

Educational Data Analysis by Applied SPSS

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Data analysis generally begins with the calculation of a number of summary statistics such as the mean, median, standard deviation, etc., and by creating informative graphical displays of the data such as histograms, box plots, and stem-and-leaf plots.[2]

1.3 SPSS Crosstabs

Cross tabulation tables, or contingency tables are frequently employed to examine the relationship between two variables (usually nominal or ordinal) that have a small number of categories.[4]

1.4 SPSS Graph

SPSS can display your data in a bar chart, a line graph, an area graph, a pie chart, a scatterplot, a histogram, a collection of high-low indicators, a box plot, or a dual-axis graph. Adding to the flexibility, each of these basic forms can have multiple appearances. For example, a bar chart can have a two- or three-dimensional appearance, represent data in different colors, or contain simple lines or I-beams for bars. The choice of layouts is almost endless.[3]

2. Algorithm

2.1 Notation (cross tabulation algorithm) [1]

Notation	Description
X_i	Distinct values of row variable arranged in ascending order: $X_1 < X_2 < \dots < X_R$
Y_j	Distinct values of row variable arranged in ascending order: $Y_1 < Y_2 < \dots < Y_C$

ABSTRACT

SPSS is powerful to analyze Educational data. This paper intends to support educational leaders the benefits of data analyzing with applied SPSS. It showed the data analysis of qualified rates such as bad, neutral, good and very good on the subjects. As SPSS's background algorithms, it showed the cross tabulation algorithm for cross tabulation tables. And then Sample data 'course_evaluation.sav' was downloaded from Google and was analyzed and viewed. It used IBM SPSS statistics version 23 and PYTHON version 3.7.

1. INTRODUCTION

Nowadays educational businesses are competing with others not to lose their market places in local and external regions. To avoid the loss of market places they should use data science technology. This paper used SPSS integrated with Python software. It showed the data analysis of qualified rates such as bad, neutral, good and very good on the subjects that includes two tables, two graphs and six data analytical views.

1.2 SPSS

SPSS, standing for Statistical Package for the Social Sciences, is a powerful, user-friendly software package for the manipulation and statistical analysis of data. The package is particularly useful for students and researchers in psychology, sociology, psychiatry, and other behavioral sciences, containing as it does an extensive range of both univariate and multivariate procedures.

f_{ij}	Sum of cell weights for cases in cell(i,j)
C_j	$\sum_{i=1}^R f_{ij}$ the jth column subtotal
r_i	$\sum_{j=1}^C f_{ij}$ the ith row subtotal
w	$\sum_{j=1}^C f_{ij} = \sum_{i=1}^R f_{ij}$ the grand total

2.2. Marginal and Cell Statistics [1]

count	$= f_{ij}$
Expected Count	$E_{ij} = \frac{r_i C_j}{w}$
row percent	$= 100 \times (f_{ij} / r_i)$
column percent	$= 100 \times (f_{ij} / r C_j)$
total percent	$= 100 \times (f_{ij} / W)$

2.3 cross tabulation algorithm [1]

Residual	$R_{ij} = f_{ij} - E_{ij}$
Standardized Residual	$SR_{ij} = \frac{R_{ij}}{\sqrt{E_{ij}}}$
Adjusted Residual	$AR_{ij} = \frac{R_{ij}}{\sqrt{E_{ij}(1-\frac{r_i}{w})(1-\frac{C_j}{w})}}$

3. Testing

3.1 How do you rate this course?

SPSS Code

CROSSTABS

/TABLES=major BY q1

/FORMAT=AVALUE TABLES

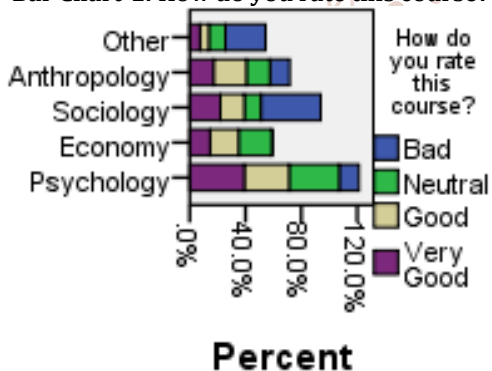
/CELLS=COUNT COLUMN

/COUNT ROUND CELL.

Table-1: How do you rate this course?

