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ANALYSIS AND RELEVANCY OF ENGINEERING EDUCATION TO THE NEEDS OF INDUSTRY

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Abstract: *Cronbach's alpha is a measure of level of internal consistency that how closely related a set of items. It's regarded as a measure of scale reliability. The purpose of this paper is to measure reliability and internal consistency of Relevancy of Engineering Education to The Needs of Industry – Industrial Survey. As per the request of KP Governor, University of Engineering and Technology, Peshawar to analyze the relevancy of Engineering Education to the needs of knowledge-based economy. In order to assess the reliability and internal consistency of this survey, one of the reliability analysis models, Cronbach's alpha is used for this analysis. To avoid the complications and errors, IBM SPSS Statistics tool is preferred over manual method. Survey data is imported into the spreadsheet and fifteen variables are identified as items. Data is then copied to the SPSS in data view and coded variables in variable view, ordinal scale is selected in measure column. Descriptive required for item, scale, and scale if item deleted are chosen. Correlations, means, and variances are also chosen to get merged into the results of reliability analysis. Value of overall alpha is 0.808 that is quite high and shows the strong internal consistency among the 15 items. This implies participants who tended to pick high score for one item also tended to choose high scored for the following item. With the value of overall Cronbach's alpha, that is, 80.08%, is determined that the scale is dependable because of the alpha being in the favorable range, the survey data is valid for curriculum design.*

Keywords: *Reliability Analysis, Cronbach's Alpha, Engineering Education*

1. INTRODUCTION

Cronbach's coefficient alpha statistic is usually utilized as an indication of the reliability a list of questions, displaying that subjects present exactly the same response pattern within the time period of the list of questions and, where outcomes span several sessions, as time passes (test-retest reliability). Alpha implies the extent of the correlation between items. Nevertheless, as noted formerly, dispositions in the manner subjects reply to surveys (CMV) may unnaturally fill this coefficient alpha. Thus identified correlations may to some (unknown) extent be taken into account by CMV bias instead of symbolizing meaningful relationships in the data. Where questionnaire-based research uses coefficient alpha and doesn't address the matter of CMV, there's perhaps reason to be concerned. We recommend that in which a questionnaire reaches risk, however is not demonstrably free of CMV, a higher coefficient alpha be addressed with doubt Cronbach (1951).

A considerable physique of study has examined the variation of CMV across various fields. Particular themes arise. Crampton and Wagner reveal that technique effects differ in between study domains (Crampton and Wagner, 1994). Cote and Buckley discovered that technique variance differed significantly across disciplines (Cote and Buckley, 1987). A coefficient equals 0.856; the closer a would be to 1 the much better and, being a common guideline, a worth more than 0.80 is regarded as great (Bryman and Cramer, 2011). Cronbach's a is generally utilized for numerous Likert-style questionnaires once the researcher desires to figure out whether or not the scale is dependable (Chiarini and Vagnoni, 2017). The improvement of a scale to evaluate demands from the teacher profession and associated skills in graduates to get a German tracer study project can serve as an instance. Confirmatory aspect evaluation (CFA), principal element evaluation (PCA) and Cronbach's coefficient alpha are utilized to check the reliability from the scale (Landmann et al., 2015).

Among the fundamental presumptions of IRT is the fact that examinees are utilizing the same ability or exact same composite of numerous abilities to reply to each one of the test products Ackerman (1994). Inside a following research, Parasuraman created 22 item instruments, the SERVQUAL, for assessing consumer perceptions and services information high quality operating and retailing organizations (Parasuraman et al., 1988). Cronin and Taylor check out the dimensionality from the service high quality scale by indicates of a confirmatory aspect evaluation (CFA) (Cronin and Taylor, 1992). The scale reliability is confirmed utilizing the Cronbach's alpha (a) (Sultan and Wong, 2010). The sample size can also be in line using the generalized scientific guideline for sample size choice (Krejcie and Morgan, 1970). The exam for unidimensionality is really a extremely mandatory situation for create credibility and reliability looking at Hattie (1985). Duggirala and his group measured patient fulfillment in Indian hospitals (Duggirala et al., 2008). Pakdil and Harwood utilized SERVQUAL scale plus they

analyzed patient satisfaction (Pakdil and Harwood, 2005). Hasin performed an instance study in Thailand hospitals to determine patient satisfaction (Hasin et al., 2001). Silvestro performed a report for knowing notion levels within the National Wellbeing Service breast cancer screening unit Silvestro (2005).

2. METHODOLOGY

As per directives of the Governor KPK, University of Engineering and Technology Peshawar has conducted a survey of industries to assess the relevancy of Engineering Education to the needs of knowledge-based economy. The survey will help identify the gap between the curriculum of engineering education and the requirement of the industries. The data gathered is going to be used for the sole purpose of identifying urgent measures for improving relevancy of educations. This survey will eradicate all the problems students face during engineering education and after graduation as well. And on the basis of survey results, government of KPK will take necessary actions to provide students with internship and jobs opportunities at the right time, and will also help industries to cut the organizational costs, improve process, and reduce cycle time, but this is not possible without the interaction of industries and students.

Thirty-two industries from KPK region have been selected to address the survey questionnaire. Experienced technical person from each organization is selected to duly answer every question in the survey and provide feedback. University of Engineering and Technology follows the curriculum designed by HEC for different engineering disciplines that aims at specific attributes and variables included in this survey. It covers about internship for fresh engineering graduates along with the type of engineer(s) the organization mostly hires.

