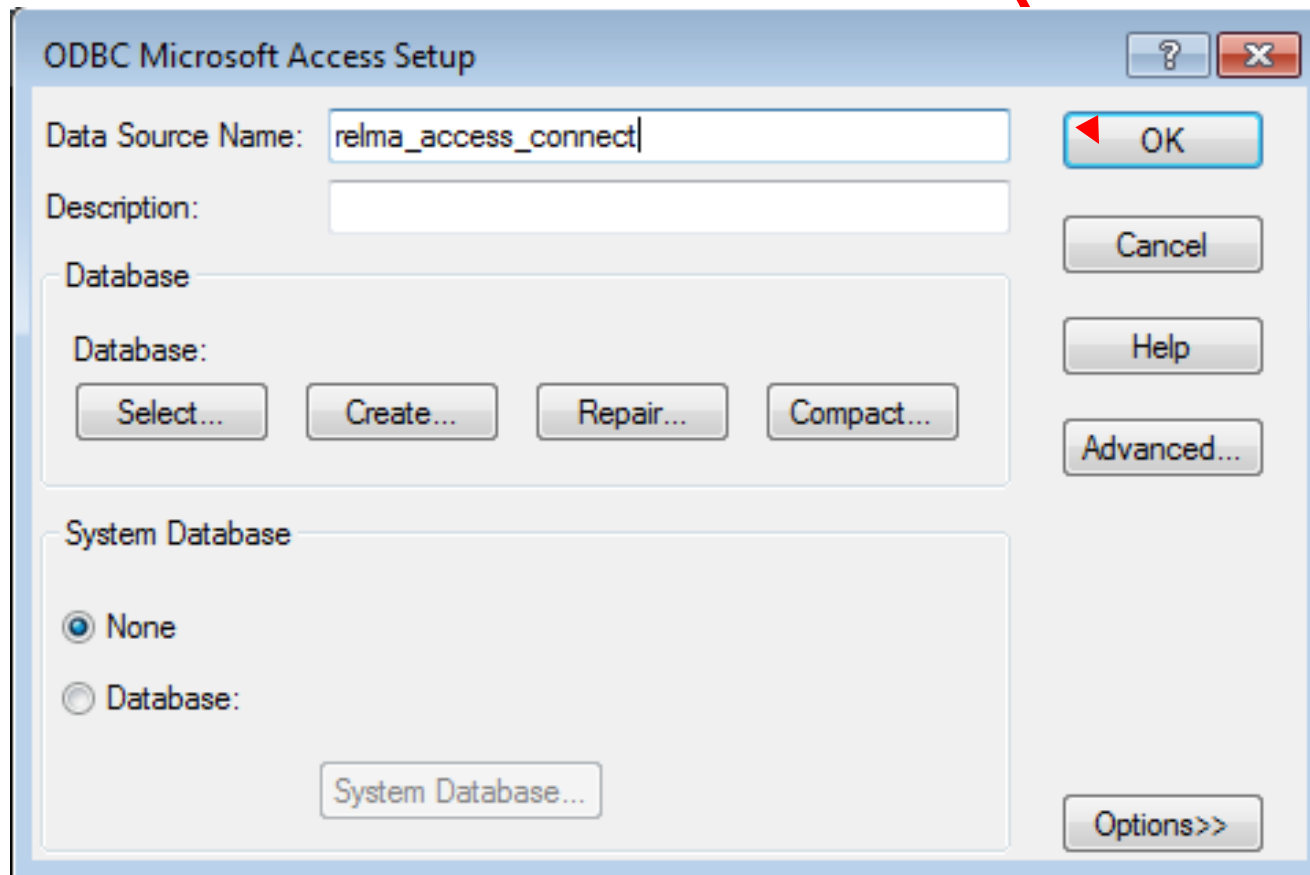
Select source database

1. Navigate to location of the database (the Access database we want to connect to in this example)
2. Select source database
3. Click OK



