

LECTURE NOTES IN STATISTICS

(For Master in Information Technology Students)

Northern Negros State College of Science and
Technology Graduate School

Prepared By:
RITCHIE F. BALANDRA, Ph.D.

**For instructional purposes
only**

Part 4

- ANALYSING AND INTERPRETING DATA
USING COMPUTER SOFT WARE

Descriptive Statistics

□ Frequency and Percentage

Sample Situation

- In his study, the researcher will have to present the profile of B.S.Ed. entrants in terms of school origin, place of residence, computer literacy, and TV program exposures.

Statement of the Problem

- What is the profile of B.S.Ed. entrants of NONESCOST in terms of following variables:
 - a. School Origin
 - b. Place of Residence
 - c. Computer Knowledge
 - d. TV Program Exposure

Profile Variables

- a. School Origin:** (1) integrated schools, (2) extension schools, (3) national high schools (4) special classes.
- b. Place of Residence:** (1) outside the city, (2) within the city
- c. Computer Knowledge:** (1) didn't know how to use computer, (2) With only few knowledge on basic computer, (3) with enough knowledge and know how to use internet, (4) with enough knowledge even on developing multi-media projects.
- d. TV Program Watch:** (1) watch only few TV programs (2) watch many TV programs

Data Collected from Questionnaires:

- School Origin: 1,2,3,3,2,1,1,4,3,2.
- Place of Residence: 1,1,1,2,1,2,2, 2,1,1.
- Computer Knowledge: 3,3,3,4,1,1,2,2,1,1.
- TV Program Watch: 1,1,2,2,1,1,1,2,2,2.

Steps:

- Open SPSS
- Select variable view and enter variable name
- Select data view and enter your data
- Label the profile variables
- Go to values and classify each variable

- Select analyze-frequency
- Enter variable names to the right variable box
(highlight and click arrow)
- Click ok

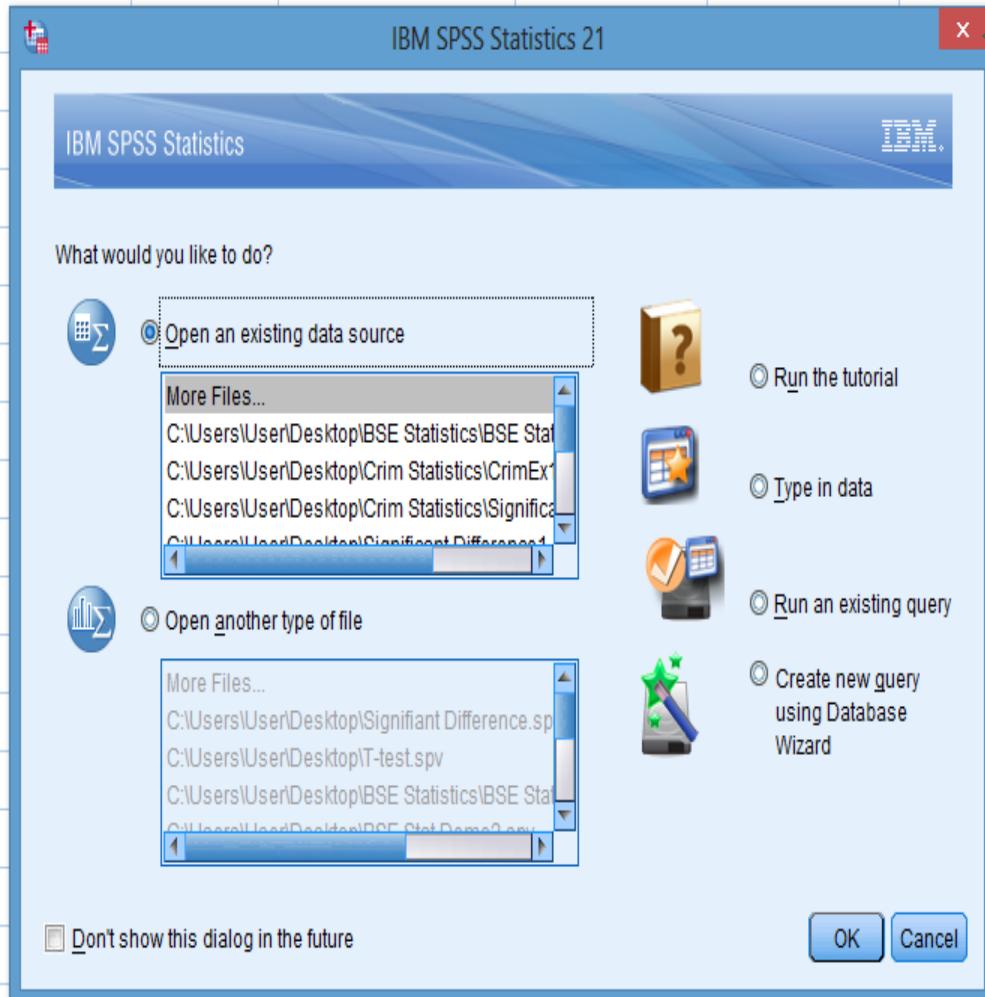
DEMONSTRATION

Data to be Subjected to Analysis

- School Origin: 1,2,3,3,2,1,1,4,3,2.
- Place of Residence: 1,1,1,2,1,2,2, 2,1,1.
- Computer Knowledge: 3,3,3,4,1,1,2,2,1,1.
- TV Program Watch: 1,1,2,2,1,1,1,2,2,2.

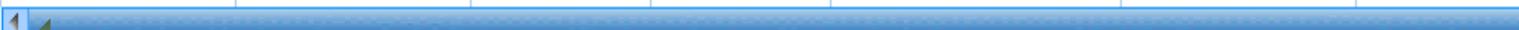


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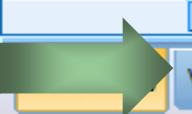


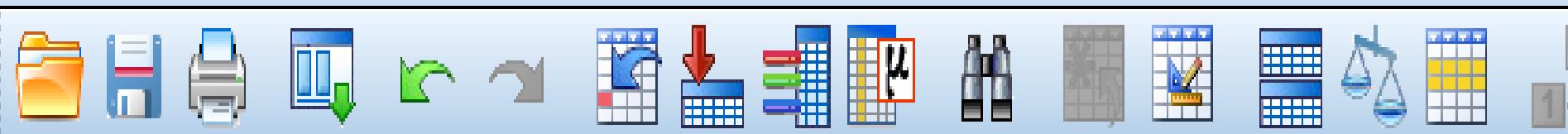
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3	Computer_...	Numeric	8	2	Computer Kno...	{1.00, Didnt...}	None	8
4	TV_Progra...	Numeric	8	2	TV Program W...	{1.00, Watc...	None	8
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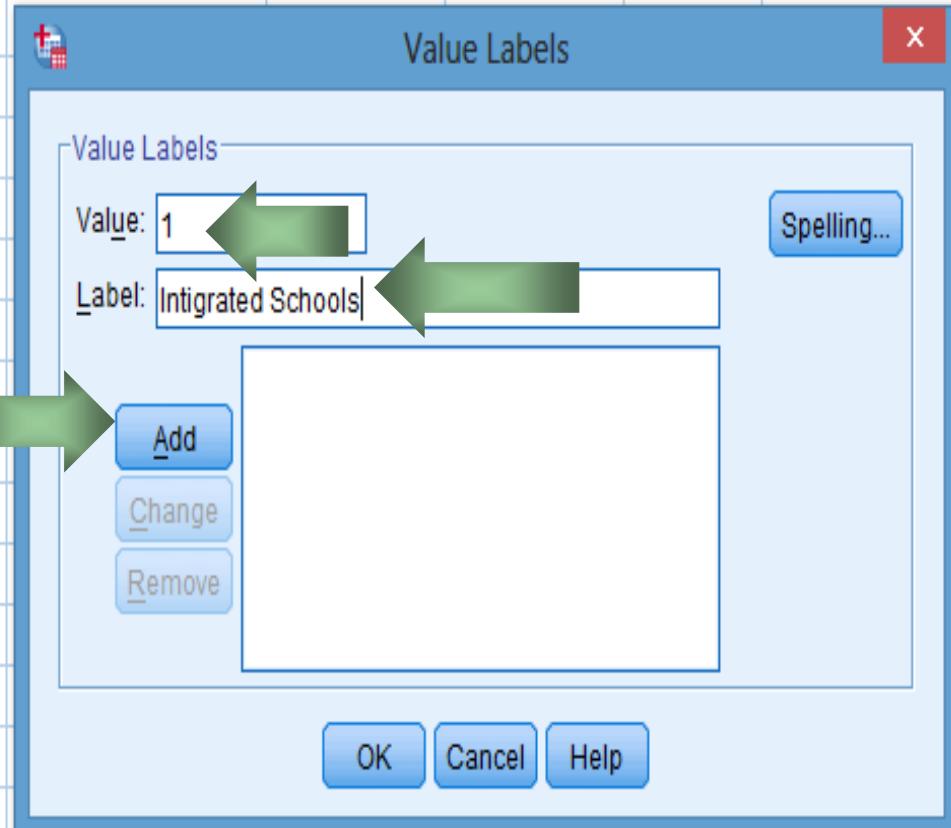
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9	3.00	1.00	1.00	2.00				
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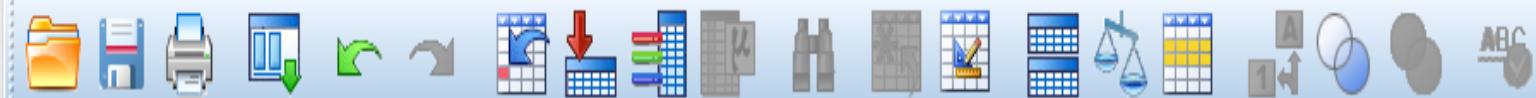




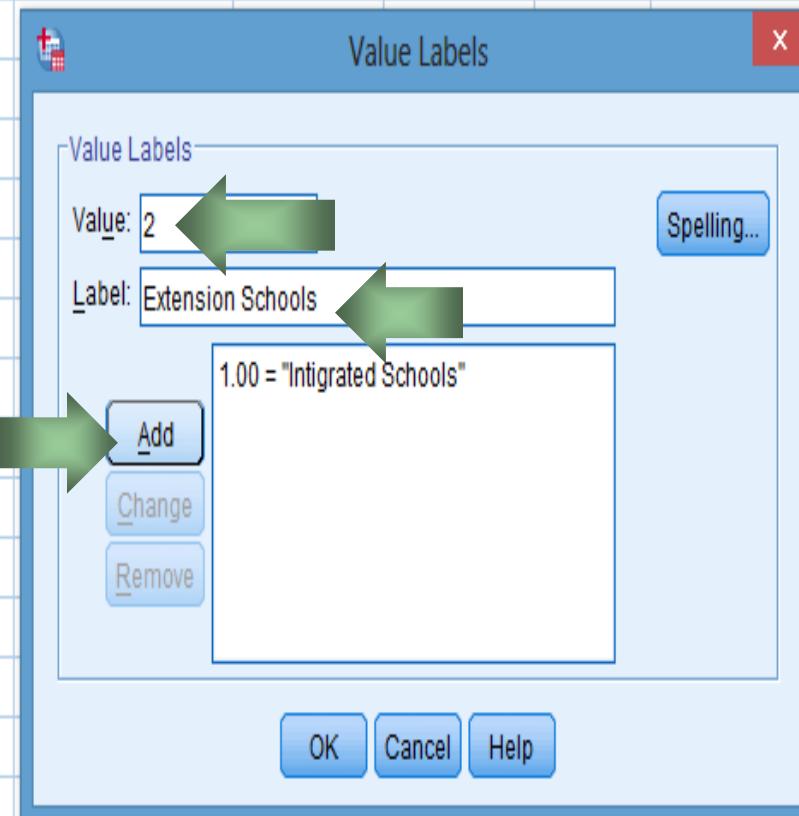


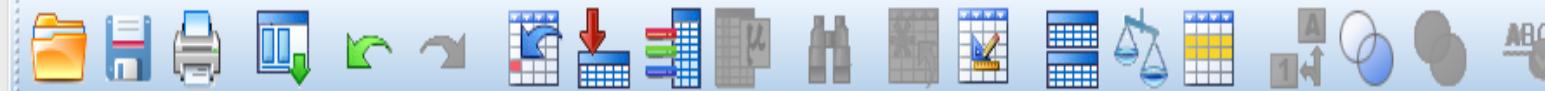
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3	Computer_Knowledge	Numeric	8	2	Computer Knowledge	None	None	8	Right	Unknown
4	TV_Program_Watch	Numeric	8	2	TV Program Watch	None	None	8	Right	Unknown
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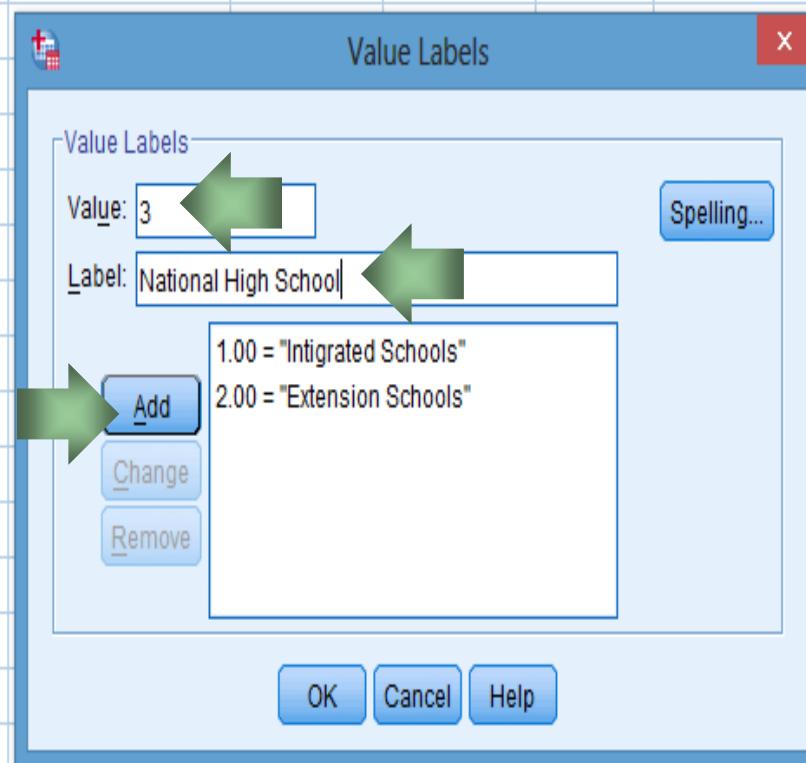


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3	Computer_Knowledge	Numeric	8	2	Computer Knowledge	None	None	8	Right	Unknown	Input
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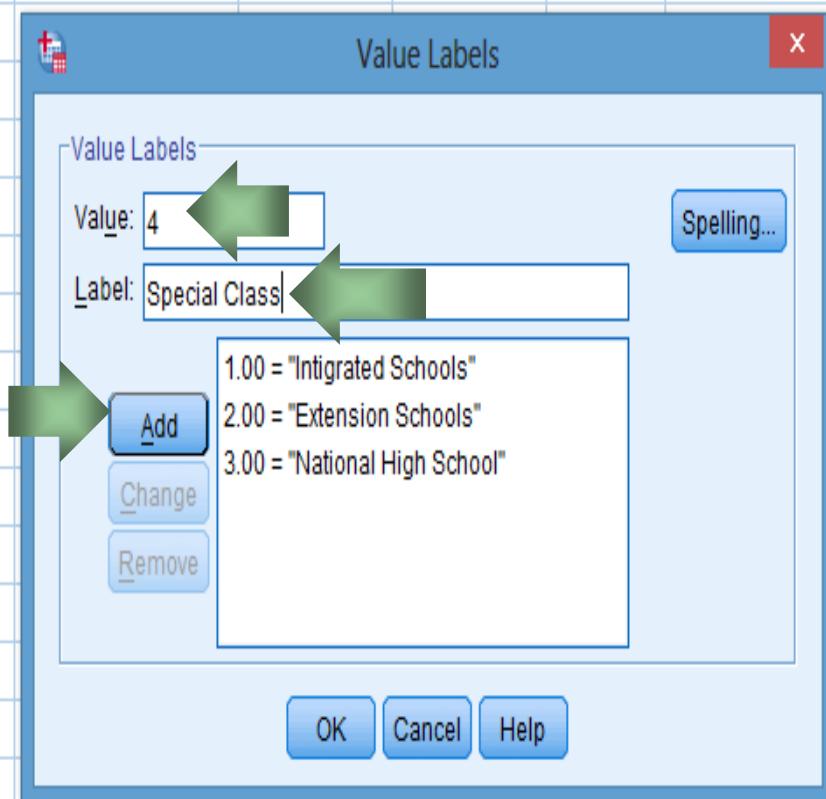


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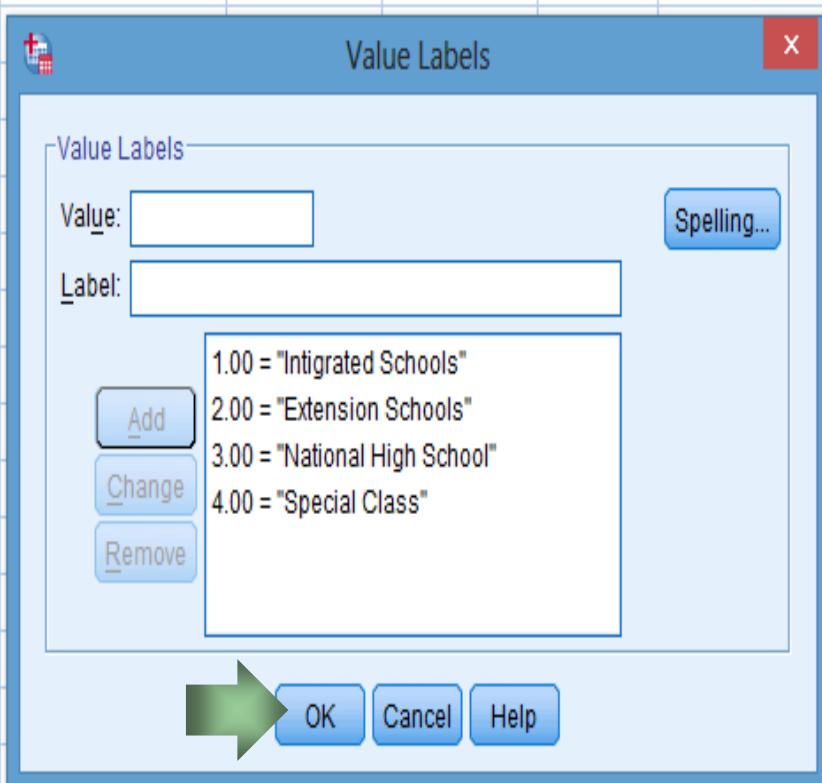