What's currently your (primary) major? * How do you rate this course? Crosstabulation	How do you rate this course?				Total
	Bad	Neutral	Good	Very Good	
major Psychology	14.3%	35.7%	32.3%	39.0%	100.0%
Economy	0.0%	23.8%	20.4%	14.6%	100.0%
Sociology	42.9%	11.9%	17.2%	22.0%	100.0%
Anthropology	14.3%	16.7%	23.7%	17.1%	100.0%
Other	28.6%	11.9%	6.5%	7.3%	100.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Bar Chart-1: How do you rate this course?



3.1.1 Data analytical view:

As a result of table-1 and bar chart-1, sociology course got the most bad-rate and psychology course got the most very-good rate. Therefore the course leaders need to check the weak points of the sociology course and modify this course to get better rate. If needed, the external course experts should be hired.

3.2 How do you rate the teacher of this course?

SPSS Code

CROSSTABS

/TABLES=major BY q2

/FORMAT=AVALUE TABLES

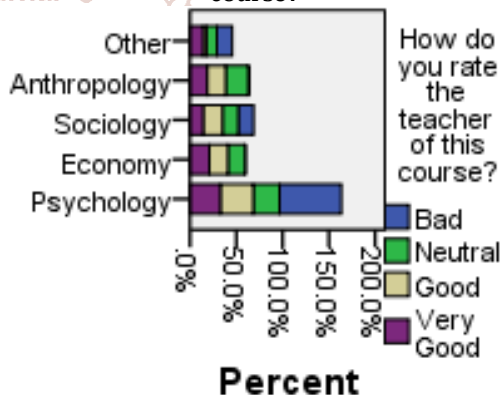
/CELLS=COUNT COLUMN

/COUNT ROUND CELL.

Table-2: How do you rate the teacher of this course?

What's currently your (primary) major? * How do you rate the teacher of this course? Crosstabulation	How do you rate the teacher of this course?				Total
	Bad	Neutral	Good	Very Good	
major Psychology	66.7%	28.3%	35.8%	32.6%	100.0%
Economy	0.0%	18.9%	19.8%	20.9%	100.0%
Sociology	16.7%	17.0%	21.0%	14.0%	100.0%
Anthropology	0.0%	24.5%	19.8%	18.6%	100.0%
Other	16.7%	11.3%	3.7%	14.0%	100.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Bar Chart-1: How do you rate the teacher of this course?



3.2.1 Data analytical view:

As a result of table-2 and bar chart-2, psychology teachers got the most bad-rate and the most very-good rate. Therefore the teaching leaders need to check the weak points of the psychology teachers and train these teachers to get better rate. If needed, the external teaching experts should be hired.

3.3 Other data analysis and views

After the above analyzing, can continue to research the questions showed at the below with the same ways as 3.1 and 3.2 tests.

q3. How do you rate the lectures of this course?

q4. How do you rate the assignments of this course?

q5. How do you rate the learning resources (such as syllabi and handouts) that were issued by us?

q6. How do you rate the learning resources (such as books) that were not issued by us?

If you analyze question 'q3', will see the most bad-rate lecture is sociology lecture and the most very-good rate lecture is psychology lecture and then educational leaders need to check the weak points of the most bad-rate lectures and modify the lectures to get better qualified rate with help of lectures experts.

If you analyze question 'q4', will see the most bad-rate assignment is psychology assignment and the most very-good rate assignments is sociology assignment and then educational leaders need to check the weak points of the most bad-rate assignments and modify the assignments to get better qualified rate with help of assignments experts.

If you analyze question 'q5', will see the most bad-rate syllabi and handout is psychology syllabi and handout and the most very-good rate syllabi and handout is psychology syllabi and handout and then educational leaders need to check the weak points of the most bad-rate syllabi and handouts and modify the syllabi and handouts to get better qualified rate with help of syllabi and handouts experts.

If you analyze question 'q6', will see the most bad-rate books are psychology, economy and anthropology books and the most very-good rate book is anthropology book and then educational leaders need to check the weak points of the most bad-rate books and modify the books to get better qualified rate with help of books experts.

4. Conclusion

SPSS data analysis tools are valuable in social science, educational business and marketing fields. It is very good for presentation report by graphical design. This paper shows the weak and good points analyzing on each subject. Educational leaders can get their goal with good result and can avoid the loss of goodwill of his educational business in local and global regions by using SPSS software.

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