Click OK for data source name

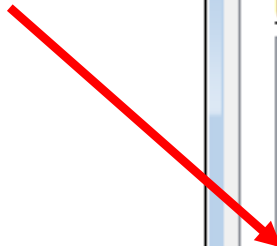
- Click OK button under Database



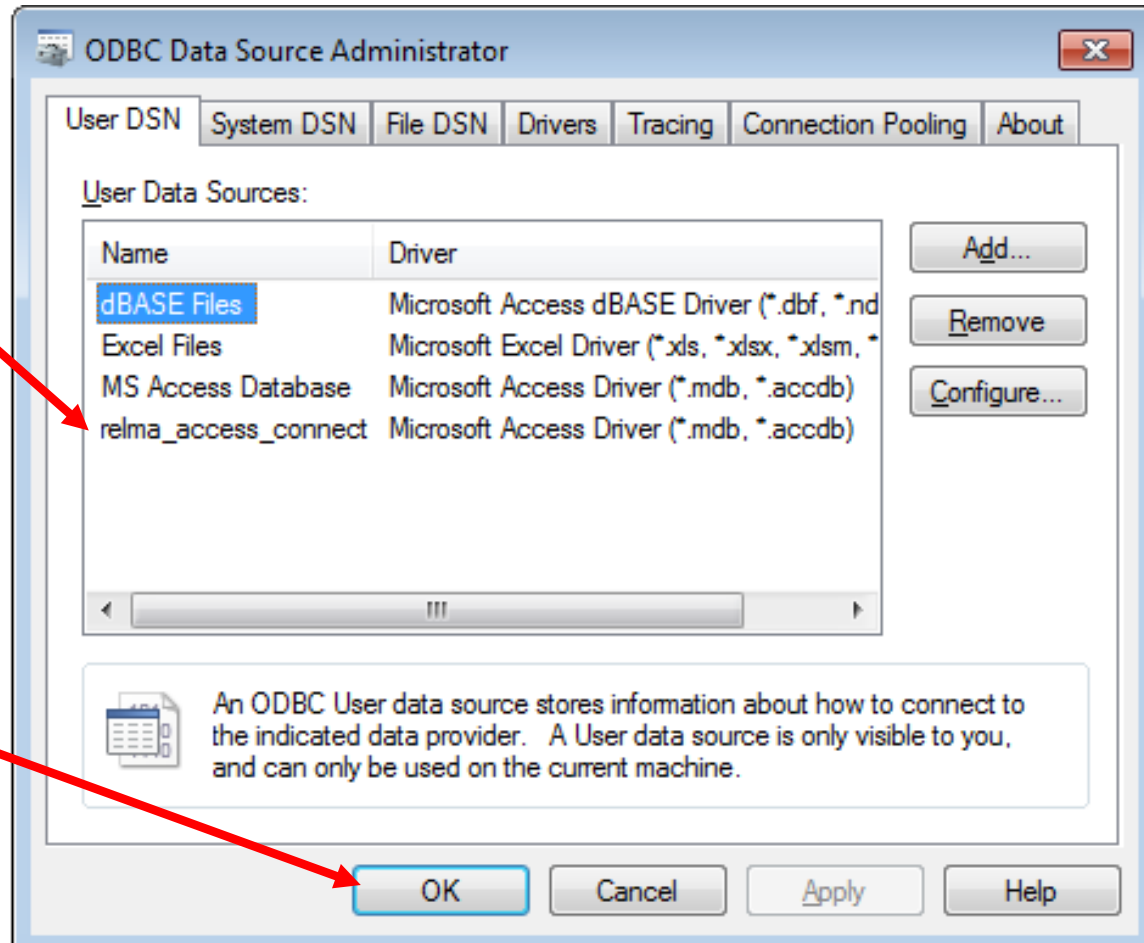
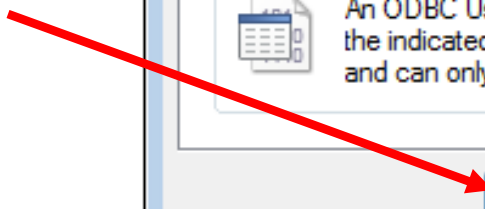
New data source appears in ODBC directory

1. New data source listed in ODBC directory
2. Click OK

1



2

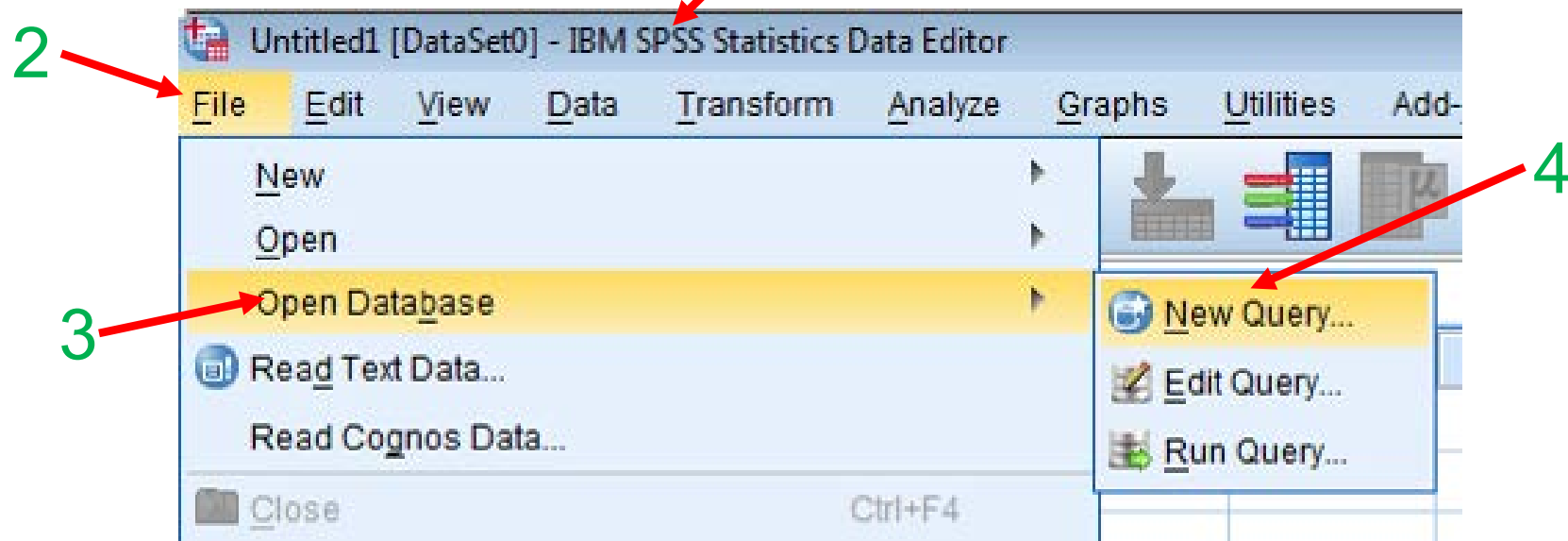


Connecting to a Database

- Now that our ODBC data source exists for communicating with the database, the information in the database can be extracted directly into other software packages (e.g. SPSS) for further manipulation