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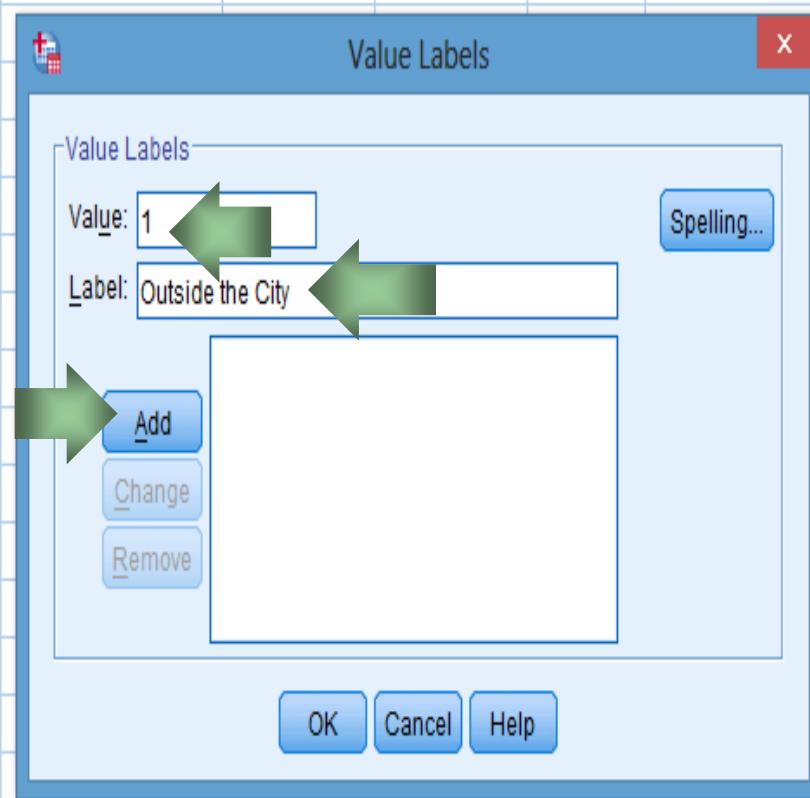


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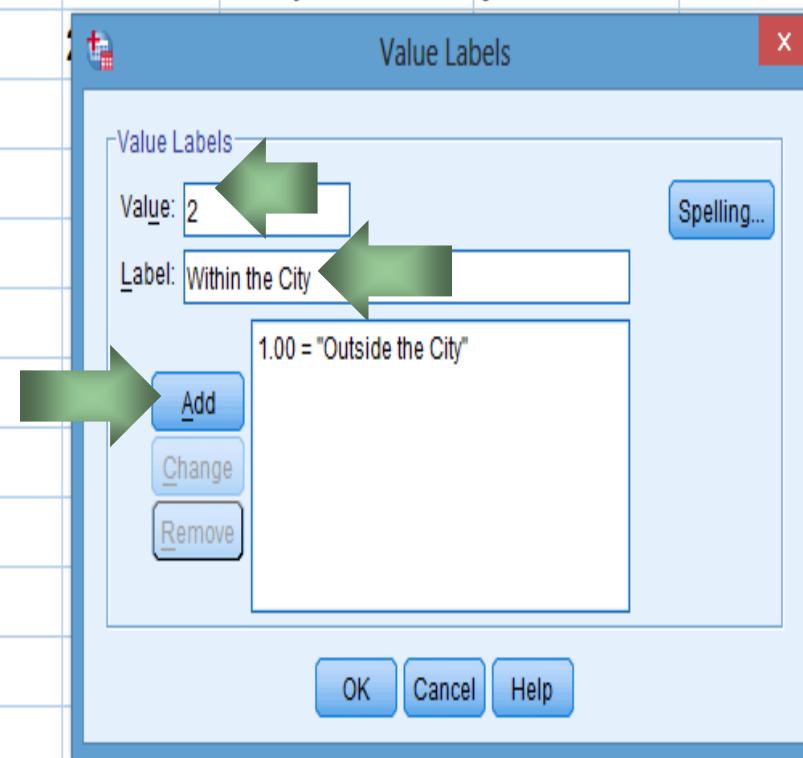


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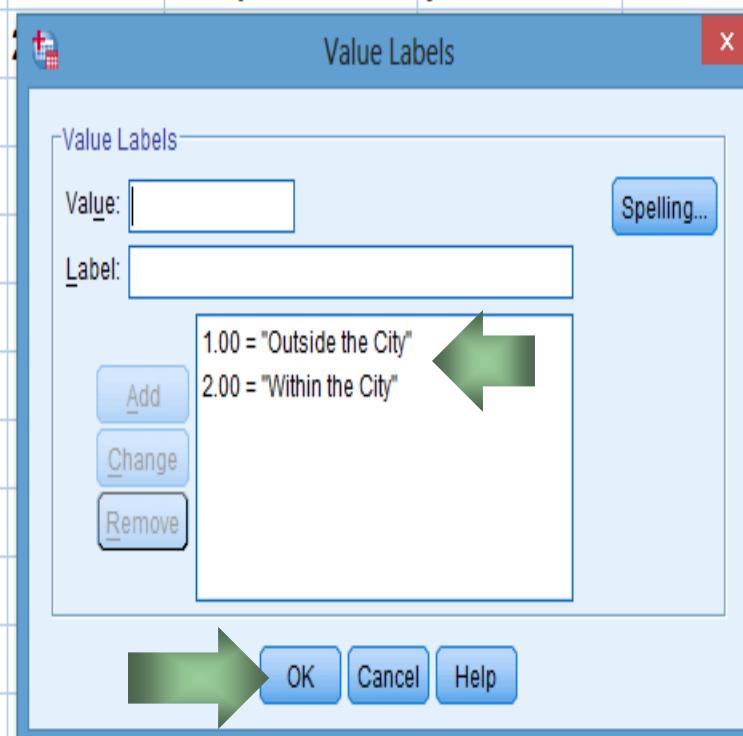


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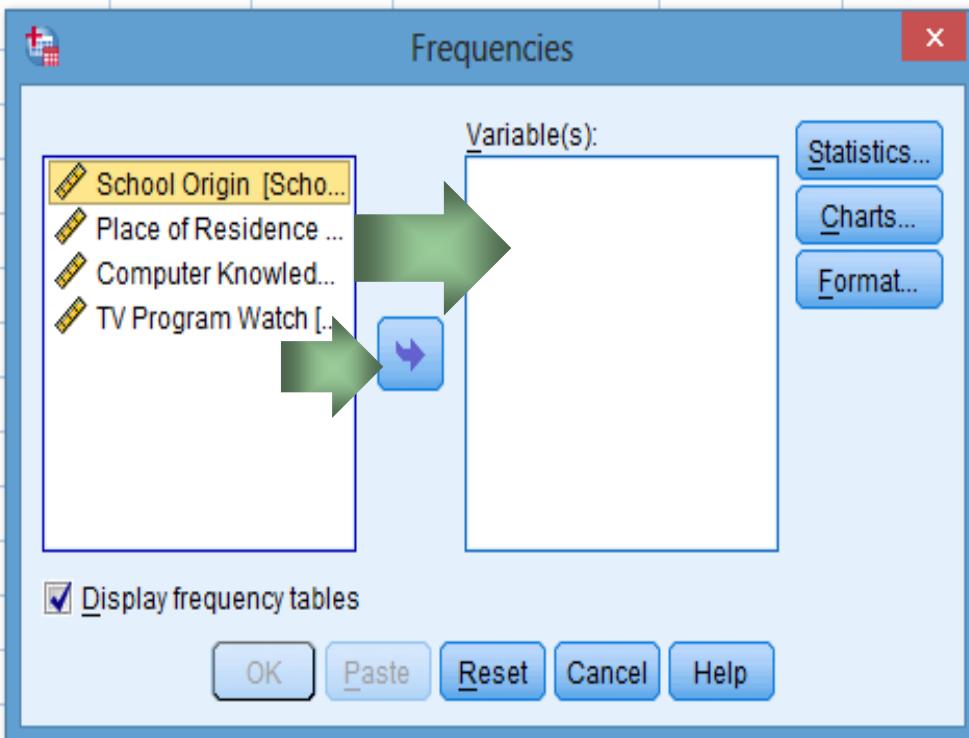
Reports Descriptive Statistics Compare Means General Linear Model Correlate Regression Classify Dimension Reduction Scale Nonparametric Tests Forecasting Multiple Response Simulation... Quality Control ROC Curve...

Frequencies... Descriptives... Explore... Crosstabs... Ratio... P-P Plots... Q-Q Plots...

	Name	Type	Values	Missing	Columns	Align
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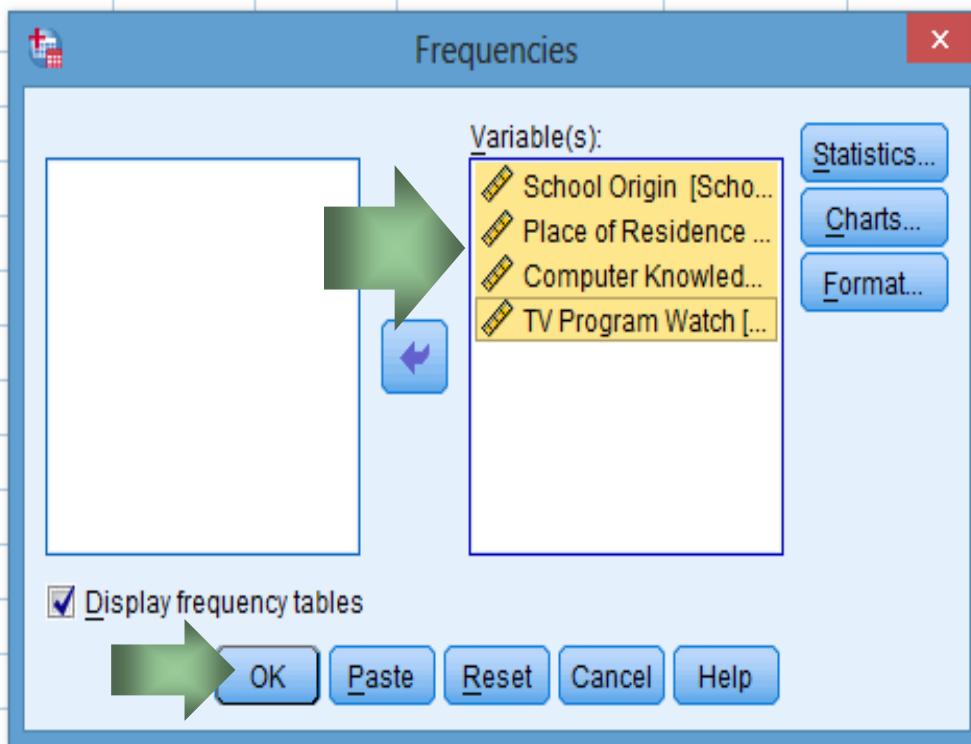


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3	Computer_Knowledge	Numeric	8	2	Computer Knowledge	{1.00, Didnt ...}	None	8	Right
4	TV_Program_Watch	Numeric	8	2	TV Program Watch	{1.00, Watc...}	None	8	Right
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The screenshot shows the SPSS Frequencies dialog box. The 'Variable(s)' list contains four variables: School_Origin, Place_Residence, Computer_Knowledge, and TV_Program_Watch. A green arrow points from the 'OK' button at the bottom to the 'Display frequency tables' checkbox. Another green arrow points from the 'OK' button to the 'Display frequency tables' checkbox.



Frequency Table

School Origin

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intigrated Schools	3	30.0	30.0	30.0
	Extension Schools	3	30.0	30.0	60.0
	National High School	3	30.0	30.0	90.0
	Special Class	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Place of Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Outside the city	6	60.0	60.0	60.0
	Within the City	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Computer Knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Didnt know how to use computer	4	40.0	40.0	40.0
	Has only few knowledge on basic computer	2	20.0	20.0	60.0
	Has enough knowledge on basic computer and use of internet	3	30.0	30.0	90.0
	Has knowledge on making multi-media projects	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

TV Program Watch

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Watch only few TV programs	5	50.0	50.0	50.0
	Watch many TV Programs	5	50.0	50.0	100.0
	Total	10	100.0	100.0	

Tabular Presentation for School Origin

Table 1 School Origin of B.S.Ed. Entrants

Types of School	Frequency	Percentage
Integrated School	3	30
Extension School	3	30
National High School	3	30
Special Class	1	10
Total	10	100

Tabular Presentation for Place of Residence

Table 2 Place of Residence of B.S.Ed. Entrants

Place of Residence	Frequency	Percentage
Outside the City	6	60
Within the City	4	40
Total	10	100

Tabular Presentation for Computer Knowledge

Table 3 Computer Knowledge of B.S.Ed. Entrants

Computer Knowledge	Frequency	Percentage
Didn't know how to use computer	4	40
Has only few knowledge on computer	2	20
Has enough knowledge on computer and use of internet	3	30
Has knowledge in making multimedia projects	1	10
Total	10	100

Tabular Presentation for TV Program Watch

Table 4 TV Program Watch by B.S.Ed. Entrants

TV Program Exposure	Frequency	Percentage
Watch only few TV programs	5	50
Watch many TV programs	5	50
Total	10	100

Sample Statement of Findings

- In terms of school origin, findings of the study showed that 3 out 10 or 30% of B.S.Ed. entrants came from Integrated schools, 3 out of 10 or 30 came from extension school, 3 out 10 or 30 % came from national high school and only 1 out of 10 or 10% belongs to special class.
- In terms of place of residence, findings showed that 6 out 10 or 60% those who lived outside and only 4 out of 10 or 40% lived with in the city.

- Based on computer knowledge, 4 out of 10 or 40% didn't have knowledge on the use of computer, 2 out of 10 or 20% have only few knowledge on computer, 3 out of 10 or 30% are with enough knowledge on computer and use of internet, and 1 out of 10 or 10% knows how to make multimedia projects.

- In terms of TV program watch, 5 out of 10 or 50% watch only few TV programs, and the other 5 out of 10 or also 50% watch many TV programs.

- MEAN, STANDARD DEVIATION AND VERBAL DESCRIPTIONS

Sample Situation

- In the study conducted, the researcher will have to assess the academic performance of B.S.Ed. entrants in areas such as english proficiency, problem solving skills and science process skills.

Statement of the Problem

- Statement of the Problem: What is the level of academic performance of B.S.Ed. entrants in areas such as:
 - a. english proficiency,
 - b. problem solving skills, and
 - c. science process skills.

Rating Scale Used by the Researcher

Mean Scores

4.20 - 5.0

3.40 - 4.19

2.60 – 3.39

1.80 – 2.59

1.0 – 1.79

Description

Very High

High

Average

Low

Very Low

Steps

- Open SPSS
- Select variable view and enter variable name.
- Select data view and enter data.
- Select analyse-Descriptive Statistics-Descriptive.
- Transfer variable names to right variable box (highlight and click arrow).
- Click ok

DEMONSTRATION

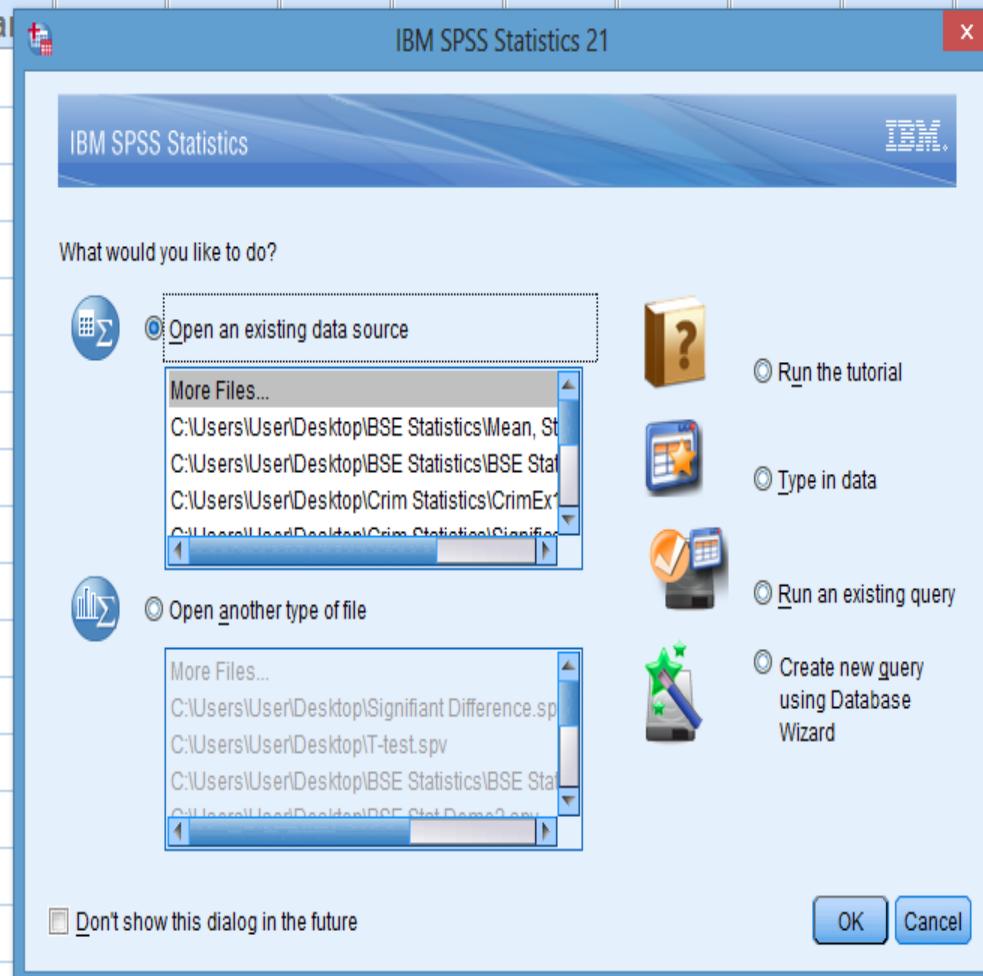
Sample Data

English Proficiency	Problem Solving Skills	Science Process Skills
2.3	4.3	3.4
3.5	4.2	2.9
2.7	3.8	3.7
3.4	3.9	4.0
2.5	4.5	4.5
3.6	3.9	3.3
3.3	4.6	3.2
4.2	3.7	4.6
3.9	3.4	4.5
4.5	3.9	4.3



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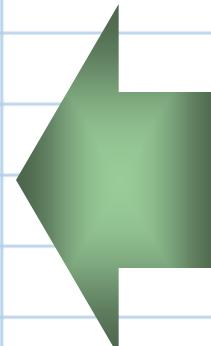


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	english_proficiency	problem_solving_skills	science_process_skills	var	var	var
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2	3.50	4.20	2.90			
3	2.70	3.80	3.70			
4	3.40	3.90	4.00			
5	2.50	4.50	4.50			
6	3.60	3.90	3.30			
7	3.30	4.60	3.20			
8	4.20	3.70	4.60			
9	3.90	3.40	4.50			
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	english_pro ficiency	Ivin
1	2.30	
2	3.50	
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8	4.20	
9	3.90	
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- Reports
- Descriptive Statistics
- Compare Means
- General Linear Model
- Correlate
- Regression
- Classify
- Dimension Reduction
- Scale
- Nonparametric Tests
- Forecasting
- Multiple Response
- Simulation...
- Quality Control
- ROC Curve...

123 Frequencies...

μd Descriptives...

Explore...

Crosstabs...

Ratio...

P-P Plots...

Q-Q Plots...