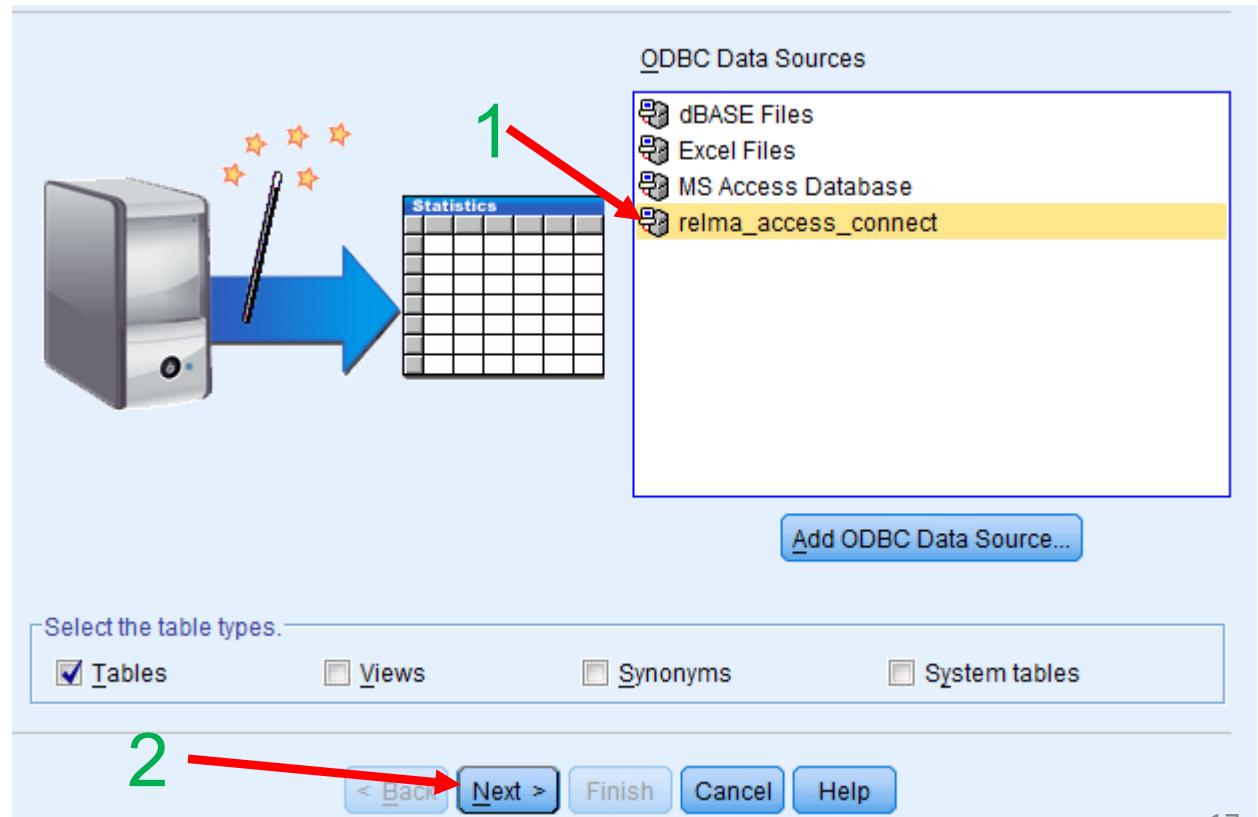
Connect to database using SPSS

1. Open an instance of SPSS (screenshots use SPSS 22.0)
2. Navigate to the File menu in SPSS
3. Click on 'Open Database'
4. Select 'New Query'



Choose your data source

1. Select the data source of interest (in this example, the relma_access_connect data source)
2. Click Next



View available tables in data source

- Now we can view data tables in the database
 - student_assessments
 - student_demographics
- Press ‘+’ button to list variables in student_demographics table

Select Data

Select the fields you want to retrieve. Then click the arrow button or drag the fields to the Retrieve Fields list.

Tip: Selecting a table selects all of its fields.

Available Tables:

☒ student_assessments
☐ student_demographics

Retrieve Fields in this Order:

☐ Sort field names

Show:

☒ Tables

☐ Views

☐ Synonyms

☐ System tables

< Back


Next >

Finish

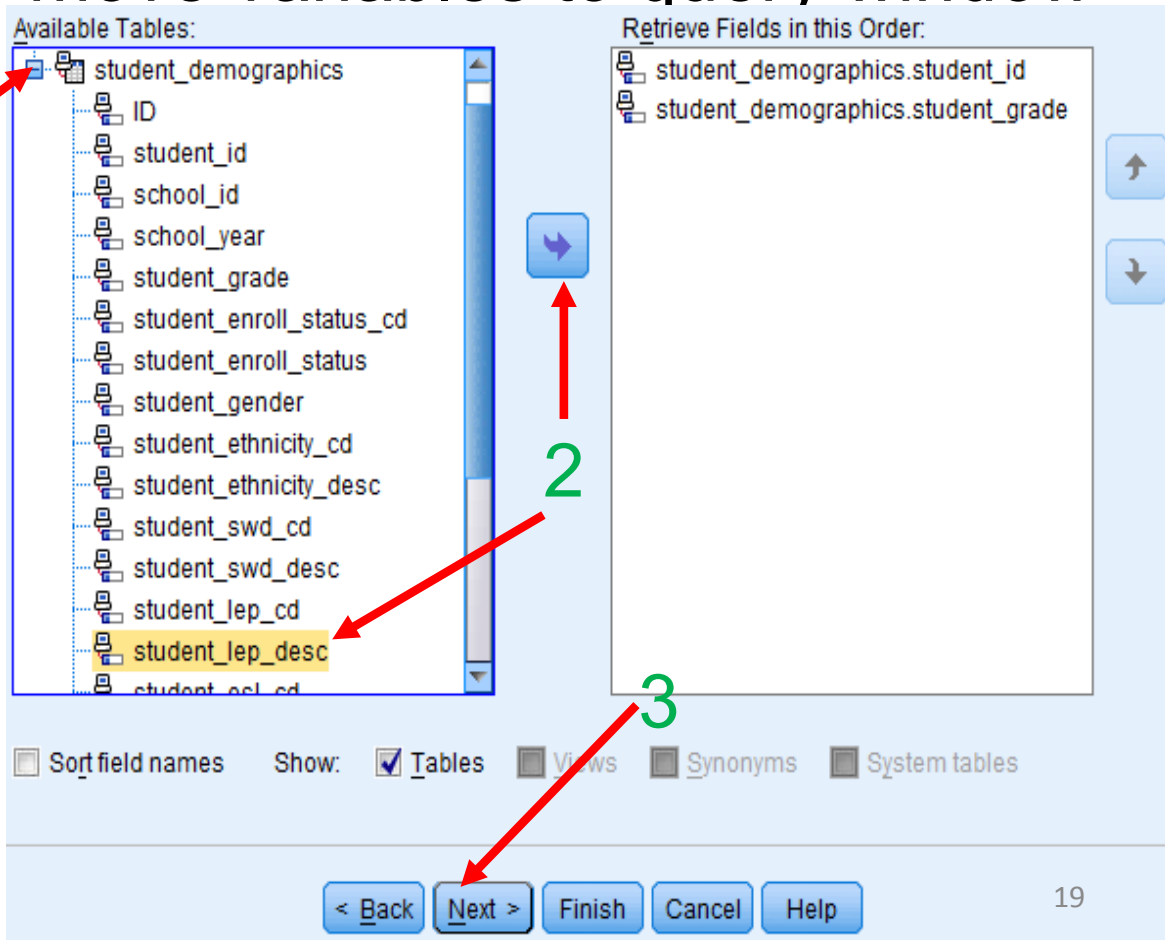
Cancel

Help

Select demographic variables

1. Click on variables in student_demographics table
2. Click  arrow to move variables to query window

- a) Student_id
(student identification number)
- b) Student_grade
(student grade level)
- c) Student_lep_desc
(student LEP status description)



Available Tables:

- student_demographics
 - ID
 - student_id
 - school_id
 - school_year
 - student_grade
 - student_enroll_status_cd
 - student_enroll_status
 - student_gender
 - student_ethnicity_cd
 - student_ethnicity_desc
 - student_swd_cd
 - student_swd_desc
 - student_lep_cd
 - student_lep_desc
 - student_race_cd

Retrieve Fields in this Order:

- student_demographics.student_id
- student_demographics.student_grade

Sort field names Show: ☒ Tables ☐ Views ☐ Synonyms ☐ System tables

< Back Next > Finish Cancel Help

3. Click Next

Select assessment variables

1. Press '+' to list variables in student_assessments table
2. Select reading_achmnt_lvl from student_assessments table
3. Click ➡ arrow to move variable to query window
4. Click Next

The screenshot displays a database query builder interface. On the left, under 'Available Tables:', the 'student_assessments' table is expanded, showing a list of fields: ID, student_id, math_scalescore, math_achmnt_lvl, math_zscore, math_testgrade, reading_scalescore, reading_achmnt_lvl, reading_zscore, and reading_testgrade. The 'student_demographics' table is also listed below. A red arrow labeled '1' points to the '+' icon next to 'student_assessments'. A red arrow labeled '2' points to 'reading_achmnt_lvl'. A red arrow labeled '3' points to the right-pointing arrow button between the two panels. On the right, under 'Retrieve Fields in this Order:', the selected field 'student_assessments.reading_achmnt_lvl' is listed. A red arrow labeled '4' points to the '> Next' button at the bottom of the interface. The bottom of the interface includes checkboxes for 'Sort field names', 'Show: Tables' (checked), 'Views', 'Synonyms', and 'System tables', along with buttons for '< Back', '> Next', 'Finish', 'Cancel', and 'Help'.

Adding/deleting relationships

1. Auto Join will find variables in common among tables and join them automatically
2. Un-Check the Auto Join Tables button (all joins are removed)

Specify Relationships

In order to retrieve data from multiple tables, you must specify how to join them. To indicate a join, first select the type of join that you want. Then drag a field from one table over the corresponding field in the other table. Alternatively, you can select the two fields and press the Join button.

The screenshot shows the 'Specify Relationships' dialog box with two tables listed:

- student_demographics**

ID	COUNTER
school_id	DOUBLE
school_year	DOUBLE
student_birthdate	DATETIME
student_enroll_status	VARCHAR
student_enroll_status_cd	VARCHAR
student_entry_cd	VARCHAR
student_entry_date	DATETIME
student_esl_cd	VARCHAR
student_esl_desc	VARCHAR
student_ethnicity_cd	VARCHAR
student_ethnicity_desc	VARCHAR
student_gender	VARCHAR
student_gifted_cd	VARCHAR
student_grade	VARCHAR
student_id	VARCHAR
student_lep_cd	VARCHAR
- student_assessments**

ID	COUNTER
math_achmnt_lm	DOUBLE
math_scalescore	DOUBLE
math_testgrade	DOUBLE
math_zscore	DOUBLE
reading_achmnt_lm	DOUBLE
reading_scalescore	DOUBLE
reading_testgrade	DOUBLE
reading_zscore	DOUBLE
student_id	VARCHAR

A red arrow points from the 'student_id' field in the 'student_demographics' table to the 'student_id' field in the 'student_assessments' table. A green arrow points to the 'Auto Join Tables' checkbox, which is currently checked. The 'Join Type' is set to 'Inner'. At the bottom, there are buttons for '< Back', 'Next >', 'Finish', 'Cancel', and 'Help'.

Join types

1. Change type of join using drop-down button

- a) Inner Join returns *only* records with matching student_ids in both tables
- b) Right Join returns *all* records from student_assessments and records with matches in student_demographics
- c) Left Join returns *all* records from student_demographics and records with matches in student_assessments

Specify Relationships

In order to retrieve data from multiple tables, you must specify how to join them. To indicate a join, first select the type of join that you want. Then drag a field from one table over the corresponding field in the other table. Alternatively, you can select the two fields and press the Join button.

student_demographics	
ID	COUNTER
school_id	DOUBLE
school_year	DOUBLE
student_birthdate	DATETIME
student_enroll_status	VARCHAR
student_enroll_status_cd	VARCHAR
student_entry_cd	VARCHAR
student_entry_date	DATETIME
student_esl_cd	VARCHAR
student_esl_desc	VARCHAR
student_ethnicity_cd	VARCHAR
student_ethnicity_desc	VARCHAR
student_gender	VARCHAR
student_gifted_cd	VARCHAR
student_grade	VARCHAR
student_id	VARCHAR
student_lev_cd	VARCHAR