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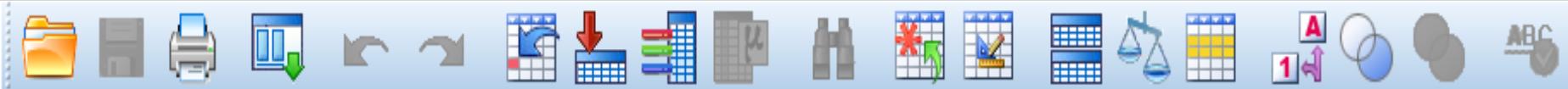
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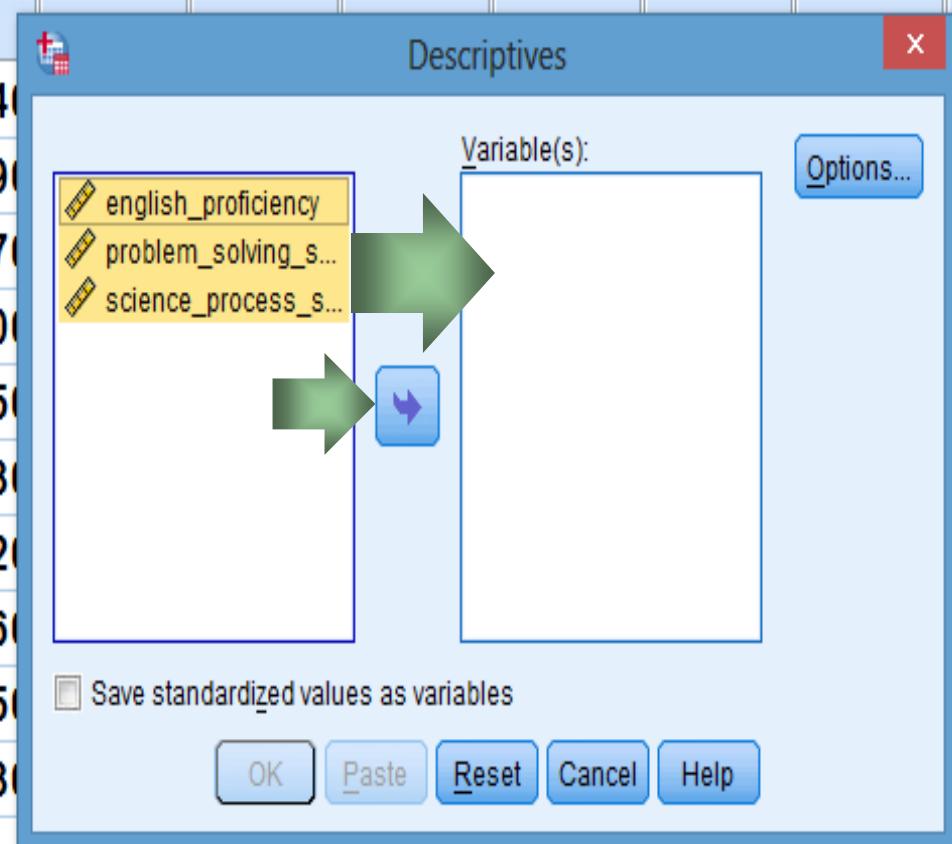
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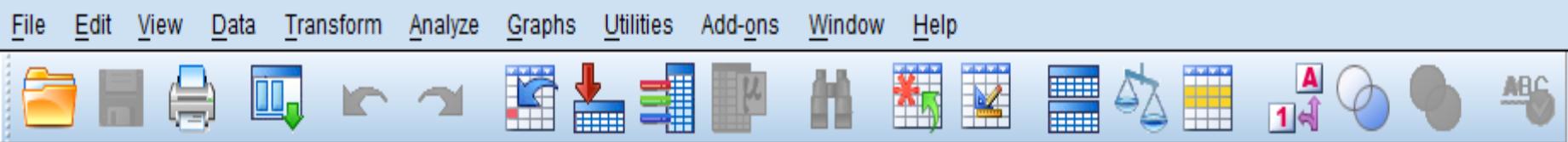
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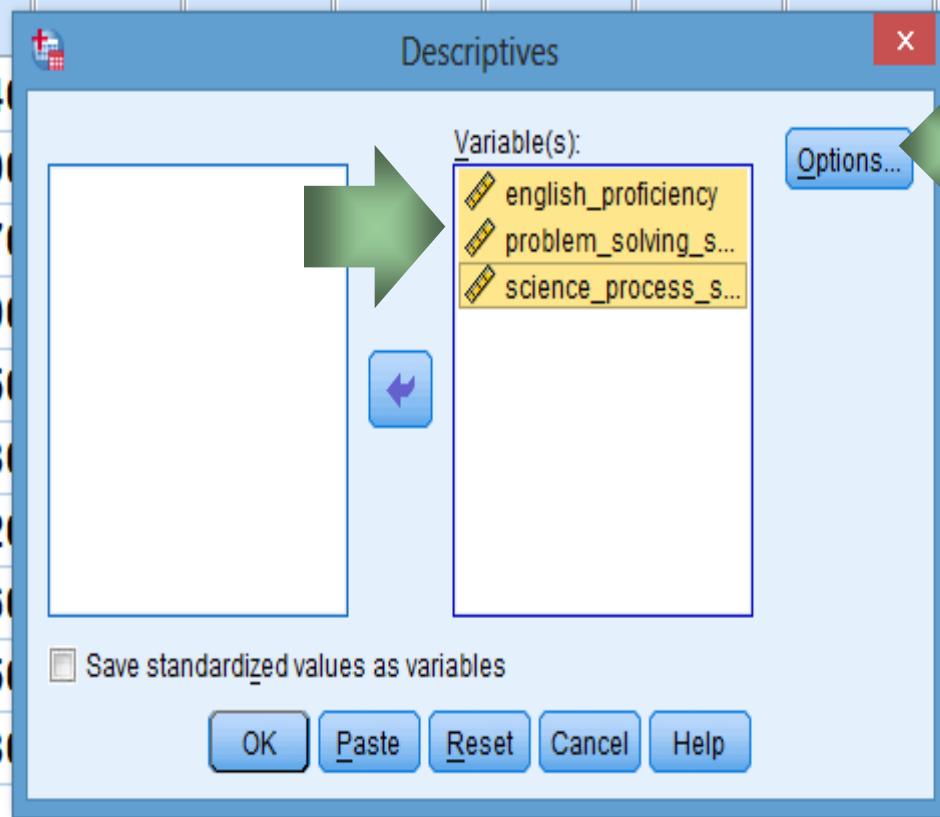


	english_proficiency	problem_solving_skills	science_process_skills	var						
1	2.30	4.30	3.40							
2	3.50	4.20	2.90							
3	2.70	3.80	3.70							
4	3.40	3.90	4.00							
5	2.50	4.50	4.50							
6	3.60	3.90	3.30							
7	3.30	4.60	3.20							
8	4.20	3.70	4.60							
9	3.90	3.40	4.50							
10	4.50	3.90	4.30							
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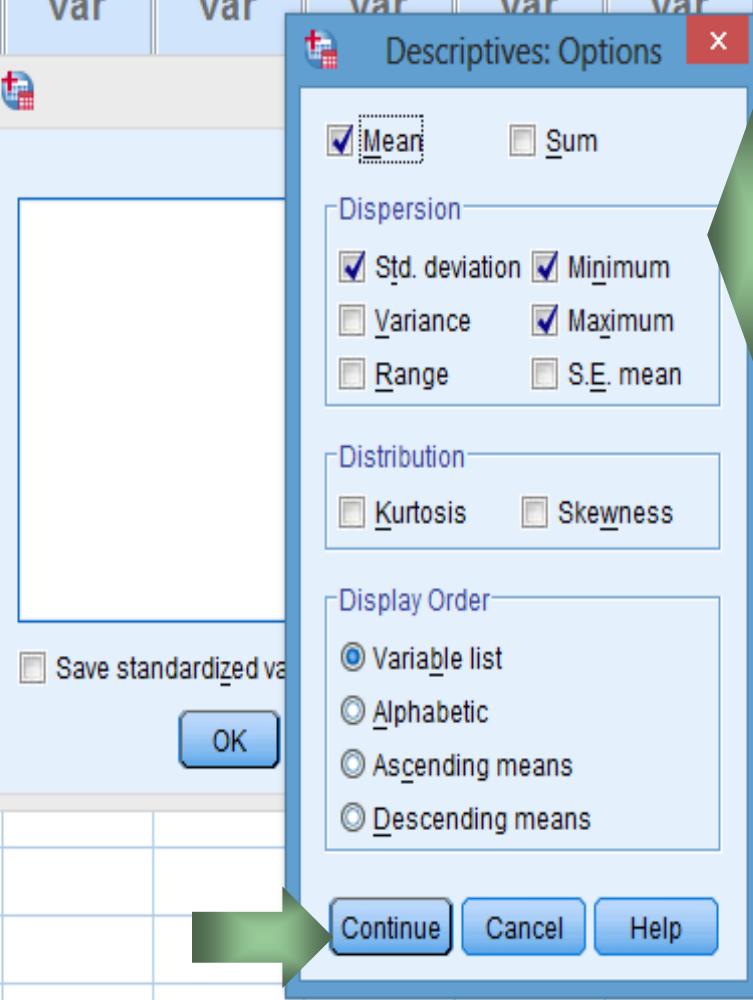


	english_proficiency	problem_solving_skills	science_process_skills	var						
1	2.30	4.30	3.40							
2	3.50	4.20	2.90							
3	2.70	3.80	3.70							
4	3.40	3.90	4.00							
5	2.50	4.50	4.50							
6	3.60	3.90	3.30							
7	3.30	4.60	3.20							
8	4.20	3.70	4.60							
9	3.90	3.40	4.50							
10	4.50	3.90	4.30							
11										
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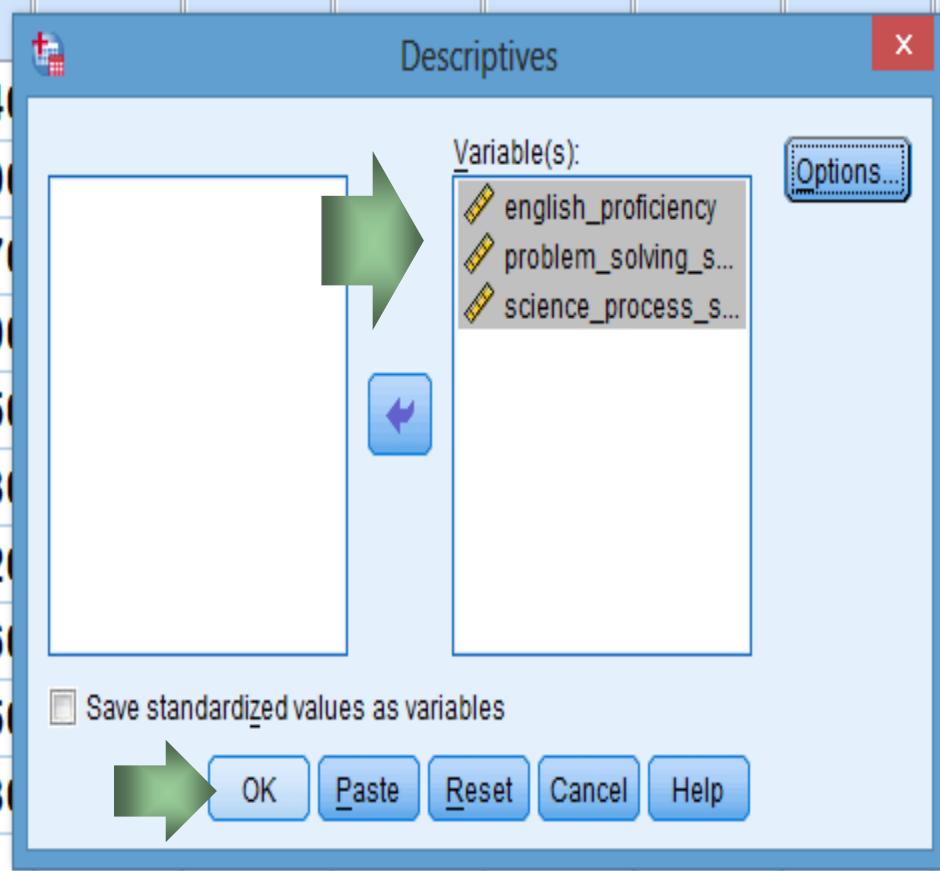


	english_pro ficiency	problem_so lving_skills	science_pr ocess_skill s	var							
1	2.30	4.30	3.40								
2	3.50	4.20	2.90								
3	2.70	3.80	3.70								
4	3.40	3.90	4.00								
5	2.50	4.50	4.50								
6	3.60	3.90	3.30								
7	3.30	4.60	3.20								
8	4.20	3.70	4.60								
9	3.90	3.40	4.50								
10	4.50	3.90	4.30								
11											
12											
13											
14											





	english_proficiency	problem_solving_skills	science_process_skills	var						
1	2.30	4.30	3.40							
2	3.50	4.20	2.90							
3	2.70	3.80	3.70							
4	3.40	3.90	4.00							
5	2.50	4.50	4.50							
6	3.60	3.90	3.30							
7	3.30	4.60	3.20							
8	4.20	3.70	4.60							
9	3.90	3.40	4.50							
10	4.50	3.90	4.30							
11										
12										



Computer Output

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
english_proficiency	10	2.30	4.50	33.90	3.3900	.72026
problem_solving_skills	10	3.40	4.60	40.20	4.0200	.37357
science_process_skills	10	2.90	4.60	38.40	3.8400	.62218
Valid N (listwise)	10					

Table 5. The Level of English Proficiency, Problem Solving Skills and Science Process Skills of B.S.Ed. Entrants

Variables	Std. Deviation	Mean	Verbal Description
English Proficiency	.72026	3.3900	Average
Problem Solving Skill	.37357	4.0200	High
Science Process Skill	.62218	3.8400	High

Scale

Range	Verbal Description
4.20 - 5.0	Very High
3.40 - 4.19	High
2.60 – 3.39	Average
1.80 – 2.59	Low
1.0 – 1.79	Very Low

Findings

- In the findings of the study showed that B.S.Ed. entrants obtained mean of 3.39 verbally described as average in English proficiency, 4.02 in problem solving skills and 3.84 in science process skills, both verbally described as high.

Conclusion

- From the findings the researcher were able to conclude that BSED entrants are average in english proficiency, and both high in problem solving and science process skills.

Recommendation

- It is recommended that the english proficiency of BSED entrants being the weakest among the three skills, should be given first priority by the department to be improved. Secondly both problem solving and science process skills although high these should also be given considerations to reach the very high level and maintained their status.

TEST FOR NORMALITY AND NON-PARAMETRIC TESTS

How Normality of Data Distribution is Checked?

□ Tests Employed

two well-known tests of normality and most widely used methods

- Kolmogorov Smirnov –KS (Large Sample Size-2000 or More)
- Shapiro Wilk Test (Small Sample Size)

The Skewness-Kurtosis All test for normality is one of three general normality tests designed to detect all departures from normality. It is comparable in power to the other two tests. The normal distribution has a skewness of zero and kurtosis of three.

- Skewness and Kurtosis of Data

Steps for Checking Normality of Data Distributions

- Open SPSS
- Select Variable View and Name Variables
- Enter your data
- Select Analyse – Descriptive – Explore
- Select Plot – Check Histogram – Normality Plots with Tests - Continue
- Click Ok

SITUATION 1-DATA ENTERED ARE APPROXIMATELY NORMAL AND PAIRED

SAMPLE DATA OF COMMUNITY SATISFACTION

WITHIN THE CITY	OUTSIDE THE CITY
1.4	2.8
2.2	3.2
2.4	3.3
1.8	2.9
1.4	3.2
3.2	2.4
2.3	3.4
2.2	3.5
3.4	2.4
2.2	3.4



1:	WithinCity	OutsideCity	var													
1	1.40	2.80														
2	2.20	3.20														
3	2.40	3.30														
4	1.80	2.90														
5	1.40	3.20														
6	3.20	2.40														
7	2.30	3.40														
8	2.20	3.50														
9	3.40	2.40														
10	2.20	3.40														
11																
12																
13																
14																
15																
16																
17																

File Edit View D Analyze Graphs Utilities Add-ons Window Help

Reports Descriptive Statistics Compare Means General Linear Model Correlate Regression Classify Dimension Reduction Scale Nonparametric Tests Forecasting Multiple Response Simulation... Quality Control ROC Curve...

Frequencies... Descriptives... Explore... Crosstabs... Ratio... P-P Plots... Q-Q Plots...

Visible: 2 of 2 Variables

	WithinCity	Out	var									
1		1.40										
2		2.20										
3		2.40										
4		1.80										
5		1.40										
6		3.20										
7		2.30										
8		2.20										
9		3.40										
10		2.20										
11												
12												
13												
14												
15												
16												
17												

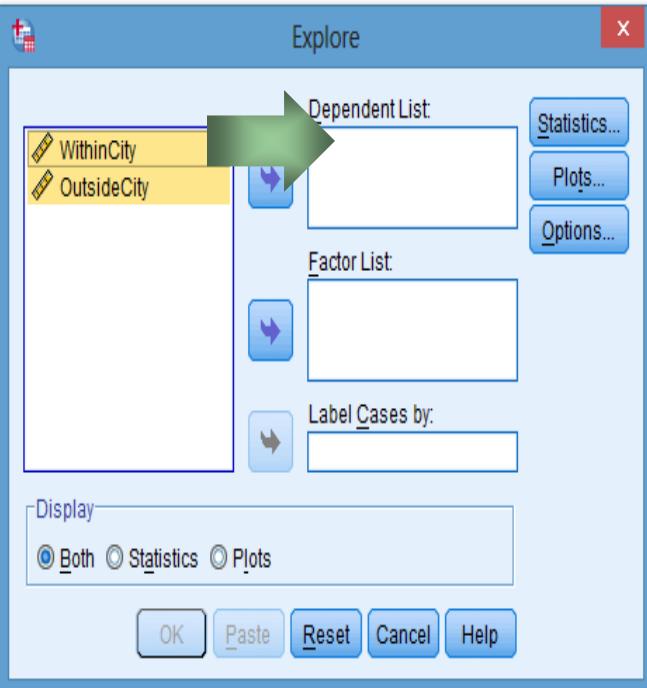
Data View Variable View

The screenshot shows the 'Analyze' menu open, with the 'Descriptive Statistics' option selected. The 'Explore...' command is highlighted with a yellow box and a green arrow pointing towards it from the left. Another green arrow points from the right towards the 'Analyze' menu bar.