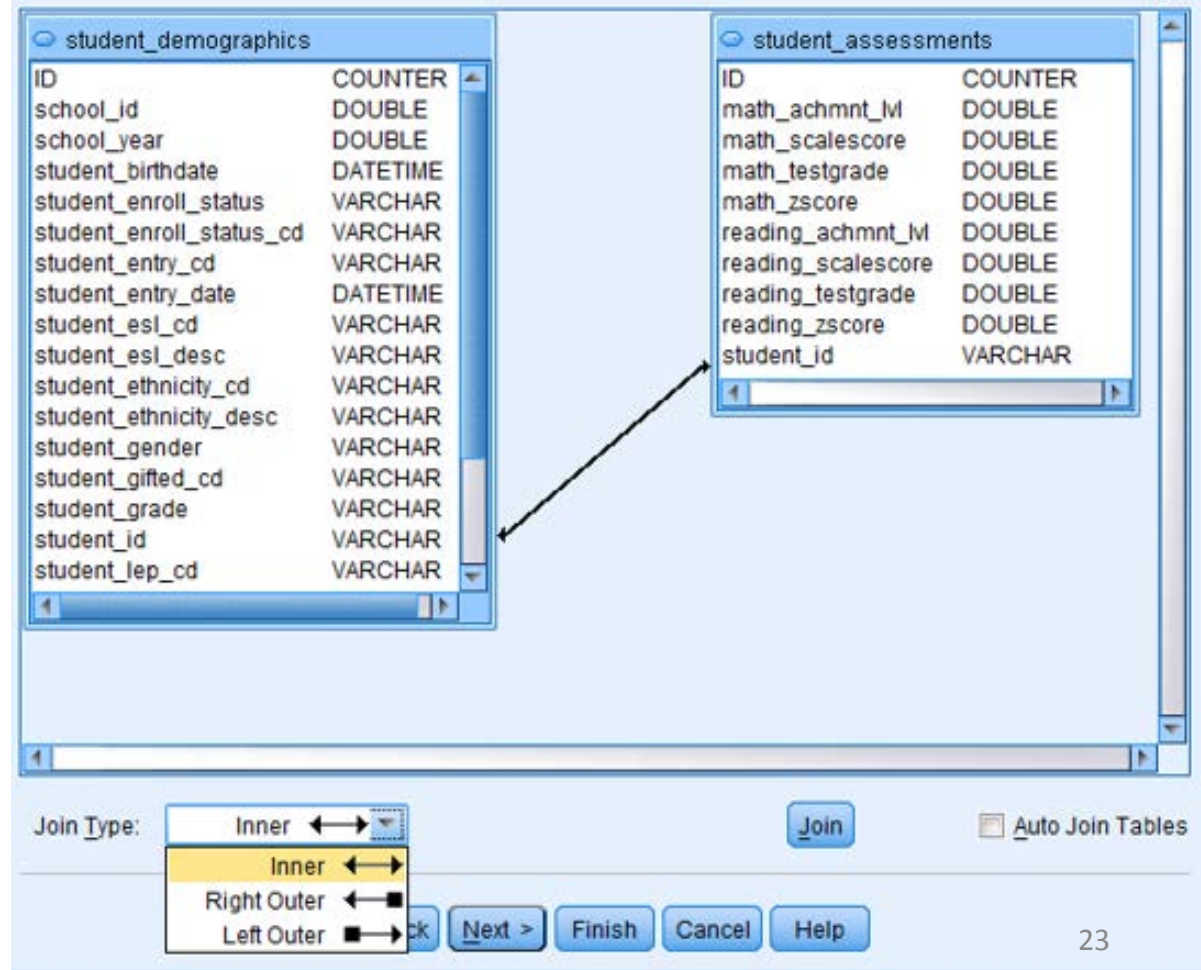
student_assessments	
ID	COUNTER
math_achmnt_lvl	DOUBLE
math_scalescore	DOUBLE
math_testgrade	DOUBLE
math_zscore	DOUBLE
reading_achmnt_lvl	DOUBLE
reading_scalescore	DOUBLE
reading_testgrade	DOUBLE
reading_zscore	DOUBLE
student_id	VARCHAR

Join Type: Inner Join ☒ Auto Join Tables

< Back Next > Finish Cancel Help

Specifying join types

1. Click and hold on variable in one table, drag mouse to corresponding field in other table (in this example, create relationship from student_id-to-student_id)
2. Be sure that 'Inner' is specified in the Joint Type dropdown box
3. Click Next



Filter data during data retrieval

- Returned data can be filtered during retrieval

1. Select student_grade from Column to filter window
2. Use drop-down to select criteria operation ('=')
3. Enter '06' to return only 6th grade student data
4. Click Next

The screenshot shows the 'Filter Data' dialog box in SPSS. The 'Fields:' list on the left contains 'student_demographics.s...', 'ID', 'student_id', 'school_id', 'school_year', 'student_grade', 'student_enroll', and 'student_enroll'. A red arrow labeled '1' points to 'student_grade'. The 'Criteria:' table has columns 'Expression 1', 'Relation', and 'Expression 2'. A red arrow labeled '2' points to the 'Relation' column, which contains '='. A red arrow labeled '3' points to the 'Expression 2' column, which contains '06'. The 'Functions:' list at the bottom left contains various mathematical and string functions. A red arrow labeled '4' points to the 'Next >' button at the bottom right of the dialog box.