Visible: 2 of 2 Variables

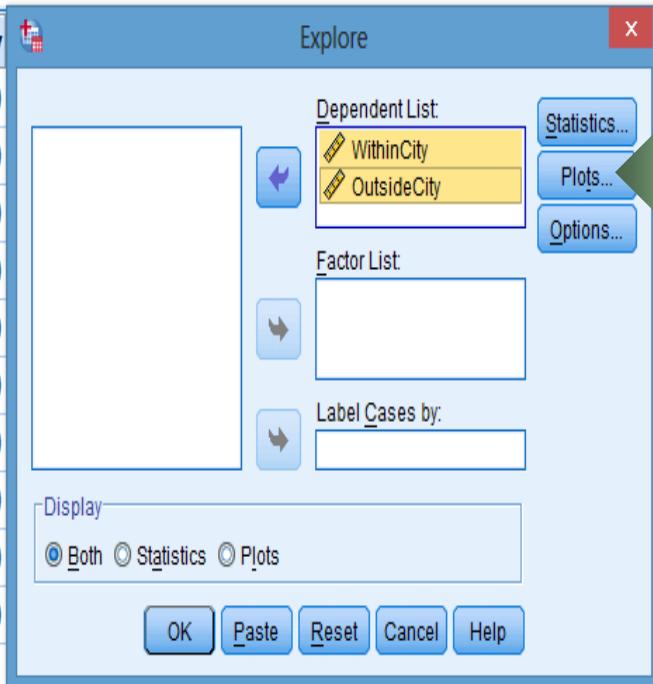
1:	WithinCity	OutsideCity	var						
1	1.40	2.80							
2	2.20	3.20							
3	2.40	3.30							
4	1.80	2.90							
5	1.40	3.20							
6	3.20	2.40							
7	2.30	3.40							
8	2.20	3.50							
9	3.40	2.40							
10	2.20	3.40							
11									
12									
13									
14									
15									
16									
17									





Visible: 2 of 2 Variables

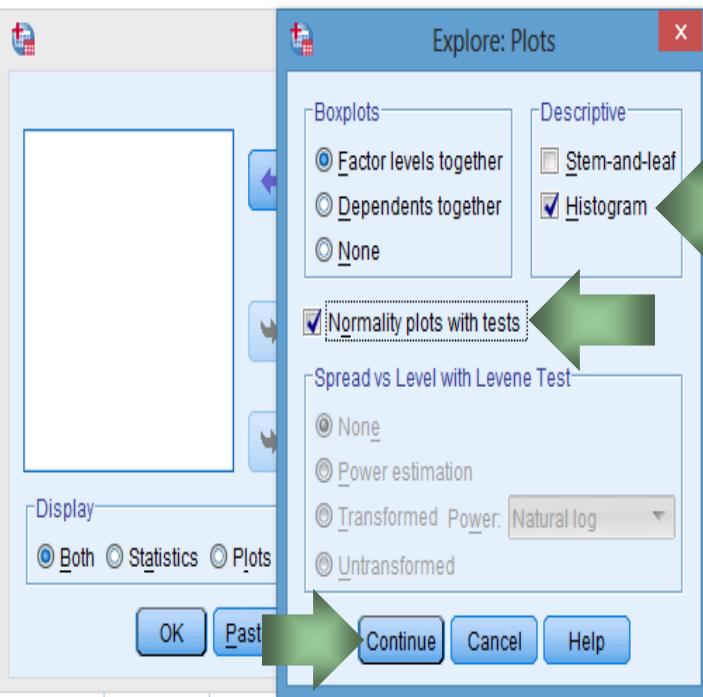
1:	WithinCity	OutsideCity	var						
1	1.40	2.80							
2	2.20	3.20							
3	2.40	3.30							
4	1.80	2.90							
5	1.40	3.20							
6	3.20	2.40							
7	2.30	3.40							
8	2.20	3.50							
9	3.40	2.40							
10	2.20	3.40							
11									
12									
13									
14									
15									
16									
17									





Visible: 2 of 2 Variables

1:	WithinCity	OutsideCity	var	var	var	var	var	var
1	1.40	2.80						
2	2.20	3.20						
3	2.40	3.30						
4	1.80	2.90						
5	1.40	3.20						
6	3.20	2.40						
7	2.30	3.40						
8	2.20	3.50						
9	3.40	2.40						
10	2.20	3.40						
11								
12								
13								
14								
15								
16								
17								





1

Visible: 2 of 2 Variables

	WithinCity	OutsideCity
1	1.40	2.80
2	2.20	3.20
3	2.40	3.30
4	1.80	2.90
5	1.40	3.20
6	3.20	2.40
7	2.30	3.40
8	2.20	3.50
9	3.40	2.40
10	2.20	3.40
11		
12		
13		
14		
15		
16		
17		

The screenshot shows the 'Explore' dialog box in SPSS. The 'Dependent List' section contains two items: 'WithinCity' and 'OutsideCity'. The 'Factor List' and 'Label Cases by' sections are currently empty. On the right side, there are three buttons: 'Statistics...', 'Plots...', and 'Options...'. At the bottom left, a green arrow points to the 'OK' button. Below the 'OK' button is a group of radio buttons under the heading 'Display': 'Both' (selected), 'Statistics', and 'Plots'.

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
WithinCity	.210	10	.200*	.906	10	.252
OutsideCity	.244	10	.094	.872	10	.105

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Interpretation

- Sig. value of .252 of first data set (within city) and sig. value of .105 of second data set (outside city) are all greater than .05 indicating that the two data sets are approximately normally distributed.

SITUATION 2- DATA ENTERED ARE NOT APPROXIMATELY NORMAL AND ENTERED IN GROUP



Visible: 2 of 2 Variables

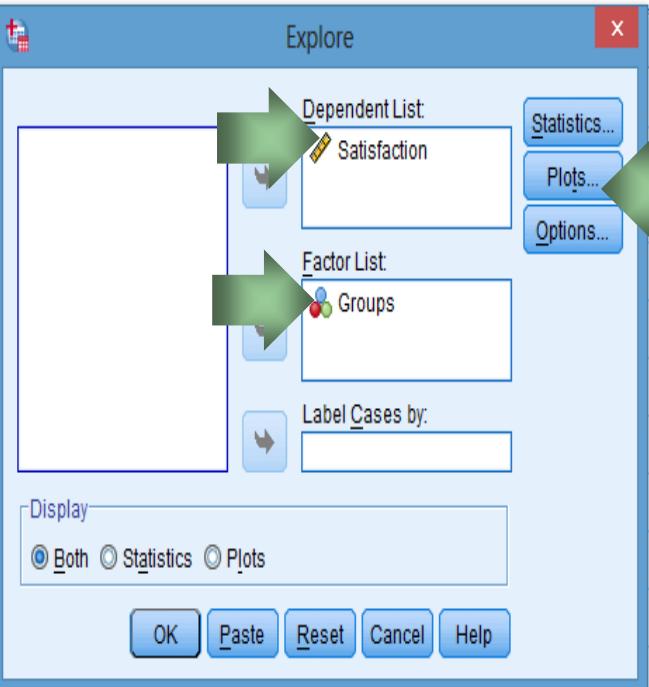




	Groups	Satisfaction	var	var	var	var	var	var	va
1	1.00	1.40							
2	1.00	1.20							
3	1.00	2.40							
4	1.00	1.80							
5	1.00	1.40							
6	1.00	3.20							
7	1.00	4.30							
8	1.00	4.20							
9	1.00	4.40							
10	1.00	4.20							
11	2.00	4.80							
12	2.00	4.20							
13	2.00	4.30							
14	2.00	1.00							
15	2.00	1.20							
16	2.00	1.00							
17	2.00	1.40							



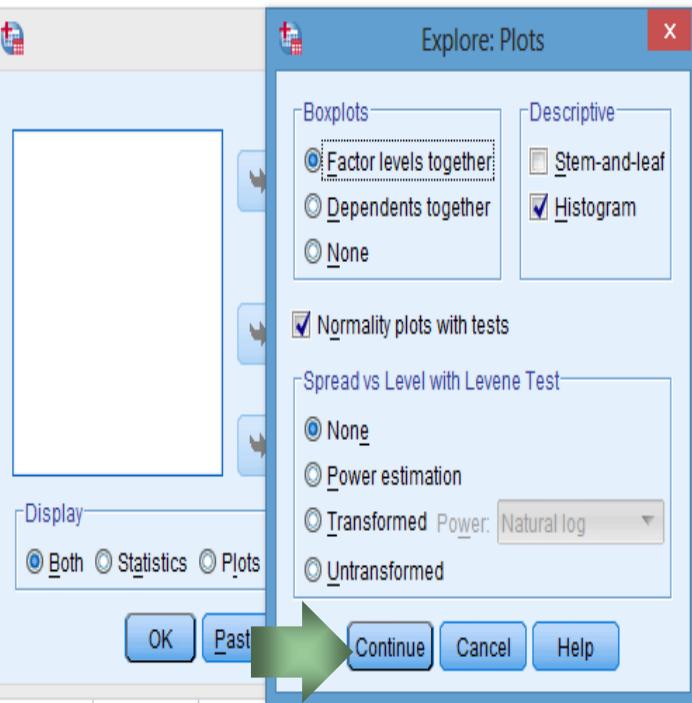
Visible: 2 of 2 Variables





Visible: 2 of 2 Variables

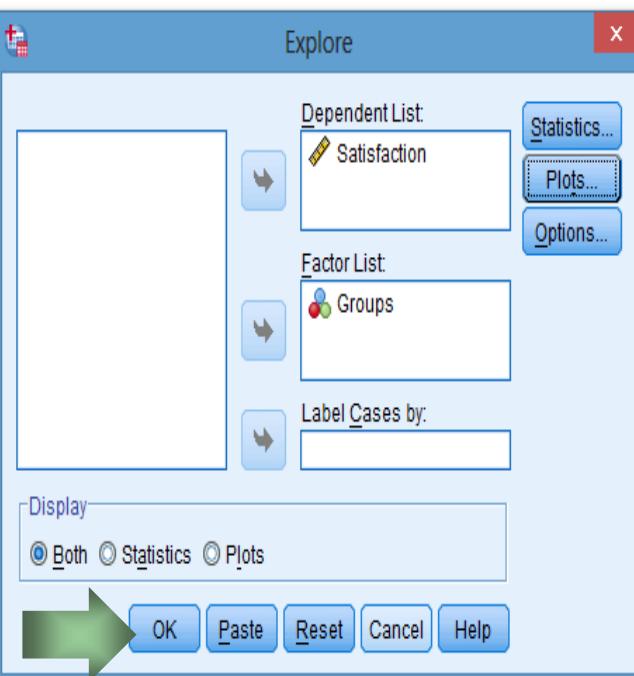
1:	Groups	Satisfaction
1	1.00	1.40
2	1.00	1.20
3	1.00	2.40
4	1.00	1.80
5	1.00	1.40
6	1.00	3.20
7	1.00	4.30
8	1.00	4.20
9	1.00	4.40
10	1.00	4.20
11	2.00	4.80
12	2.00	4.20
13	2.00	4.30
14	2.00	1.00
15	2.00	1.20
16	2.00	1.00
17	2.00	1.40





Visible: 2 of 2 Variables

	Groups	Satisfaction	var						
1	1.00	1.40							
2	1.00	1.20							
3	1.00	2.40							
4	1.00	1.80							
5	1.00	1.40							
6	1.00	3.20							
7	1.00	4.30							
8	1.00	4.20							
9	1.00	4.40							
10	1.00	4.20							
11	2.00	4.80							
12	2.00	4.20							
13	2.00	4.30							
14	2.00	1.00							
15	2.00	1.20							
16	2.00	1.00							
17	2.00	1.40							



Tests of Normality

Groups	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Satisfaction	Within the City Proper	.241	10	.105	.837	10
	Outside the City Proper	.284	10	.022	.831	10

a. Lilliefors Significance Correction

Interpretation

- Sig. value of .041 of the first data set (group 1) and sig. value of .035 of second data set (group 2) are all less than .05 indicating that the two data sets are not approximately normally distributed.



● INFERENTIAL STATISTICS

PAIRED SAMPLES T TEST

Sample Situation

- In the experiment to test the effectiveness of the teacher's-designed module, the researcher will have to find out if the said module is effective in increasing the achievement of the learners. In doing this, the researcher will have to find out if the significance of the increase on test scores of students based on the results of pre-test and post-test.

Statement of the Problem

- Is there a significant difference on pre-test and post-test scores of students subjected to teacher's-designed module?
- Hypothesis: There is no significant difference on the pre-test and post-test scores of students subjected to teacher's-designed module.

Sample Data

Students	Pre-test	Post-test
1.	12	30
2.	8	28
3.	9	26
4.	10	27
5.	11	23
6.	13	28
7.	12	29
8.	12	30
9.	14	24
10.	11	23

Steps

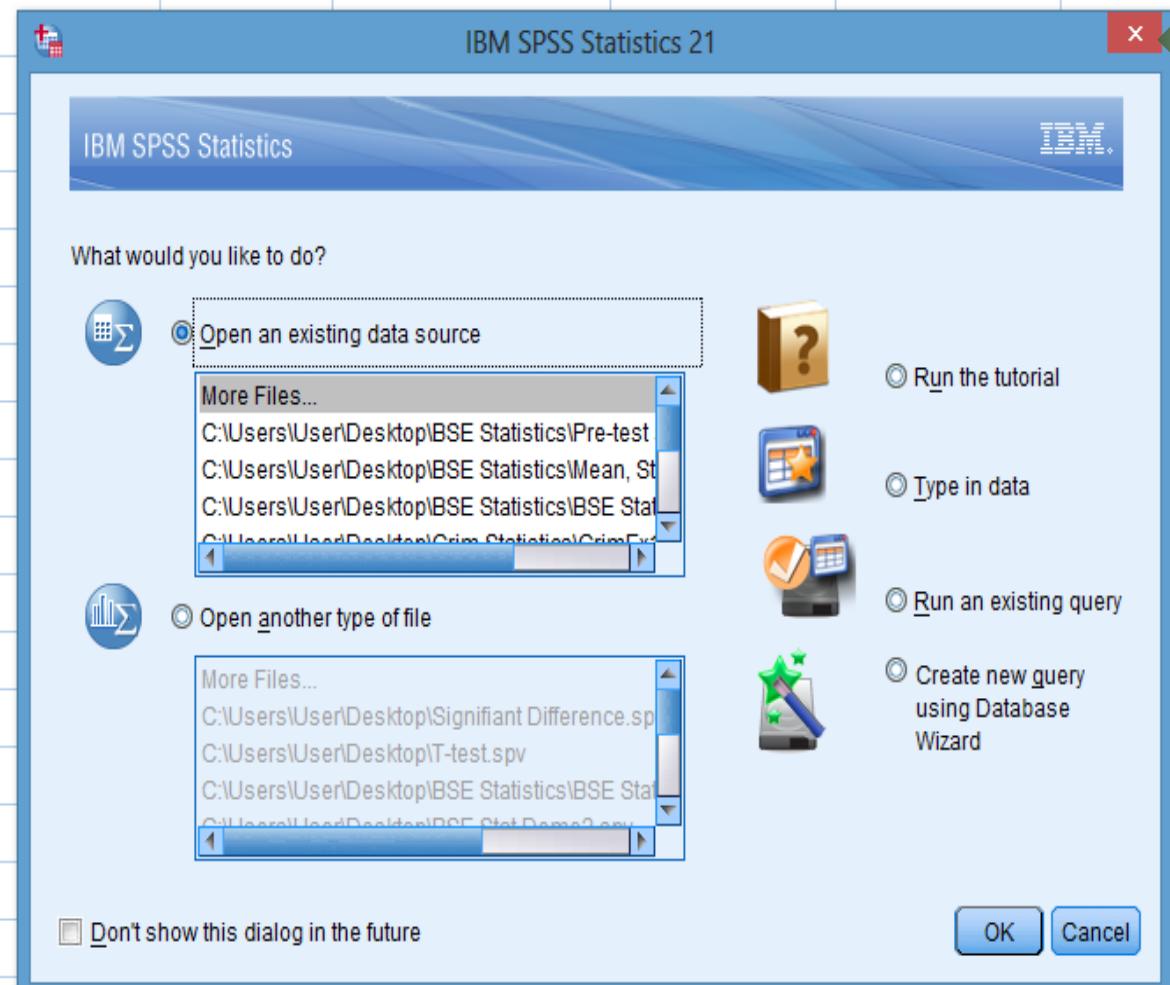
- Open SPSS
- Select variable view- Name your variable
- Select data view- Enter data

- Select analyze – Compare means – Paired samples t-test.
- Highlight the Variables – Transfer data from the left to right box (Highlight variable and click arrow).
- Ok

DEMONSTRATION



	Name	Type	Width	Decimals	Label	Values	Missing	Columns
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								





File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help



	Name	Type	Width	Decimals	Label	Values	Missing	C
1	Pre_test	Numeric	8	2		None	None	8
2	Post_test	Numeric	8	2		None	None	8
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

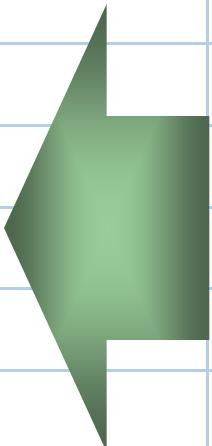
Data View





File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

	Pre_test	Post_test	var	var	var	var
1	12.00	30.00				
2	8.00	28.00				
3	9.00	26.00				
4	10.00	27.00				
5	11.00	23.00				
6	13.00	28.00				
7	12.00	29.00				
8	12.00	30.00				
9	14.00	24.00				
10	11.00	23.00				
11						
12						
13						





	Pre_test	Post
1	12.00	
2	8.00	
3	9.00	
4	10.00	
5	11.00	
6	13.00	
7	12.00	
8	12.00	
9	14.00	
10	11.00	23.00
11		
12		

- Reports
- Descriptive Statistics
- Compare Means
- General Linear Model
- Correlate
- Regression
- Classify
- Dimension Reduction
- Scale
- Nonparametric Tests
- Forecasting
- Multiple Response
- Simulation...
- Quality Control
- ROC Curve...



Means...

One-Sample T Test...

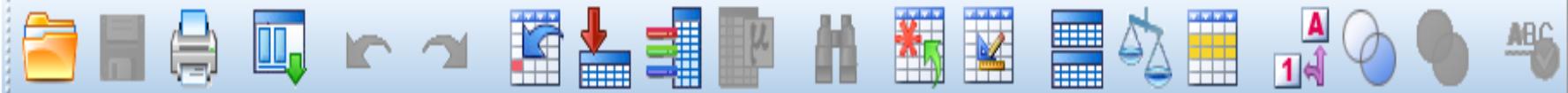
Independent-Samples T Test...

Paired-Samples T Test...