Expression 1	Relation	Expression 2
student_demographics.s...	=	'06'

Buttons at the bottom: < Back, Next >, Finish, Cancel, Help

Define variables during data retrieval

- The query can recode character string data to numeric during retrieval

1. Check the box to recode chosen variables to numeric (not in this example)
2. Change width for character string variables (or minimize based on observed values)
3. Click Next

	Result Variable Name	Data Type	Recode to Numeric
student_demographics.student_id	student_id	String	<input type="checkbox"/>
student_demographics.student_grade	student_grade	String	<input type="checkbox"/>
student_demographics.student_lep_de...	student_lep_desc	String	<input type="checkbox"/>
student_assessments.reading_achmnt...	reading_achmnt_lvl	Numeric	<input type="checkbox"/>

Width for variable-width string fields: ☐ Minimize string widths based on observed values

< Back Next > Finish Cancel Help

Retrieving results

- The query wizard generates SQL code for use inside SPSS syntax windows

1. First option will pull data directly into SPSS
2. Second option will paste in SPSS syntax window
3. Click Finish

SELECT T0.student_id, T0.student_grade, T0.student_lep_desc, T1.reading_achmnt_M FROM student_demographics T0, student_assessments T1 WHERE T0.student_id = T1.student_id AND (T0.student_grade = '06')

What would you like to do with this query?


☒ Retrieve the data I have selected.

☐ Paste it into the syntax editor for further modification

Save query to file

Retrieved data in table form

- Resulting data returned to SPSS, ready for analysis



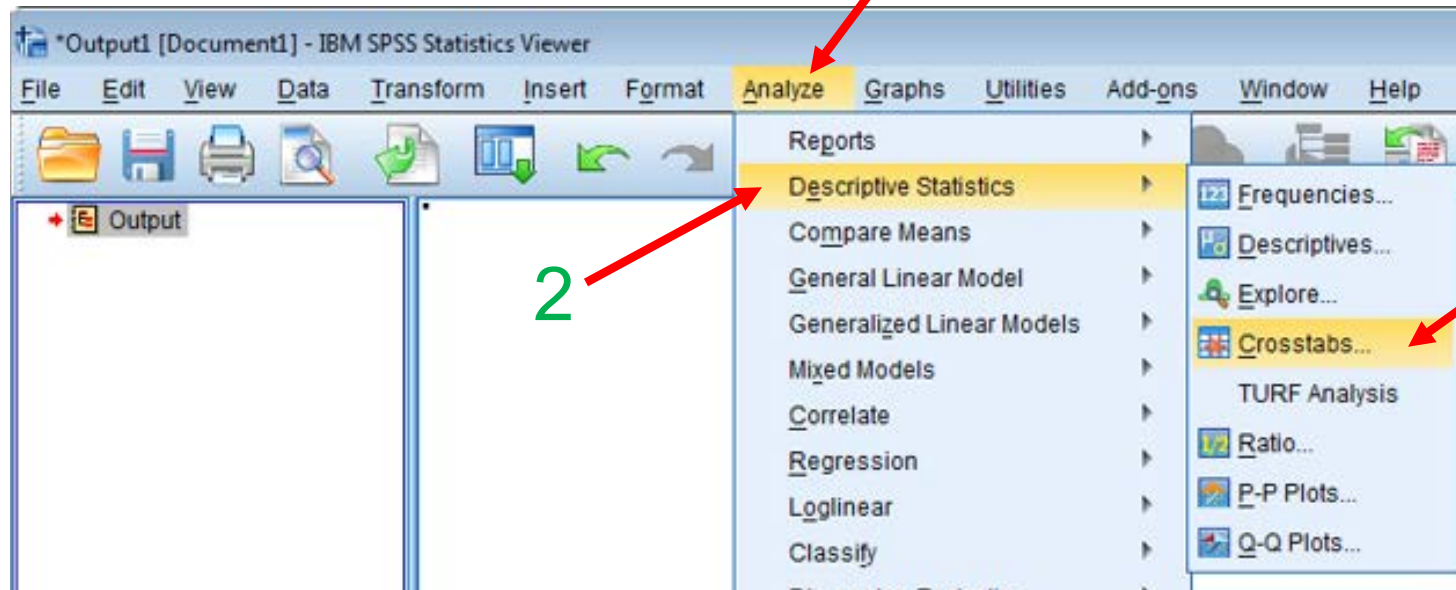
	student_id	student_grade	student_lep_desc	reading_achmnt_lm	var
1	1668822	06	LEP with End Date	3.00	
2	8281080	06	LEP with End Date	3.00	
3	8282887	06	LEP with End Date	2.00	
4	8284052	06	LEP with End Date	2.00	
5	8289278	06	LEP with End Date	2.00	
6	8294530	06	LEP with End Date	3.00	
7	8298963	06	LEP with End Date	3.00	
8	8299248	06	LEP with End Date	3.00	
9	8300223	06	LEP with End Date	3.00	
10	8300224	06	LEP with End Date	3.00	
11	8300231	06	LEP with End Date	3.00	

Summarize data retrieved from connection

- If we want something that is more friendly for leadership, we may want to summarize the raw data
- For this example, we will use a Crosstabs analysis to summarize the data