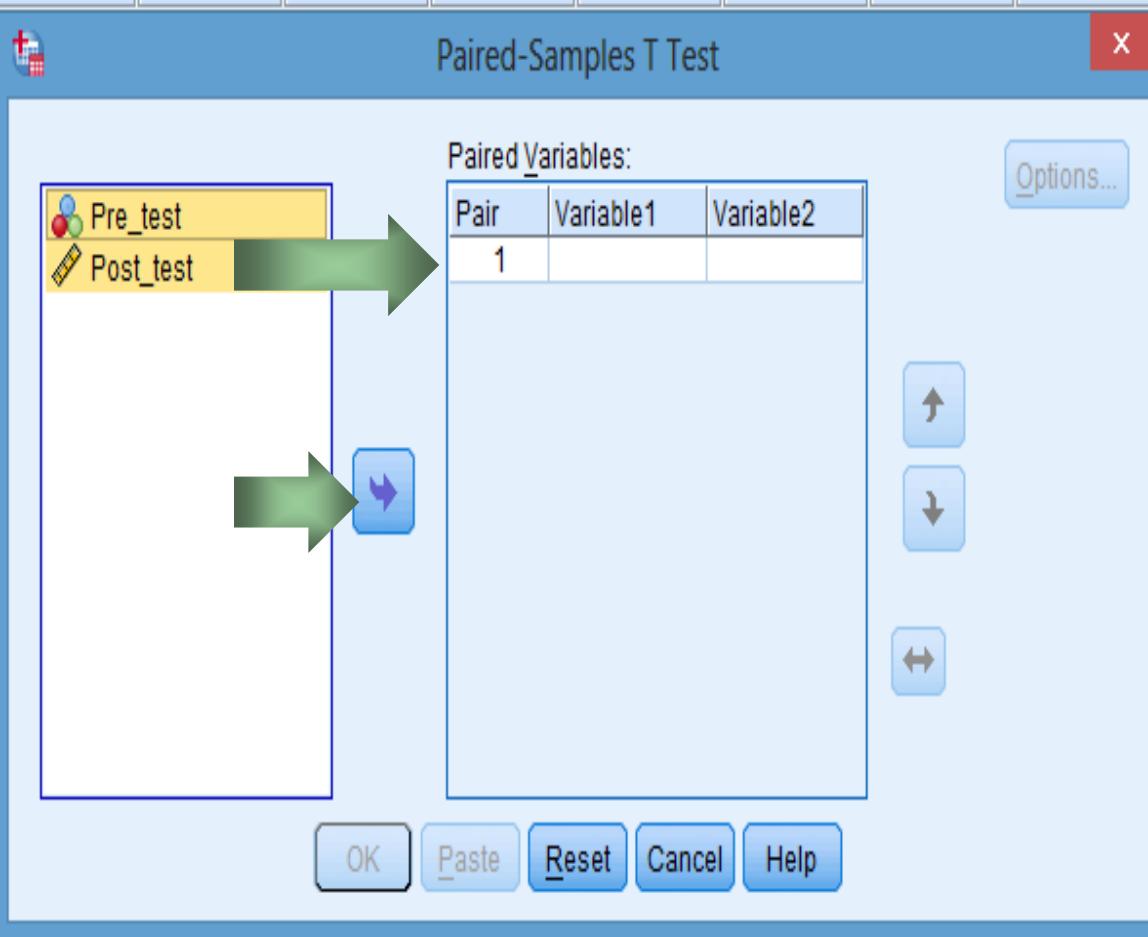
One-Way ANOVA...

ar va

23.00

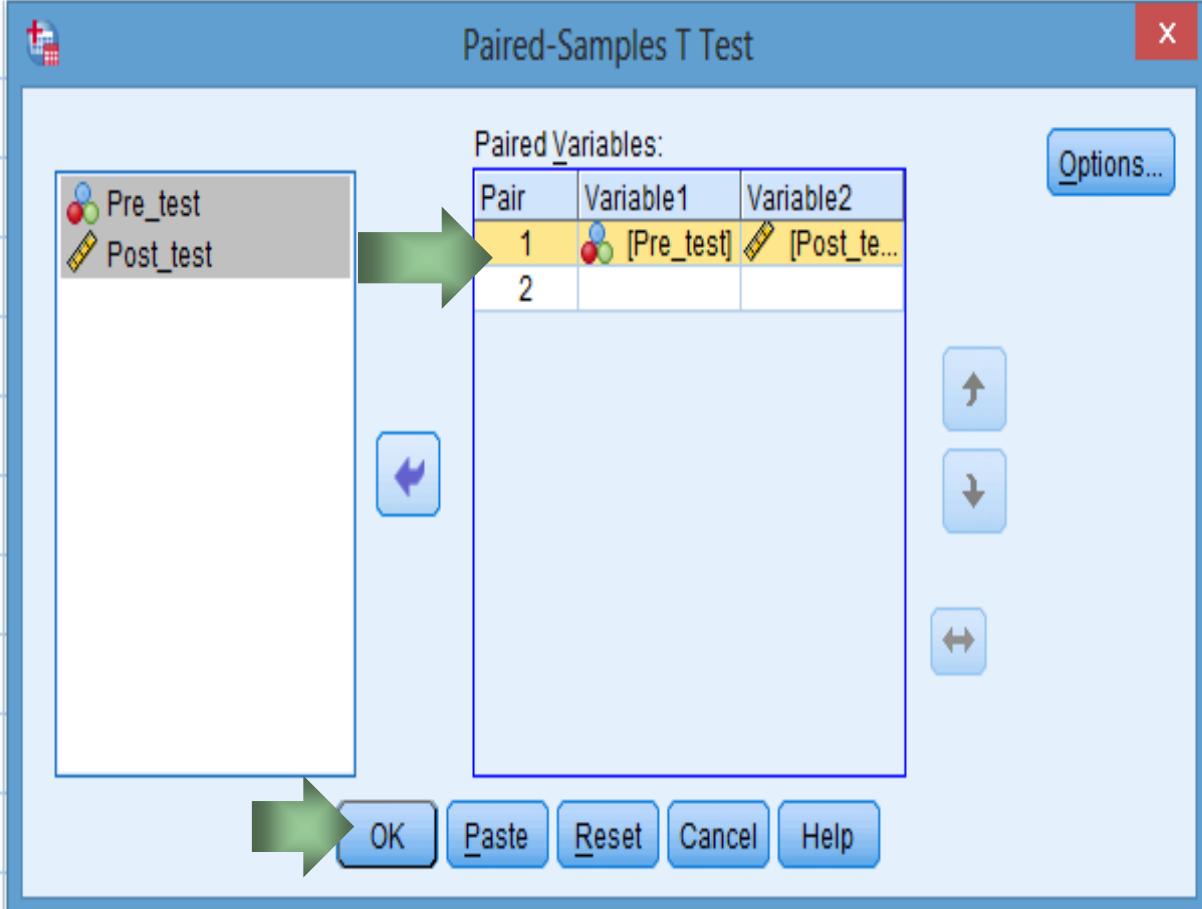


	Pre_test	Post_test	var							
1	12.00	30.00								
2	8.00	28.00								
3	9.00	26.00								
4	10.00	27.00								
5	11.00	23.00								
6	13.00	28.00								
7	12.00	29.00								
8	12.00	30.00								
9	14.00	24.00								
10	11.00	23.00								
11										
12										
13										





	Pre_test	Post_test	var								
1	12.00	30.00									
2	8.00	28.00									
3	9.00	26.00									
4	10.00	27.00									
5	11.00	23.00									
6	13.00	28.00									
7	12.00	29.00									
8	12.00	30.00									
9	14.00	24.00									
10	11.00	23.00									
11											
12											
13											



→ T-Test

[DataSet0]

Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_test	11.2000	10	1.81353
	Post_test	26.8000	10	2.69979

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1	Pre_test & Post_test	10	.009

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)			
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference							
				Lower	Upper						
Pair 1	Pre_test - Post_test	-15.60000	3.23866	1.02415	-17.91679	-13.28321	-15.232	.000			

Tabular Presentation

Table 6 Comparison on the Pre-test and Post-test Scores of Students

Variables	Std. Deviation	Mean	Df	Comp. t	p	Interpretation
Pre-test	1.81353	11.2000	9	-15.232	.000	Highly Significant
Post-test	2.69979	26.8000				

Where:

Df - Degrees of Freedom

Comp. t – Computed t value

P – Probability or Significance Value

Findings and Interpretation

- Significance value .000 denotes that there is a highly significant difference on the pre-test and post-test scores of students subjected to teacher's-designed module. This entails that the teacher's-designed module used in the classroom had significantly increase the performance of students.

Conclusion

- The teacher's-designed module is effective in improving the performance of the students.

Recommendation

- It is therefore recommended that the teacher's-designed module should be used as instructional material in the classroom.

Basis of Interpretation:

- Note: Compare the significance value with the alpha or significance level used (.05, .01)
- Sig. value > .05 is interpreted that the difference is not significant (NS). Ex: .10, .07, .06.
- Sig. value = or < .05 but > than .01 is interpreted that the difference is significant. Ex: .05, .03, .02.
- Sig value = or < .01 is interpreted that the difference is highly significant. Ex: .01, .006, .003.

Inferential Statistics

INDEPENDENT SAMPLES (UNPAIRED) T
TEST

Sample Situation

- In his study, it is the assumption of researcher that TV program watching are among of the factors or outside school activities that improves the English proficiency of B.S.Ed. entrants. To do this, he grouped the students levels of English proficiency based on the number of TV programs the students are watching. He grouped it into few and many.

Statement of the Problem

- Is there a significant difference on the english proficiency of B.S.Ed. entrants when grouped according to number of TV program watched?

- Hypothesis: There is no significant difference on english proficiency of B.S.Ed. entrants when grouped according to number of TV program watched.

Sample Data

TV Programs Watch	English Proficiency
1.00	2.30
1.00	3.50
2.00	2.70
2.00	3.40
1.00	2.50
1.00	3.60
1.00	3.30
2.00	4.20
2.00	3.90
2.00	4.50

Where: (1) – Watch Few TV Programs (2) - Watch Many TV Programs

Steps

- Open SPSS
- Select variable view- Name your variable
- Select data view- Enter data

- Select analyze – Compare means - Independent sample t-test.
- Transfer dependent variable (English Proficiency) to the dependent variable place and grouping variable (Number of TV Program Watched) at the grouping variable place. (Highlight and click arrow)

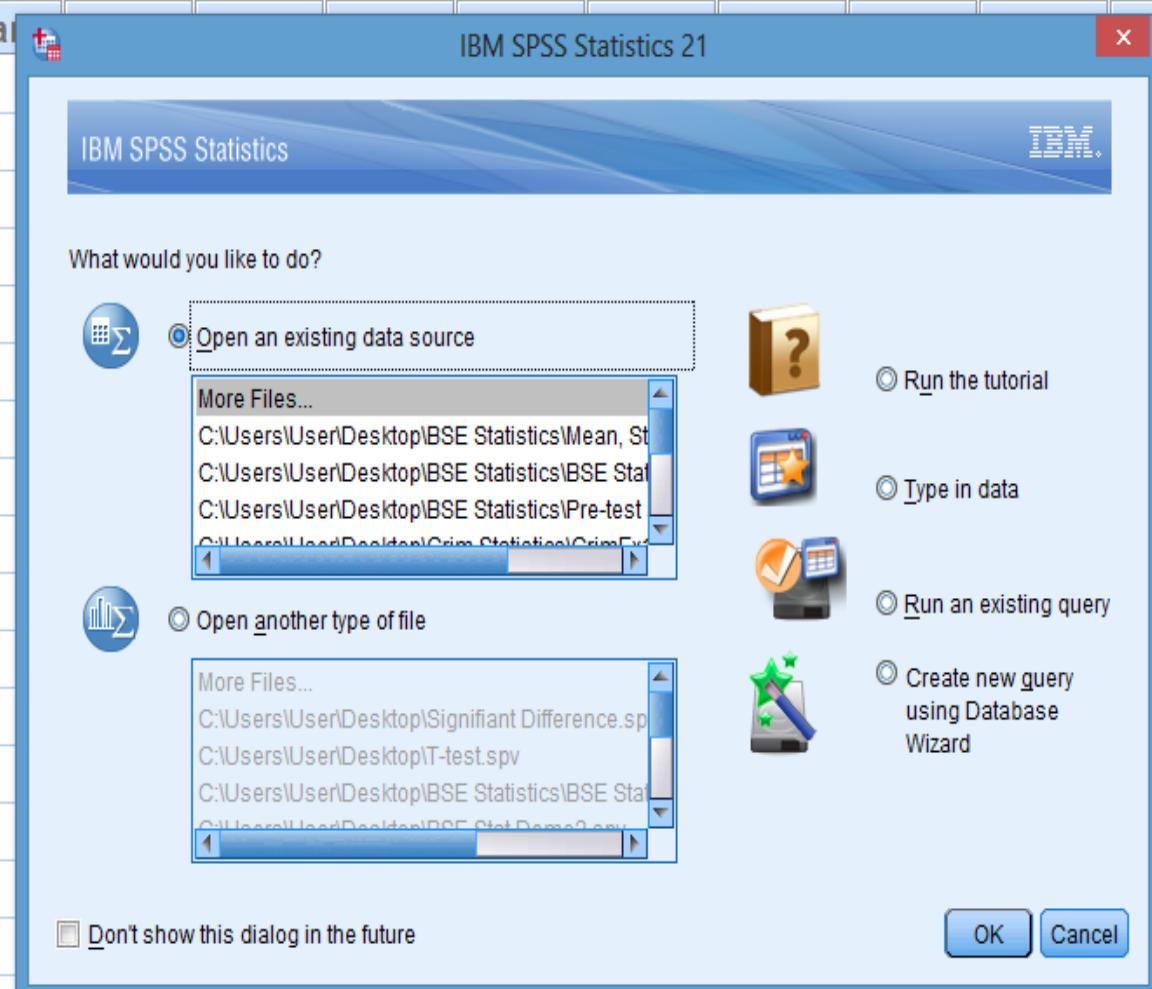
- Select define group to specify the grouping by entering “1” and “2” in group 1 place and group 2 place respectively, and click continue.
- Click “Ok”.



● DEMONSTRATION



	var	var	var	var
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				





File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

Folder Save Print Import Export Undo Redo Gridlines Statistics Data Labels Row Labels Column Labels

	Name	Type	Width	Decimals	Label
1	TV_Program_Watch	Numeric	8	2	
2	English_Proficiency	Numeric	8	2	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					



1 :	TV_Program_Watch	English_Proficiency	var	var	var	var
1	1.00	2.30				
2	1.00	3.50				
3	2.00	2.70				
4	2.00	3.40				
5	1.00	2.50				
6	1.00	3.60				
7	1.00	3.30				
8	2.00	4.20				
9	2.00	3.90				
10	2.00	4.50				
11						
12						



	TV_Program_Watch	English_Proficiency	var	var	var	var	var
1	1.00	2.30					
2	1.00	3.50					
3	2.00	2.70					
4	2.00	3.40					
5	1.00	2.50					
6	1.00	3.60					
7	1.00	3.30					
8	2.00	4.20					
9	2.00	3.90					
10	2.00	4.50					
11							
12							
13							
14							
15							
16							
17							

1

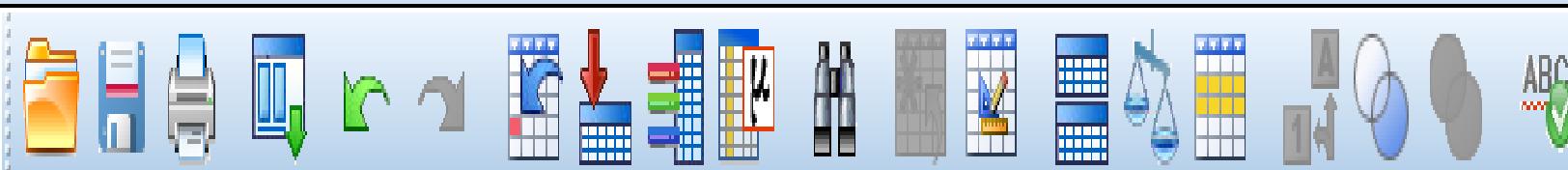
...

Data View

Variable View



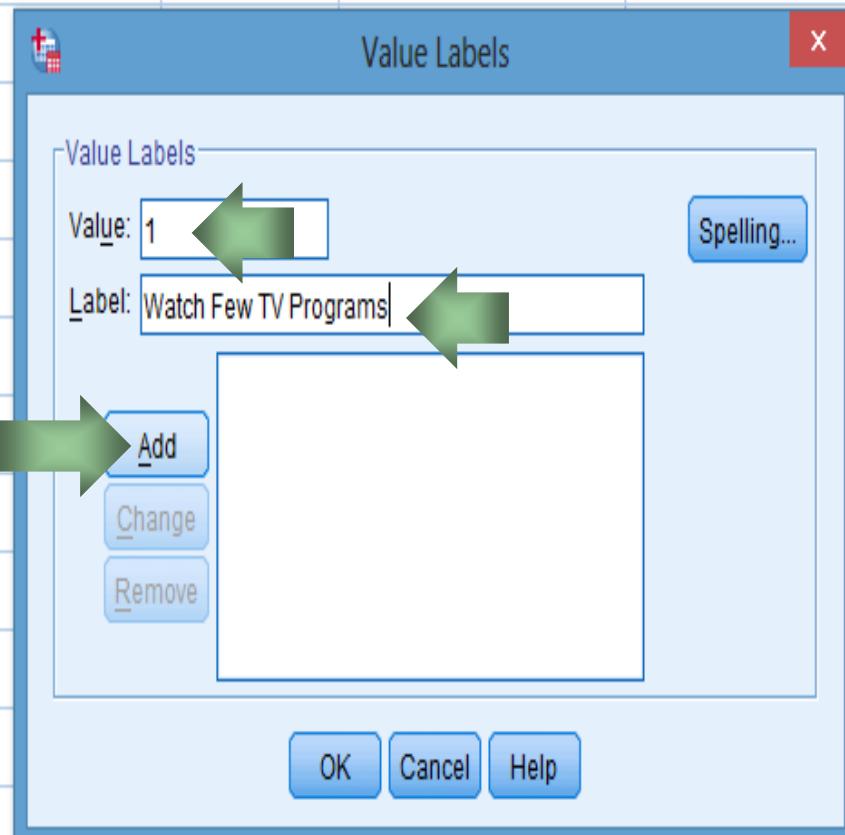
File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help



	Name	Type	Width	Decimals	Label	Values	Missing
1	TV_Program_Watch	Numeric	8	2		None	...
2	English_Proficiency	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							

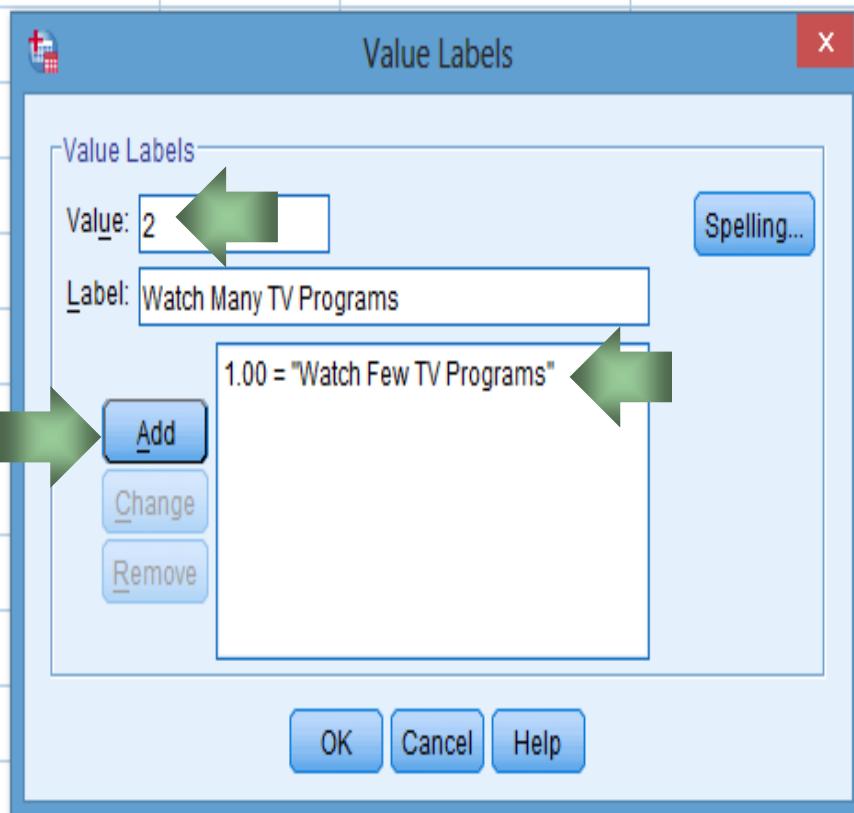


	Name	Type	Width	Decimals	Label	Values	Missing	C
1	TV_Program_Watch	Numeric	8	2		None	None	8
2	English_Proficiency	Numeric	8	2		None	None	8
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								





	Name	Type	Width	Decimals	Label	Values	Missing
1	TV_Program_Watch	Numeric	8	2		None	None
2	English_Proficiency	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							





	Name	Type	Width	Decimals	Label	Values	Missing
1	TV_Program_Watch	Numeric	8	2		None	None
2	English_Proficiency	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							





	Name	Type	Width	Decimals	Label	Values	Missing
1	TV_Program_Watch	Numeric	8	2		ograms}... ...	None
2	English_Proficiency	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							





	TV_Program_Watch	English_Proficiency	var	var	var	var
1	1.00	2.30				
2	1.00	3.50				
3	2.00	2.70				
4	2.00	3.40				
5	1.00	2.50				
6	1.00	3.60				
7	1.00	3.30				
8	2.00	4.20				
9	2.00	3.90				
10	2.00	4.50				
11						
12						
13						
14						
15						
16						
17						





File Edit View Data Tra **Analyze** Graphs Utilities Add-ons Window Help

Reports Descriptive Statistics Compare Means General Linear Model Correlate Regression Classify Dimension Reduction Scale Nonparametric Tests Forecasting Multiple Response Simulation... Quality Control ROC Curve...

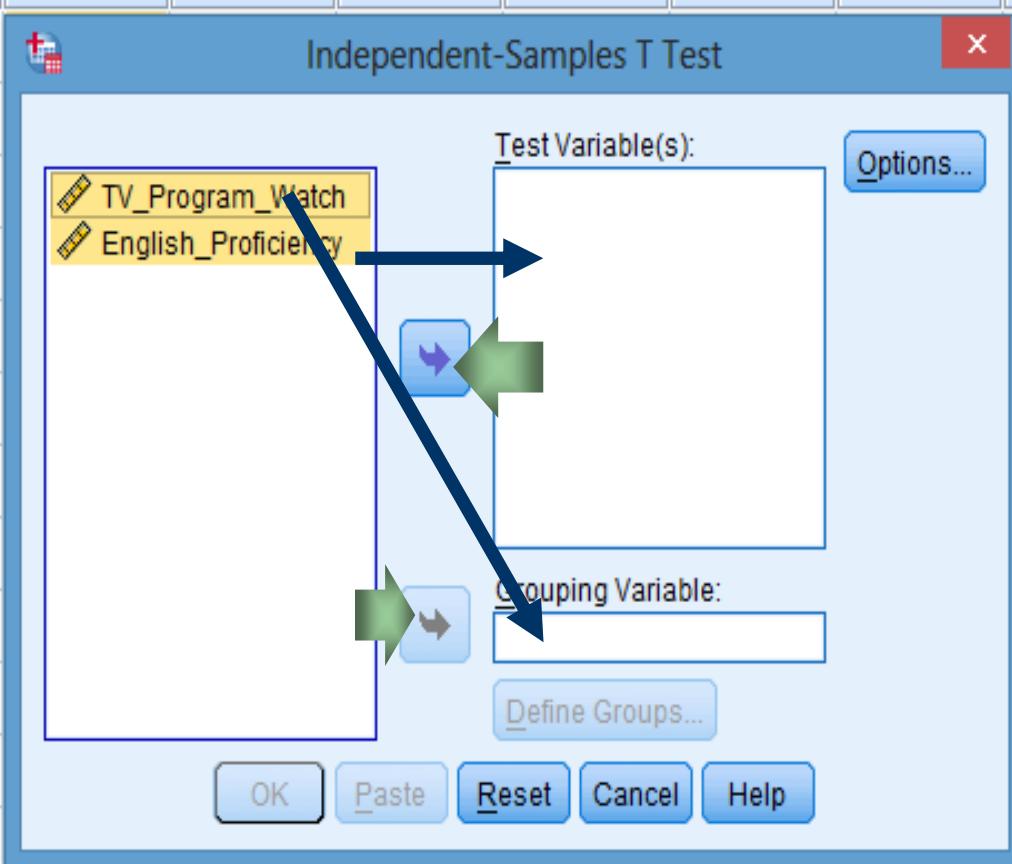
M Means... t One-Sample T Test... t AB Independent-Samples T Test... Paired-Samples T Test... F One-Way ANOVA...

	TV_Progra m_Watch	Eng of
1	1.00	
2	1.00	
3	2.00	
4	2.00	
5	1.00	
6	1.00	
7	1.00	
8	2.00	
9	2.00	3.90
10	2.00	4.50
11		
12		
13		



1:

	TV_Program_Watch	English_Proficiency	var									
1	1.00	2.30										
2	1.00	3.50										
3	2.00	2.70										
4	2.00	3.40										
5	1.00	2.50										
6	1.00	3.60										
7	1.00	3.30										
8	2.00	4.20										
9	2.00	3.90										
10	2.00	4.50										
11												
12												
13												
14												





The screenshot shows a portion of a SPSS interface with a data view and a dialog box for an Independent-Samples T Test. The data view includes columns for 'TV_Program_Watch' and 'English_Proficiency'. The dialog box has 'English_Proficiency' selected as the test variable and 'TV_Program_Watch' as the grouping variable. A green arrow points from the 'TV_Program_Watch' label to the 'Grouping Variable' field.

	TV_Program_Watch	English_Proficiency	var								
1	1.00	2.30									
2	1.00	3.50									
3	2.00	2.70									
4	2.00	3.40									
5	1.00	2.50									
6	1.00	3.60									
7	1.00	3.30									
8	2.00	4.20									
9	2.00	3.90									
10	2.00	4.50									
11											
12											
13											

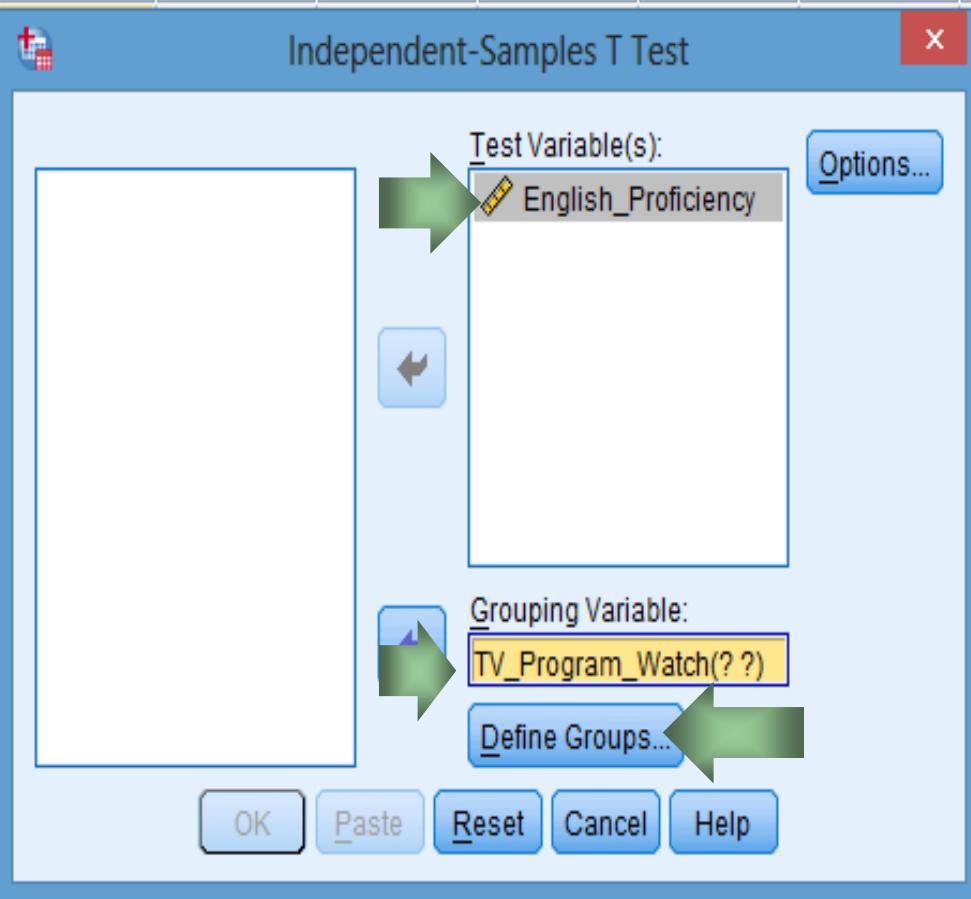
Independent-Samples T Test

Test Variable(s): English_Proficiency

Grouping Variable: TV_Program_Watch(??)

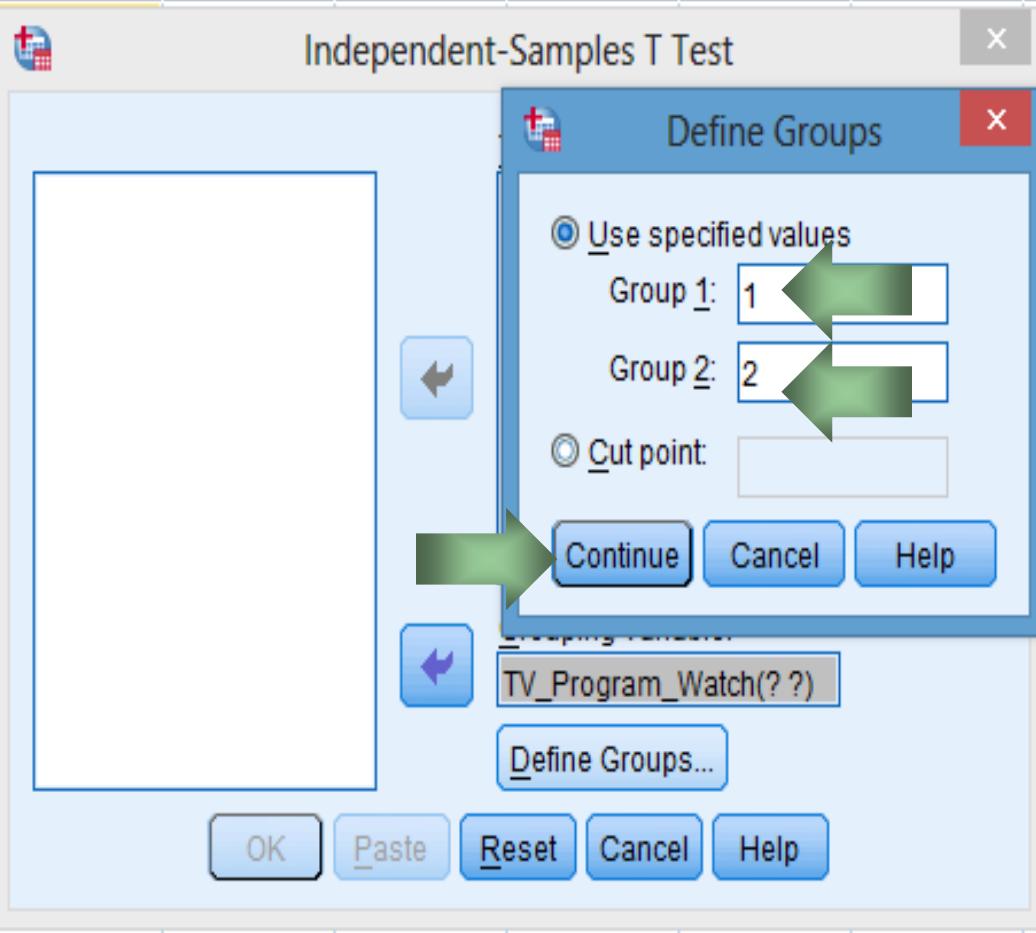
Define Groups...

OK Paste Reset Cancel Help



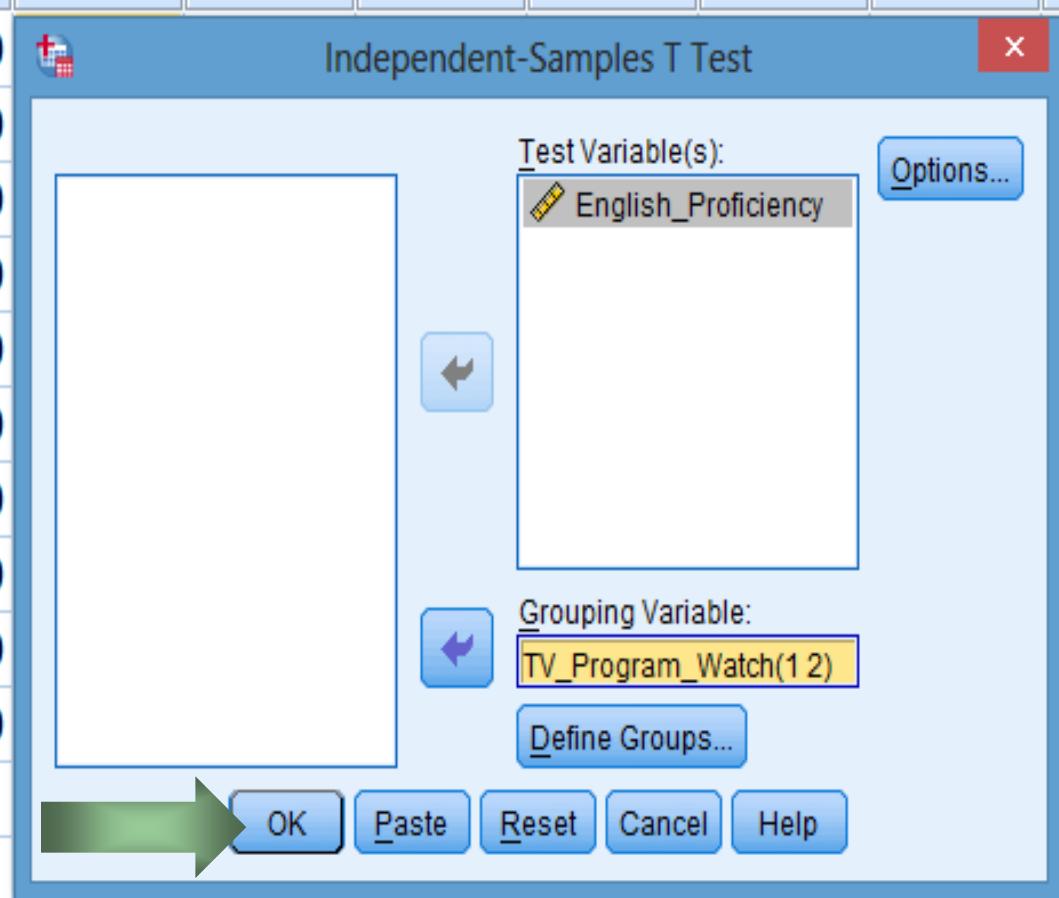


	TV_Program_Watch	English_Proficiency	var						
1	1.00	2.30							
2	1.00	3.50							
3	2.00	2.70							
4	2.00	3.40							
5	1.00	2.50							
6	1.00	3.60							
7	1.00	3.30							
8	2.00	4.20							
9	2.00	3.90							
10	2.00	4.50							
11									
12									
13									





1:	TV_Program_Watch	English_Proficiency	var	var	var	var	var	var
1	1.00	2.30						
2	1.00	3.50						
3	2.00	2.70						
4	2.00	3.40						
5	1.00	2.50						
6	1.00	3.60						
7	1.00	3.30						
8	2.00	4.20						
9	2.00	3.90						
10	2.00	4.50						
11								
12								
13								

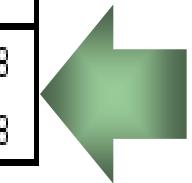


→ T-Test

[DataSet0]

Group Statistics

TV Program Watch		N	Mean	Std. Deviation	Std. Error Mean
English_Proficiency	Watch Few TV Programs	5	3.0400	.59833	.26758
	Watch Many TV Programs	5	3.7400	.70922	.31718



Independent Samples Test

	Levene's Test for Equality of Variances					
		F	Sig.	t	df	Sig. (2-tailed)
English_Proficiency	Equal variances assumed	.052	.825	-1.687	8	.130
	Equal variances not assumed			-1.687	7.779	.131



Tabular Presentation

Table 7 Comparison of English Proficiency of B.S. Ed Entrants when Group According to Number of TV Program Watched

Grouping Variables	Std. Deviation	Mean	Df	Computed t	P	Interpretation
Watched Few TV Programs	.59833	3.0400	8	-1.687	.130	Not Significant
Watched Many TV Programs	.70922	3.7400				

Findings and Interpretation

- Significance value .130 denotes that there is no significant difference on the English proficiency of BSED entrants when they are grouped according to number of TV program they are watching. The findings indicate that number of TV programs watched didn't have any effect on the english proficiency of B.S.Ed entrants.

Conclusion

- Watching TV programs is not a factor that contribute to proficiency of students in English.

Recommendation

- Another study should be conducted to investigate other factors or activities done by the students outside the school that could help elevate their proficiency in english.

Test for Samples Not Normally Distributed

- DEMONSTRATION ON THE APPLICATION OF
Mann Whitney U Test
(z test)



File Edit View Data

Analyze Graphs Utilities Add-ons Window Help



	TV_Program_Watch	Engaged
1		1.00
2		1.00
3		2.00
4		2.00
5		1.00
6		1.00
7		1.00
8		2.00
9		2.00
10		2.00
11		
12		
13		
14		
15		
16		
17		

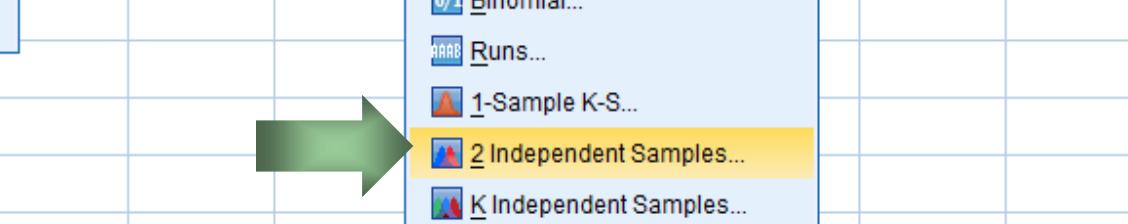
Reports
Descriptive Statistics
Compare Means
General Linear Model
Correlate
Regression
Classify
Dimension Reduction
Scale
Nonparametric Tests
Forecasting
Multiple Response
Simulation...
Quality Control
ROC Curve...



var1 var2 var3 var4 var5 var6 var7 var8



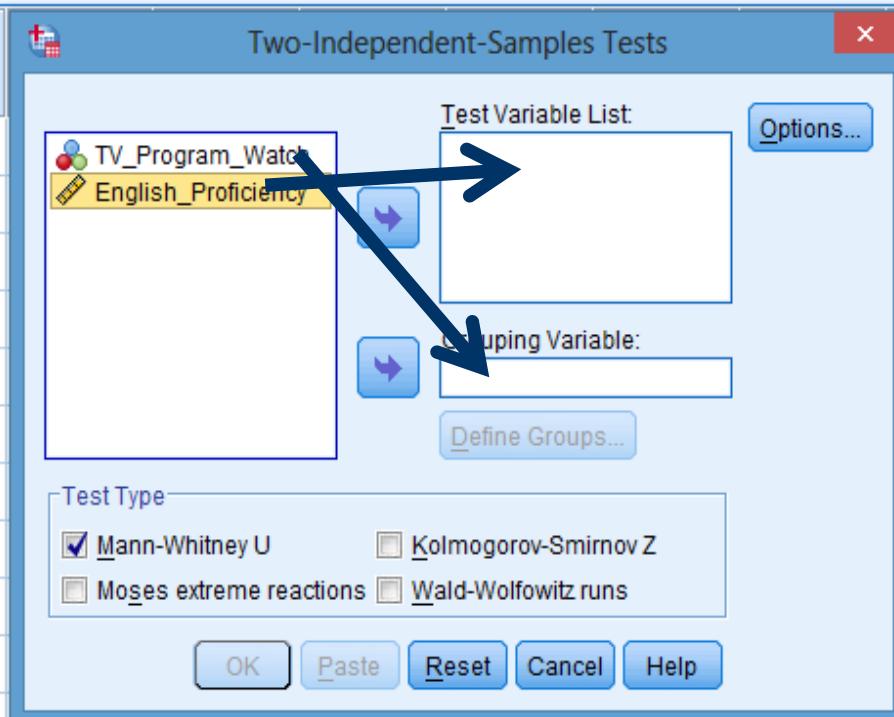
One Sample...
Independent Samples...
Related Samples...