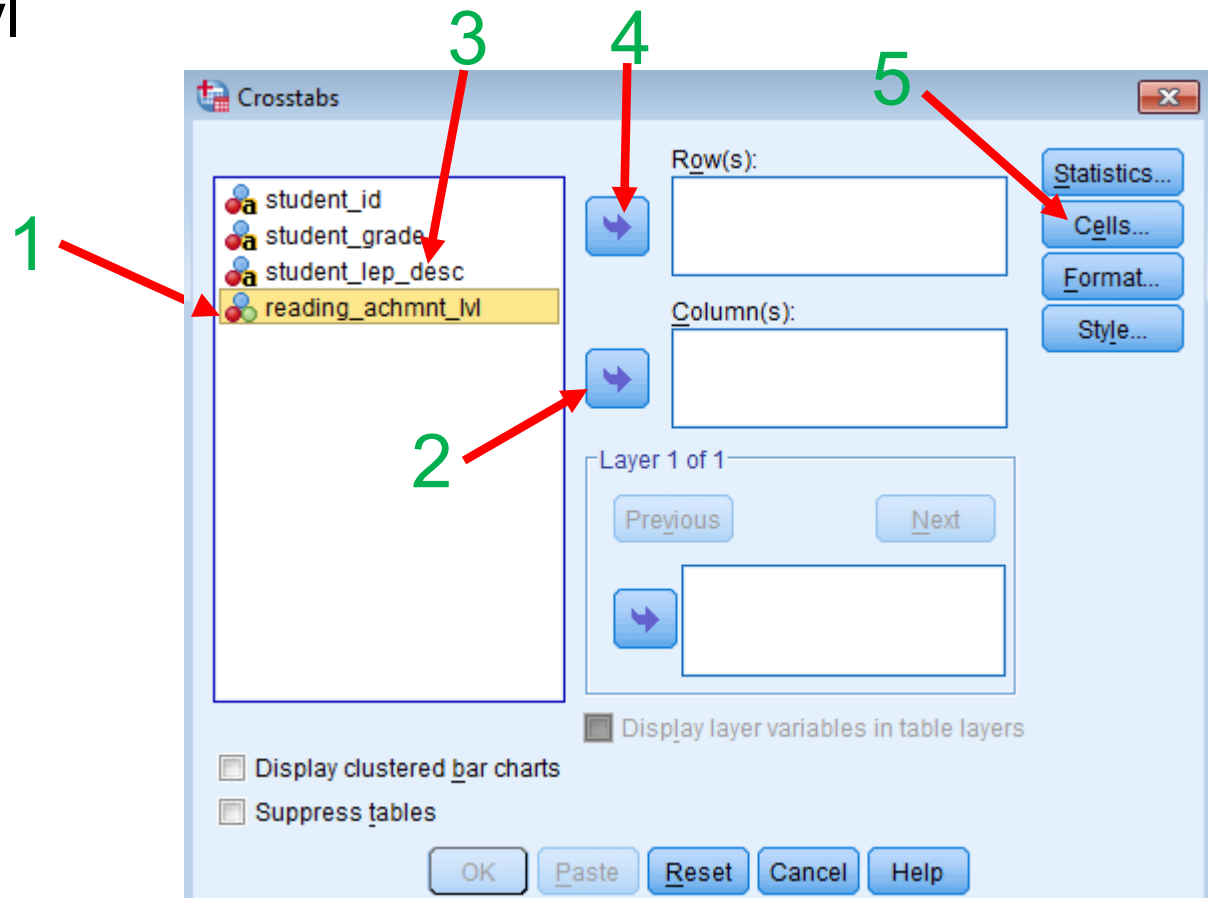
Generating crosstabs

- Let's create a Crosstabs table using the returned data
 - We'll specify reading achievement levels as columns and student LEP status as rows
- 1. Click Analyze
- 2. Click Descriptive Statistics
- 3. Click Crosstabs



Crosstabs – Specify rows & columns

1. Click reading_achmnt_lvl
2. Click arrow next to Column(s) box
3. Click student_lep_desc
4. Click arrow next to Row(s) box
5. Click Cells box



Crosstabs – Specify summaries

1. Check the Row box under Percentages
(this will show us the distribution within LEP category across achievement levels)
2. Click Continue

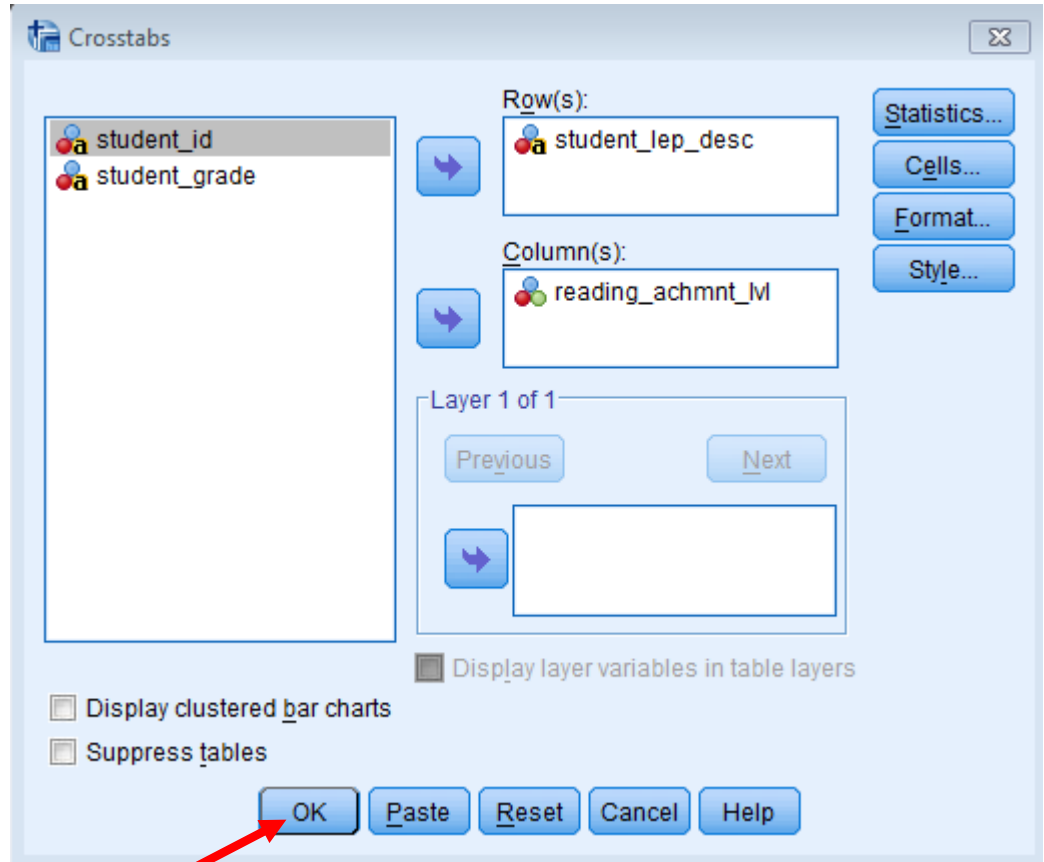
1

The screenshot shows the 'Crosstabs: Cell Display' dialog box. It contains several sections: 'Counts' with 'Observed' checked; 'z-test' with 'Compare column proportions' and 'Adjust p-values (Bonferroni method)' options; 'Percentages' with 'Row', 'Column', and 'Total' checkboxes, where 'Row' is selected; 'Residuals' with 'Unstandardized', 'Standardized', and 'Adjusted standardized' options; and 'Noninteger Weights' with radio buttons for 'Round cell counts', 'Round case weights', 'Truncate cell counts', 'Truncate case weights', and 'No adjustments'. At the bottom are 'Continue', 'Cancel', and 'Help' buttons. A red arrow points from the number '1' to the 'Row' checkbox in the 'Percentages' section. Another red arrow points from the number '2' to the 'Continue' button.