Chi-square...
Binomial...
Runs...
1-Sample K-S...
2 Independent Samples...
K Independent Samples...
2 Related Samples...
K Related Samples...

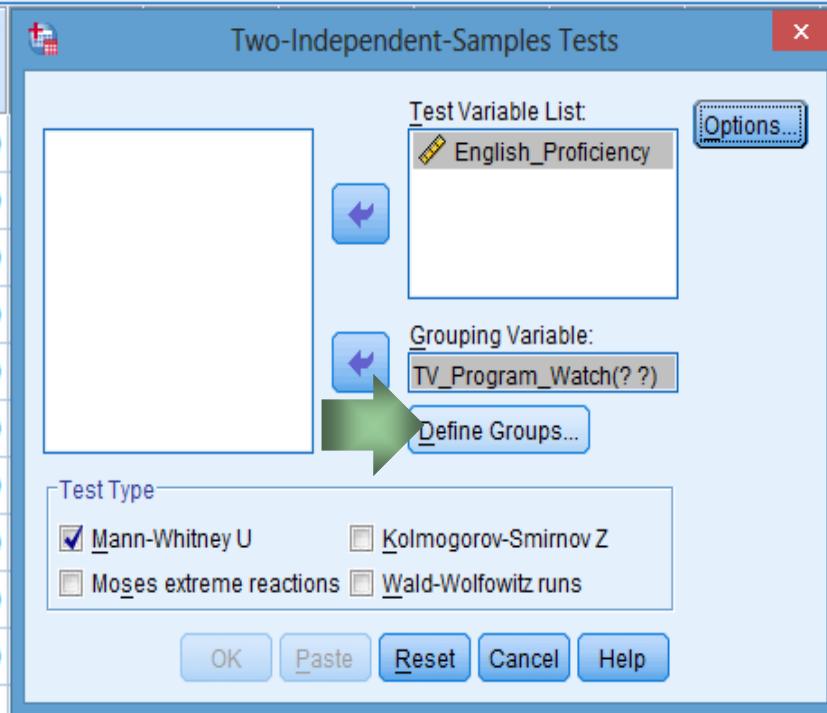


	TV_Progra m_Watch	English_Pr oficiency
1	1.00	2.30
2	1.00	3.50
3	2.00	2.70
4	2.00	3.40
5	1.00	2.50
6	1.00	3.60
7	1.00	3.30
8	2.00	4.20
9	2.00	3.90
10	2.00	4.50
11		
12		
13		
14		
15		
16		
17		



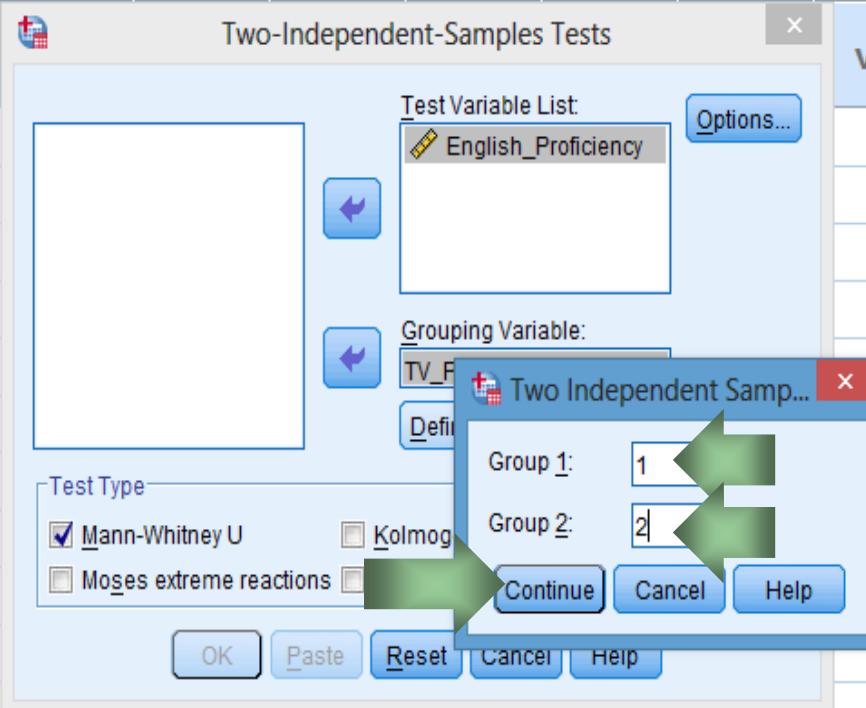


	TV_Program_Watch	English_Proficiency	var	var	var	var
1	1.00	2.30				
2	1.00	3.50				
3	2.00	2.70				
4	2.00	3.40				
5	1.00	2.50				
6	1.00	3.60				
7	1.00	3.30				
8	2.00	4.20				
9	2.00	3.90				
10	2.00	4.50				
11						
12						
13						
14						
15						
16						
17						



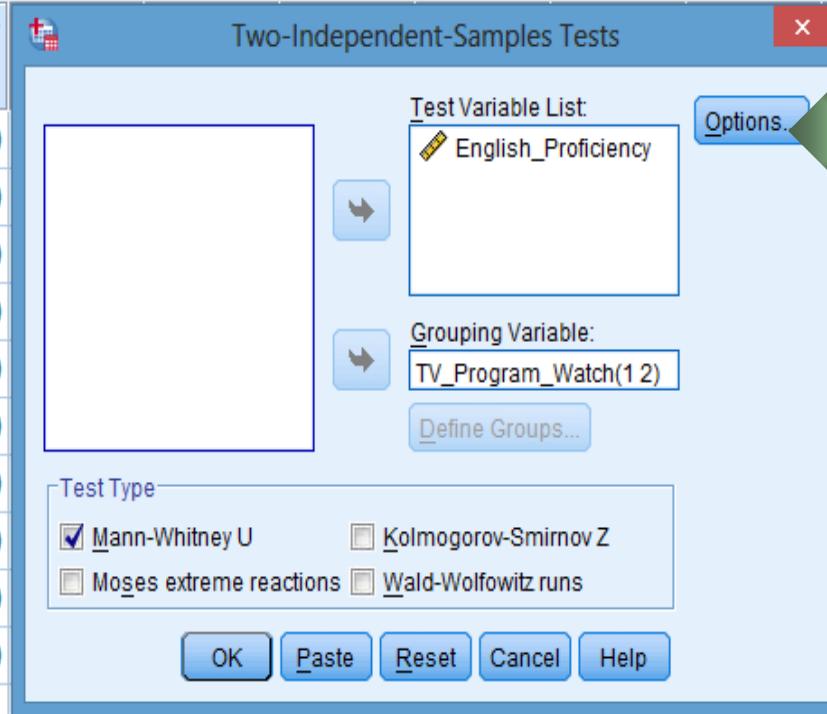


	TV_Program_Watch	English_Proficiency
1	1.00	2.30
2	1.00	3.50
3	2.00	2.70
4	2.00	3.40
5	1.00	2.50
6	1.00	3.60
7	1.00	3.30
8	2.00	4.20
9	2.00	3.90
10	2.00	4.50
11		
12		
13		
14		
15		
16		
17		





	TV_Program_Watch	English_Proficiency	var	var	var	var
1	1.00	2.30				
2	1.00	3.50				
3	2.00	2.70				
4	2.00	3.40				
5	1.00	2.50				
6	1.00	3.60				
7	1.00	3.30				
8	2.00	4.20				
9	2.00	3.90				
10	2.00	4.50				
11						
12						
13						
14						
15						
16						
17						





File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

TV_Program_Watch English_Proficiency

	TV_Program_Watch	English_Proficiency
1	1.00	2.30
2	1.00	3.50
3	2.00	2.70
4	2.00	3.40
5	1.00	2.50
6	1.00	3.60
7	1.00	3.30
8	2.00	4.20
9	2.00	3.90
10	2.00	4.50
11		
12		
13		
14		
15		
16		
17		

Two-Independent-Samples Tests

Test Variable List

Statistics

Descriptive Quartiles

Missing Values

Exclude cases test-by-test Exclude cases listwise

Test Type

Mann-Whitney U Moses extreme reactions Wilcoxon signed ranks

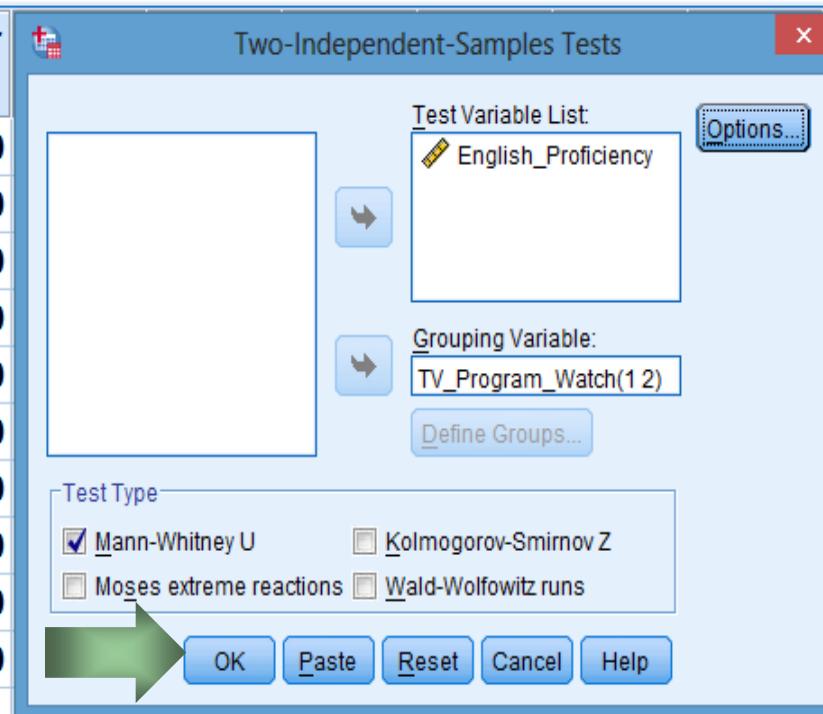
OK Cancel Help

var var var

Data View Variable View



	TV_Program_Watch	English_Proficiency	var	var	var	var
1	1.00	2.30				
2	1.00	3.50				
3	2.00	2.70				
4	2.00	3.40				
5	1.00	2.50				
6	1.00	3.60				
7	1.00	3.30				
8	2.00	4.20				
9	2.00	3.90				
10	2.00	4.50				
11						
12						
13						
14						
15						
16						
17						

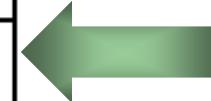


→ NPar Tests

[DataSet1] C:\Users\User\Desktop\MAED Statistics\BSE Inputs.sav

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
English_Proficiency	10	3.3900	.72026	2.30	4.50
TV_Program_Watch	10	1.5000	.52705	1.00	2.00



Mann-Whitney Test

Ranks

	TV Program Watch	N	Mean Rank	Sum of Ranks
English_Proficiency	Watch Few TV Programs	5	4.00	20.00
	Watch Many TV Programs	5	7.00	35.00
	Total	10		

Test Statistics^a

	English_Proficiency
Mann-Whitney U	5.000
Wilcoxon W	20.000
Z	-1.567
Asymp. Sig. (2-tailed)	.117
Exact Sig. [2*(1-tailed Sig.)]	.151 ^b



a. Grouping Variable:
TV_Program_Watch

Another Situation on the Use of Independent Samples t – test

- In his study the researcher will have to find out the effectiveness of his developed multi-media instruction. In doing this he will conduct classes to the equated participants. One group (experimental) will be exposed to the developed multimedia instruction and the other group (control) will be exposed to traditional teaching. After the tests were conducted to both groups the achievements of students will be compared using independent samples t test to observe the significance of the difference between two independent groups.

Statement of the Problem

- Is there a significant difference on the achievements of students exposed multi-media instruction and traditional method of teaching?
- Hypothesis: There is no significant difference on the achievements of students exposed to multi-media instruction and traditional method of teaching.

Students' Scores

Multi-media Instruction	Traditional Teaching
45	30
43	34
46	28
49	26
38	43
36	24
39	37
38	39
45	33
44	39
48	43

Steps

- Open SPSS
- Select variable view- Name your variable
- Select data view- Enter data

- Select analyze – Compare means - Independent sample t-test.
- Transfer dependent variable (Students' Achievements) to the dependent variable place and grouping variable (Methods of Instruction) at the grouping variable place. (Highlight and click arrow)

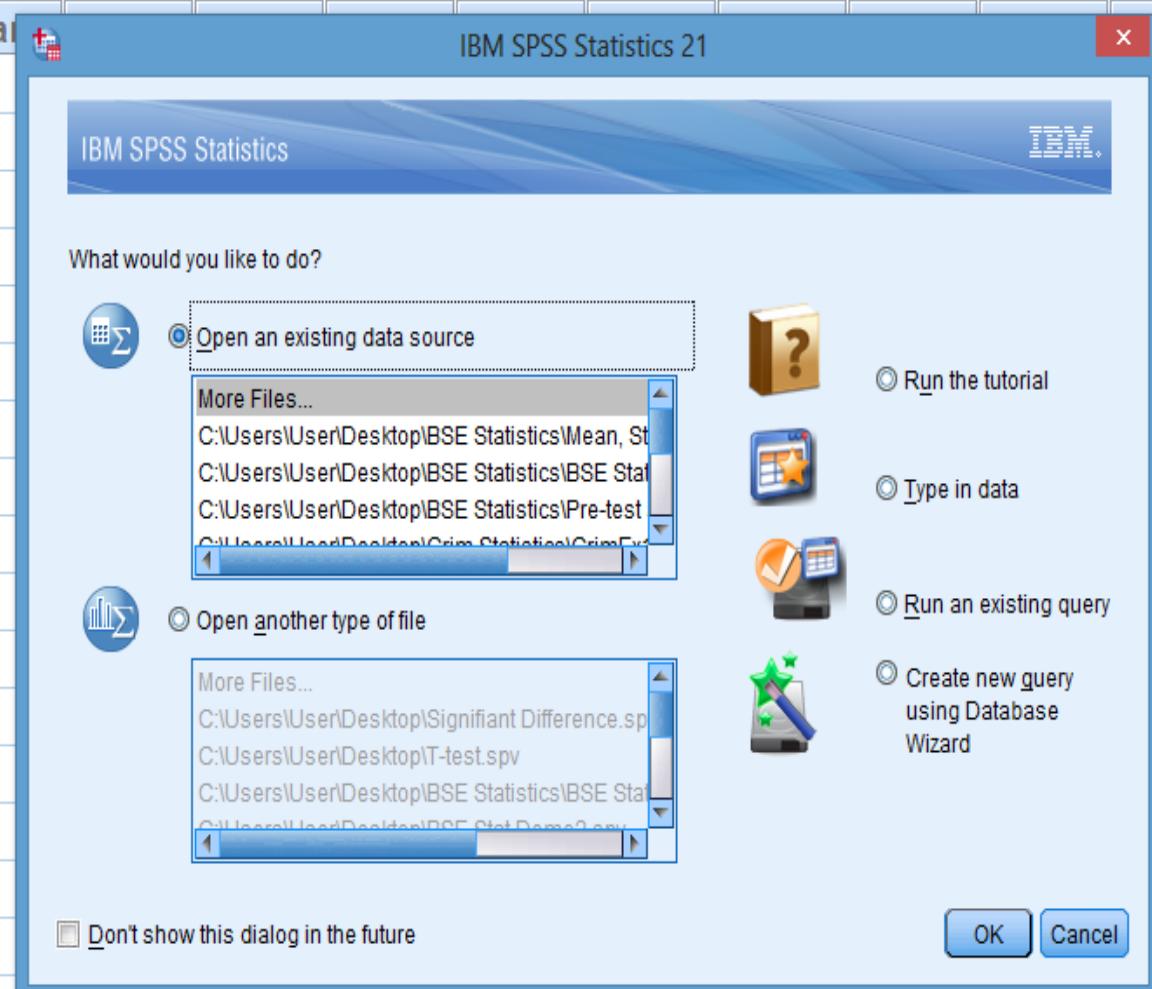
- Select define group to specify the grouping by entering “1” and “2” in group 1 place and group 2 place respectively, and click continue.
- Click “Ok”.