2

Crosstabs – Generate table

1. Click OK to generate table immediately (Clicking Paste will insert Crosstabs syntax into an SPSS syntax file)



1

PivotTable – Finished product

- Now we have counts and percentages within each LEP Status across Reading achievement levels
- Should the parameters of the request change, or new data become available, the data can quickly be refreshed using the connection

student_lep_desc * reading_achmnt_M Crosstabulation							
			reading_achmnt_lvl				Total
			1.00	2.00	3.00	4.00	
student_lep_desc	Currently LEP	Count	109	88	68	3	268
		% within student_lep_desc	40.7%	32.8%	25.4%	1.1%	100.0%
	LEP with End Date	Count	18	73	241	46	378
		% within student_lep_desc	4.8%	19.3%	63.8%	12.2%	100.0%
	Never classified LEP	Count	471	542	1196	389	2598
		% within student_lep_desc	18.1%	20.9%	46.0%	15.0%	100.0%
	Total	Count	598	703	1505	438	3244
		% within student_lep_desc	18.4%	21.7%	46.4%	13.5%	100.0%

Pasting the syntax

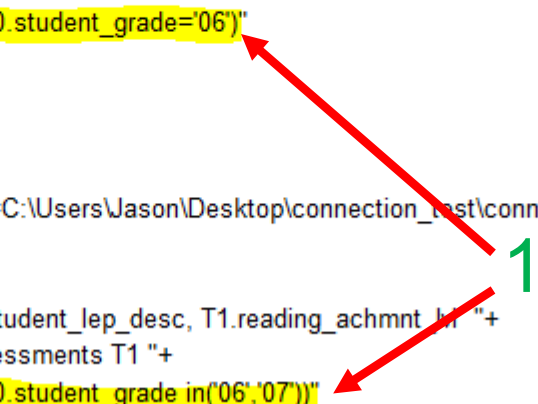
- Pasting the syntax can be advantageous for repetitive tasks
 1. Syntax for retrieving data from database
 2. Syntax for generating crosstab table

```
1  
2 GET DATA  
3 /TYPE=ODBC  
4 /CONNECT='DSN=relma_access_connect;DBQ='+  
5 'C:\Users\Jason\Desktop\connection_test\connect_training.accdb;DriverId=25;FIL=MS '+  
6 'Access;MaxBufferSize=2048;PageTimeout=5;'  
7 /SQL='SELECT T0.student_id, T0.student_grade, T0.student_lep_desc, T1.reading_achmnt_m FROM '+  
8 'student_demographics T0, student_assessments T1 WHERE T0.student_id = T1.student_id AND '+  
9 '(T0.student_grade = '06')'  
10 /ASSUMEDSTRWIDTH=255.  
11  
12 CACHE.  
13 EXECUTE.  
14 DATASET NAME DataSet1 WINDOW=FRONT.  
15 DATASET ACTIVATE DataSet1.  
16 CROSSTABS  
17 /TABLES=student_lep_desc BY reading_achmnt_m  
18 /FORMAT=AVALUE TABLES  
19 /CELLS=COUNT ROW  
20 /COUNT ROUND CELL.
```

Editing the query syntax


- Maybe leadership wants data for 6th and 7th graders
- Edit SQL syntax to pull both grade levels (compare highlighted sections)

```
22 GET DATA
23 /TYPE=ODBC
24 /CONNECT='DSN=relma_access_connect;DBQ=C:\Users\Jason\Desktop\connection_test\connect_training.accdb;DriverId=25;FIL=MS '+
25 'Access;MaxBufferSize=2048;PageTimeout=5;'
26 /SQL=
27 "SELECT T0.student_id, T0.student_grade, T0.student_lep_desc, T1.reading_achmnt_lvl "+
28 "FROM student_demographics T0, student_assessments T1 "+
29 "WHERE T0.student_id = T1.student_id AND (T0.student_grade='06')
30 /ASSUMEDSTRWIDTH=255.
31
32 GET DATA
33 /TYPE=ODBC
34 /CONNECT='DSN=relma_access_connect;DBQ=C:\Users\Jason\Desktop\connection_test\connect_training.accdb;DriverId=25;FIL=MS '+
35 'Access;MaxBufferSize=2048;PageTimeout=5;'
36 /SQL=
37 "SELECT T0.student_id, T0.student_grade, T0.student_lep_desc, T1.reading_achmnt_lvl "+
38 "FROM student_demographics T0, student_assessments T1 "+
39 "WHERE T0.student_id = T1.student_id AND (T0.student_grade in('06','07'))
40 /ASSUMEDSTRWIDTH=255.
```



Retrieved data from edited query

- Resulting data, with 6th and 7th graders, returned to SPSS, ready for analysis



	student_id	student_grade	student_lep_desc	reading_achmnt_lm	var
1	1668822	06	LEP with End Date	3.00	
2	8260933	07	LEP with End Date	3.00	
3	8261910	07	LEP with End Date	4.00	
4	8265445	07	LEP with End Date	1.00	
5	8277585	07	LEP with End Date	3.00	
6	8278256	07	LEP with End Date	2.00	
7	8279101	07	LEP with End Date	2.00	
8	8279372	07	LEP with End Date	2.00	
9	8279434	07	LEP with End Date	3.00	
10	8280342	07	LEP with End Date	2.00	

Questions/Need help

Contact:

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