● DEMONSTRATION



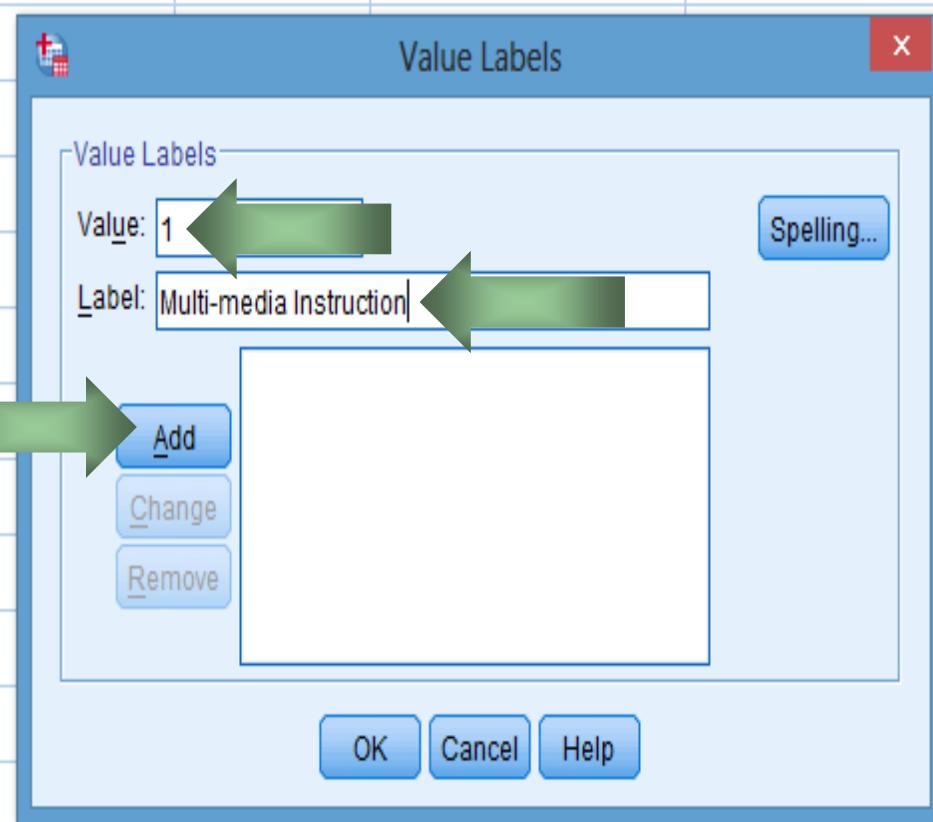
	var	var	var	var
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				



	Name	Type	Width	Decimals	Label	Values	Missing
Methods	Numeric	8	2			None	...
Achievements	Numeric	8	2			None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							

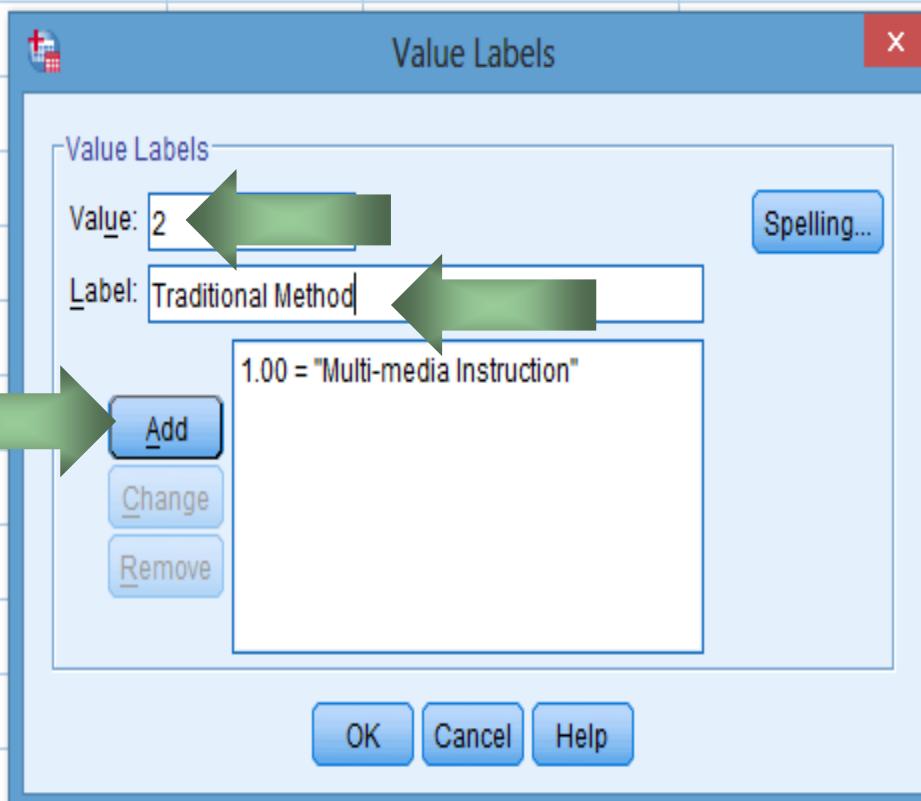


	Name	Type	Width	Decimals	Label	Values	Missing
1	Methods	Numeric	8	2		None	None
2	Achievements	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							



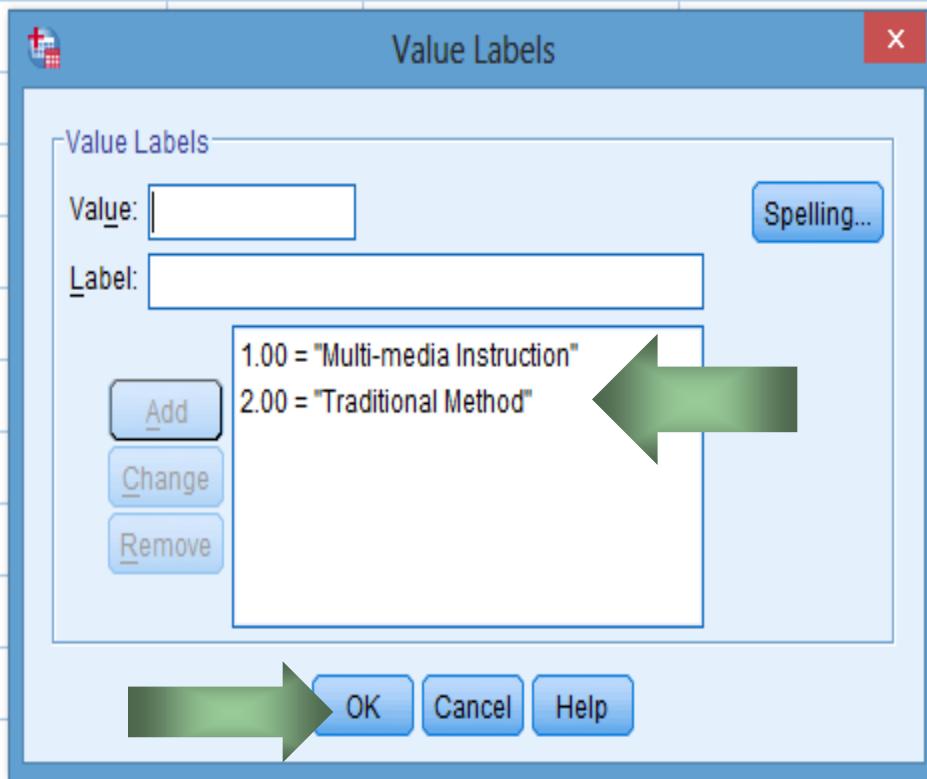


	Name	Type	Width	Decimals	Label	Values	Missing
1	Methods	Numeric	8	2		None	None
2	Achievements	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

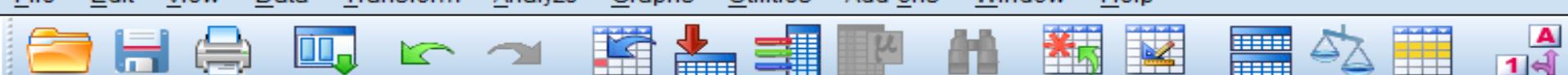




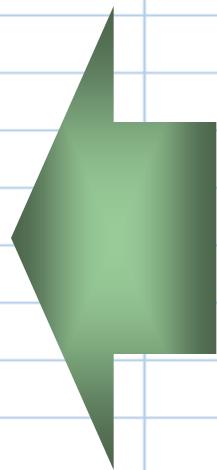
	Name	Type	Width	Decimals	Label	Values	Missing
1	Methods	Numeric	8	2		None	None
2	Achievements	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							



	Name	Type	Width	Decimals	Label	Values	Missing
1	Methods	Numeric	8	2		{1.00, Multi-...}	None
2	Achievements	Numeric	8	2		None	None
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							



	Methods	Achievements	var	var	var	var	var	var
1	1.00	45.00						
2	1.00	43.00						
3	1.00	46.00						
4	1.00	49.00						
5	1.00	38.00						
6	1.00	36.00						
7	1.00	39.00						
8	1.00	38.00						
9	1.00	45.00						
10	1.00	44.00						
11	2.00	30.00						
12	2.00	34.00						
13	2.00	28.00						
14	2.00	26.00						
15	2.00	43.00						
16	2.00	24.00						
17	2.00	37.00						





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Analyze Graphs Utilities Add-ons Window Help



	Methods	S
1	1.00	
2	1.00	
3	1.00	
4	1.00	
5	1.00	
6	1.00	
7	1.00	
8	1.00	
9	1.00	
10	1.00	44.00
11	2.00	30.00
12	2.00	34.00
13	2.00	28.00
14	2.00	26.00
15	2.00	43.00
16	2.00	24.00
17	2.00	37.00
18	2.00	39.00

- Reports
- Descriptive Statistics
- Compare Means
- General Linear Model
- Correlate
- Regression
- Classify
- Dimension Reduction
- Scale
- Nonparametric Tests
- Forecasting
- Multiple Response
- Simulation...
- Quality Control
- ROC Curve...

M Means...

t One-Sample T Test...

t Independent-Samples T Test...

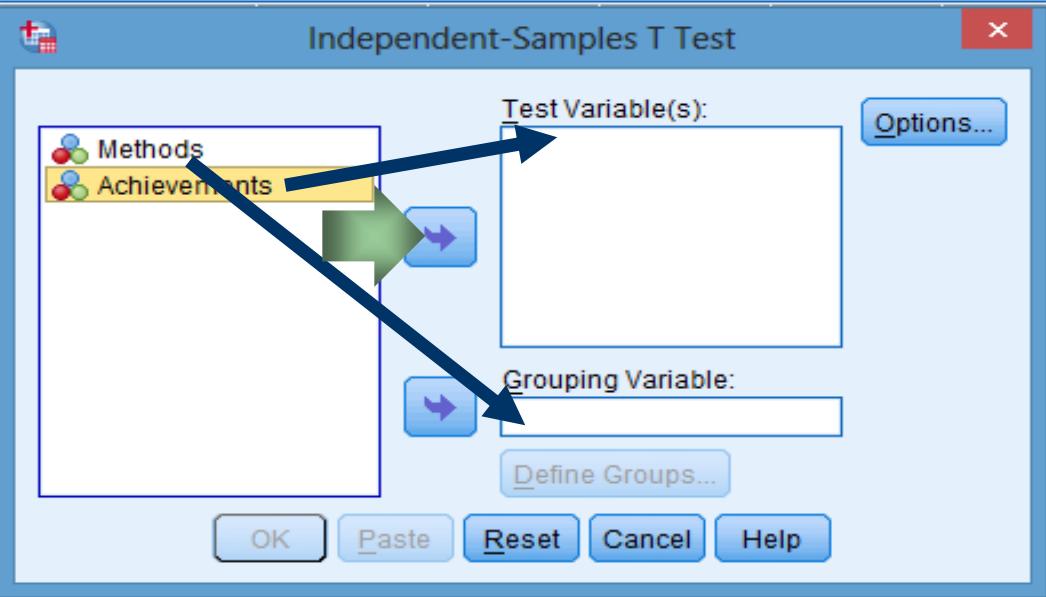
t Paired-Samples T Test...

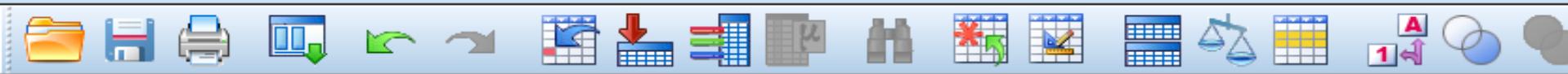
F One-Way ANOVA...

ar var

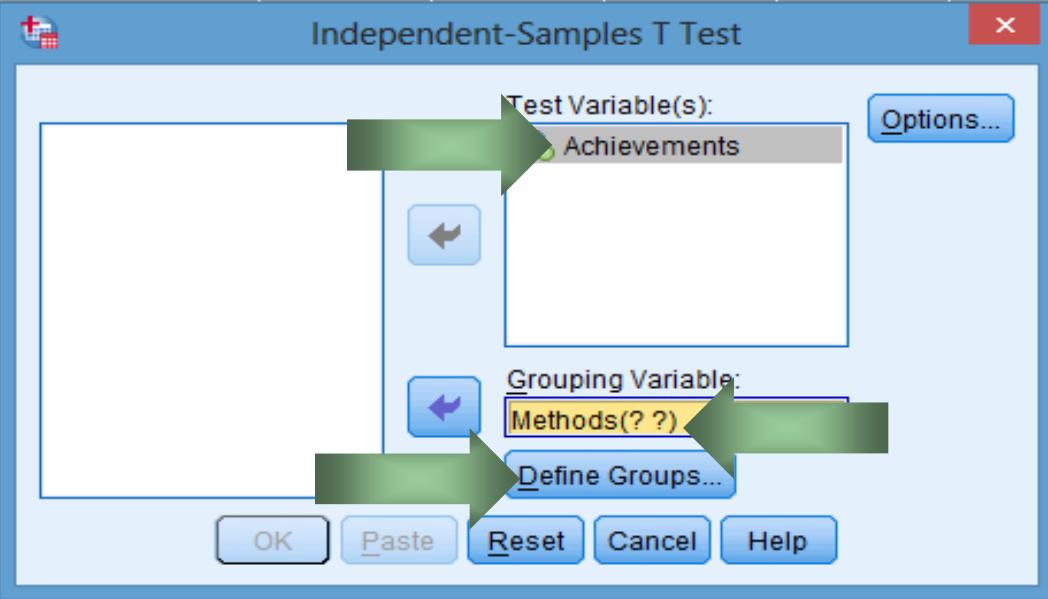


	Methods	
1	1.00	
2	1.00	
3	1.00	
4	1.00	
5	1.00	
6	1.00	
7	1.00	
8	1.00	
9	1.00	45.00
10	1.00	44.00
11	2.00	30.00
12	2.00	34.00
13	2.00	28.00
14	2.00	26.00
15	2.00	43.00
16	2.00	24.00
17	2.00	37.00



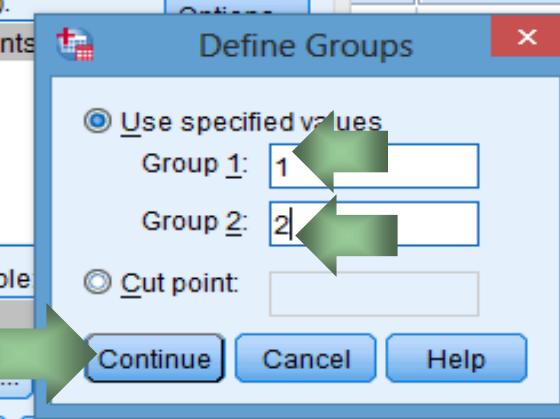
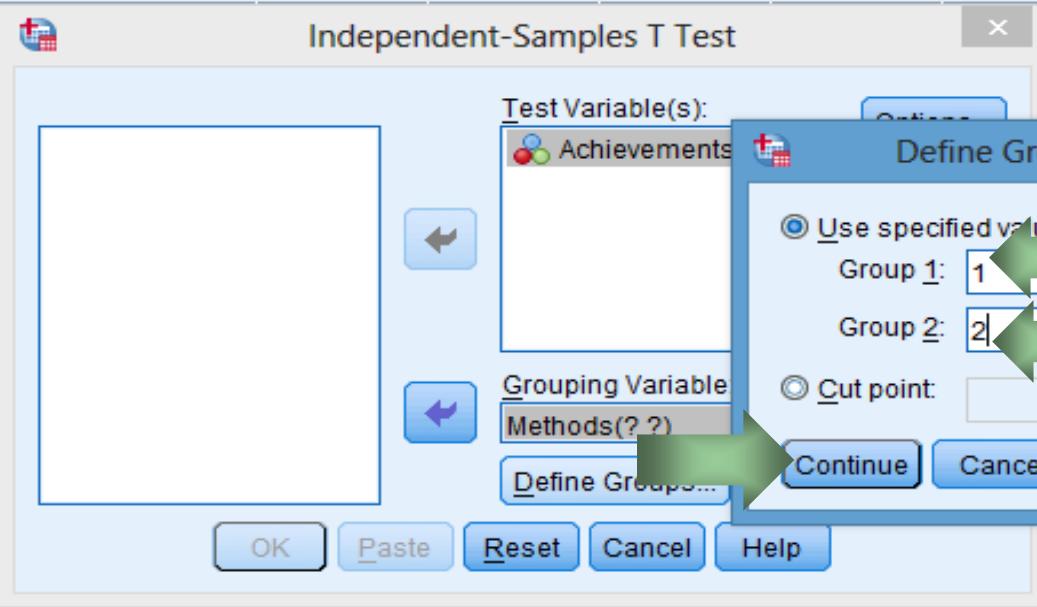


	Methods	
1	1.00	
2	1.00	
3	1.00	
4	1.00	
5	1.00	
6	1.00	
7	1.00	
8	1.00	
9	1.00	
10	1.00	44.00
11	2.00	30.00
12	2.00	34.00
13	2.00	28.00
14	2.00	26.00
15	2.00	43.00
16	2.00	24.00
17	2.00	37.00



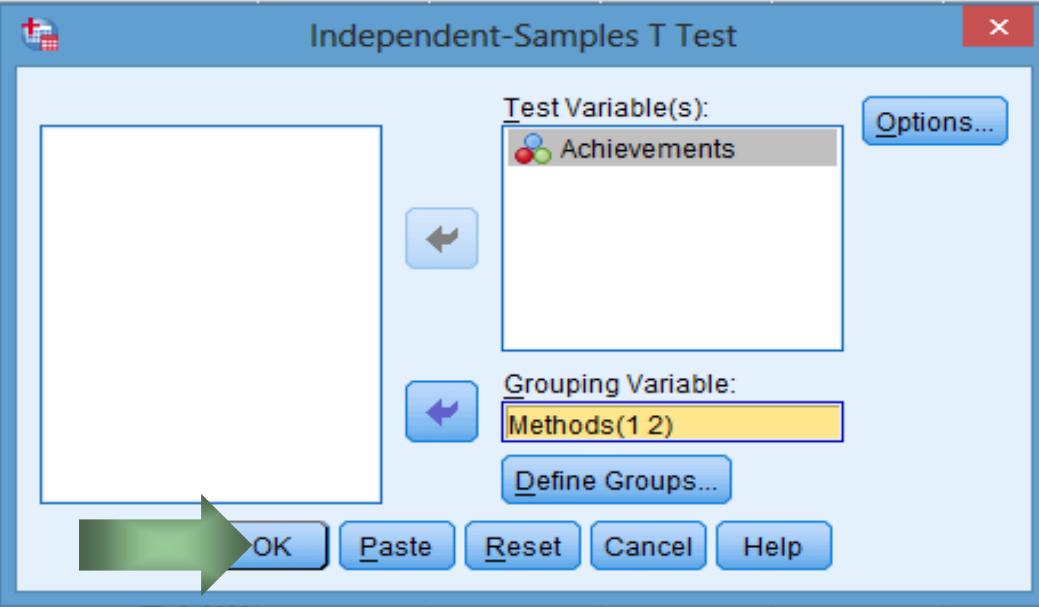


	Methods	
1		1.00
2		1.00
3		1.00
4		1.00
5		1.00
6		1.00
7		1.00
8		1.00
9		1.00
10		44.00
11		30.00
12		34.00
13		28.00
14		26.00
15		43.00
16		24.00
17		37.00





	Methods	
1		1.00
2		1.00
3		1.00
4		1.00
5		1.00
6		1.00
7		1.00
8		1.00
9		1.00
10		44.00
11	2.00	30.00
12	2.00	34.00
13	2.00	28.00
14	2.00	26.00
15	2.00	43.00
16	2.00	24.00
17	2.00	37.00



→ T-Test

[DataSet0]

Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
Scores	Methods	10	42.3000	4.27005	1.35031
	traditional Teaching	10	33.3000	6.25478	1.97793

Independent Samples Test

		Levene's Test for Equality of Variances		t-test:			
		F	Sig.	t	df	Sig. (2-tailed)	M Diff.
Scores	Equal variances assumed	1.552	.229	3.758	18	.001	
	Equal variances not assumed			3.758	15.892	.002	

Tabular Presentation

Table 8 Comparison of Test Scores Achieved by Students Exposed to Multi-media Instruction and Traditional Teaching

Grouping Variables	Std. Deviation	Mean	Df	Computed t	P	Interpretation
Multi-media Instruction	4.27005	42.3000	18	3.758	.001	Highly Significant
Traditional Teaching	6.25478	33.3000				

Findings

- The observed probability of .002 denotes that there is a highly significant difference on the test scores of students exposed to multi-media instruction and traditional teaching.

Conclusion

- Based on the observed mean and probability value, it is concluded that multi media instruction is effective than the traditional teaching.

Recommendation

- The multi-media instruction developed by the researcher is recommended to be used in the classroom.