If organization intends to apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems; engineers must be hired to perform all these effective activities. Only the engineering student knows how to analyze the problem, and design a solution for it. Investigation of complex engineering problems and usage of modern tools come through literature being taught at universities. Students are provided with better tools for effective communication that is required in industries.

Survey has been executed successfully, in order to make decision based on this survey it must be evaluated whether the survey data is reliable or not. Statistical analysis is required to perform reliability analysis through Cronbach's Alpha technique to get a certain value to make a decision about the consistency and legitimacy of data. Manual calculations require lot of knowledge and time, for the sake of ease IBM SPSS Statistics tool is used here.

2.1 Questionnaire Design

Questionnaire is designed based on the expert opinion of University of Engineering and Technology Peshawar, composed and distributed via proper channel among different organizations.

2.1.1 Measurement Level

Ordinal scale is used in this case as shown in Table 1. Choices are arranged according to the magnitude in ordered numbers.

Table 1. Ordinal Scale

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Yes				No
1	2	3	4	5

2.1.2 Questionnaire Variables

Variables that are defined for SPSS are listed in Table 2.

Table 2. Variables

Internship	Modern_Tool_Usage	Communication
Engineering_Knolwedge	The_Engineer_and_Society	Project_Management
Problem_Analysis	Environment_and_Sustainability	Lifelong_Learning
Design_Development_of_Solutions	Ethics	Value
Investigation	Individual_and_Team_Work	RandD

2.1.3 Data Collection: Feedback

After survey data collection, it is manually imported into excel spreadsheet as shown below in Table 2.

Table 3. Survey Data

Internship	Engineering_Knolwedge	Problem_Analysis	Design_Development_of_Solutions	Investigation	Modern_Tool_Usage	The_Engineer_and_Society	Environment_and_Sustainability	Ethics	Individual_and_Team_Work	Communication	Project_Management	Lifelong_Learning	Value	RandD
1.00	1.00	1.00	2.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	1.00	2.00	1.00	2.00
1.00	1.00	1.00	2.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00
1.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	2.00
2.00	1.00	2.00	1.00	2.00	1.00	3.00	1.00	1.00	2.00	1.00	2.00	2.00	3.00	2.00
2.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	2.00	2.00
2.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00
2.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	2.00	2.00	2.00
2.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	2.00	1.00	1.00	2.00	3.00	1.00	2.00
2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00
1.00	2.00	3.00	4.00	2.00	3.00	3.00	2.00	2.00	2.00	2.00	4.00	4.00	1.00	2.00
1.00	2.00	1.00	3.00	4.00	3.00	2.00	3.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00
1.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	2.00	1.00	2.00	3.00	1.00	2.00
1.00	1.00	1.00	2.00	1.00	3.00	2.00	2.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00
2.00	1.00	2.00	1.00	2.00	3.00	1.00	1.00	2.00	1.00	2.00	3.00	1.00	3.00	2.00
2.00	1.00	2.00	1.00	2.00	2.00	3.00	3.00	2.00	1.00	1.00	2.00	2.00	3.00	2.00
2.00	1.00	1.00	2.00	1.00	1.00	2.00	3.00	1.00	3.00	1.00	2.00	1.00	1.00	2.00
2.00	2.00	1.00	2.00	2.00	1.00	2.00	1.00	1.00	2.00	2.00	2.00	2.00	1.00	2.00
2.00	2.00	2.00	3.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	3.00	2.00
2.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	2.00	3.00	2.00
1.00	1.00	1.00	2.00	2.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	1.00	1.00
2.00	2.00	3.00	3.00	3.00	4.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	1.00	2.00
2.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00
2.00	2.00	3.00	3.00	4.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00
1.00	1.00	2.00	2.00	2.00	3.00	4.00	2.00	4.00	2.00	2.00	1.00	1.00	1.00	2.00
2.00	3.00	4.00	5.00	4.00	4.00	3.00	2.00	2.00	2.00	2.00	3.00	2.00	1.00	2.00
1.00	1.00	1.00	2.00	1.00	2.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00
1.00	1.00	2.00	1.00	2.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00	1.00	2.00
1.00	2.00	2.00	2.00	1.00	2.00	3.00	2.00	2.00	1.00	1.00	2.00	2.00	1.00	2.00
1.00	2.00	3.00	3.00	4.00	4.00	3.00	3.00	4.00	2.00	4.00	2.00	3.00	3.00	2.00
1.00	2.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	2.00	1.00	2.00
1.00	1.00	2.00	2.00	2.00	4.00	3.00	2.00	1.00	1.00	1.00	4.00	1.00	1.00	1.00

2.2 SPSS: Data Entry and Coding

Import Table 3 into IBM SPSS Statistics as shown in the Figure 1. There are 15 variables have been used and that are unidimensional. A new dataset is created for the survey data with row an independent source of data, and column as the characteristics.

It has very easy to use interface and working environment, a person even with a excel knowledge can easily go through it's data entry with keeping few important points in mind. Row defines the data for unique industry, while column defines the type of item. There are two view associated to the SPSS; one is the data view as shown in Figure 1 and the other is variable view discussed later on. Data view shows raw data in dataset. At the intersection of column and row, cell represent one datum.

If the dataset is of big size, SPSS provides scroll up and down feature to access every cell in the data view. Raw data can be edited in data view, just click on any cell and enter modified value. Any variable and case can be accessed by using Go to feature. Using Value Labels feature, value and label are interchanged to get view for each one.

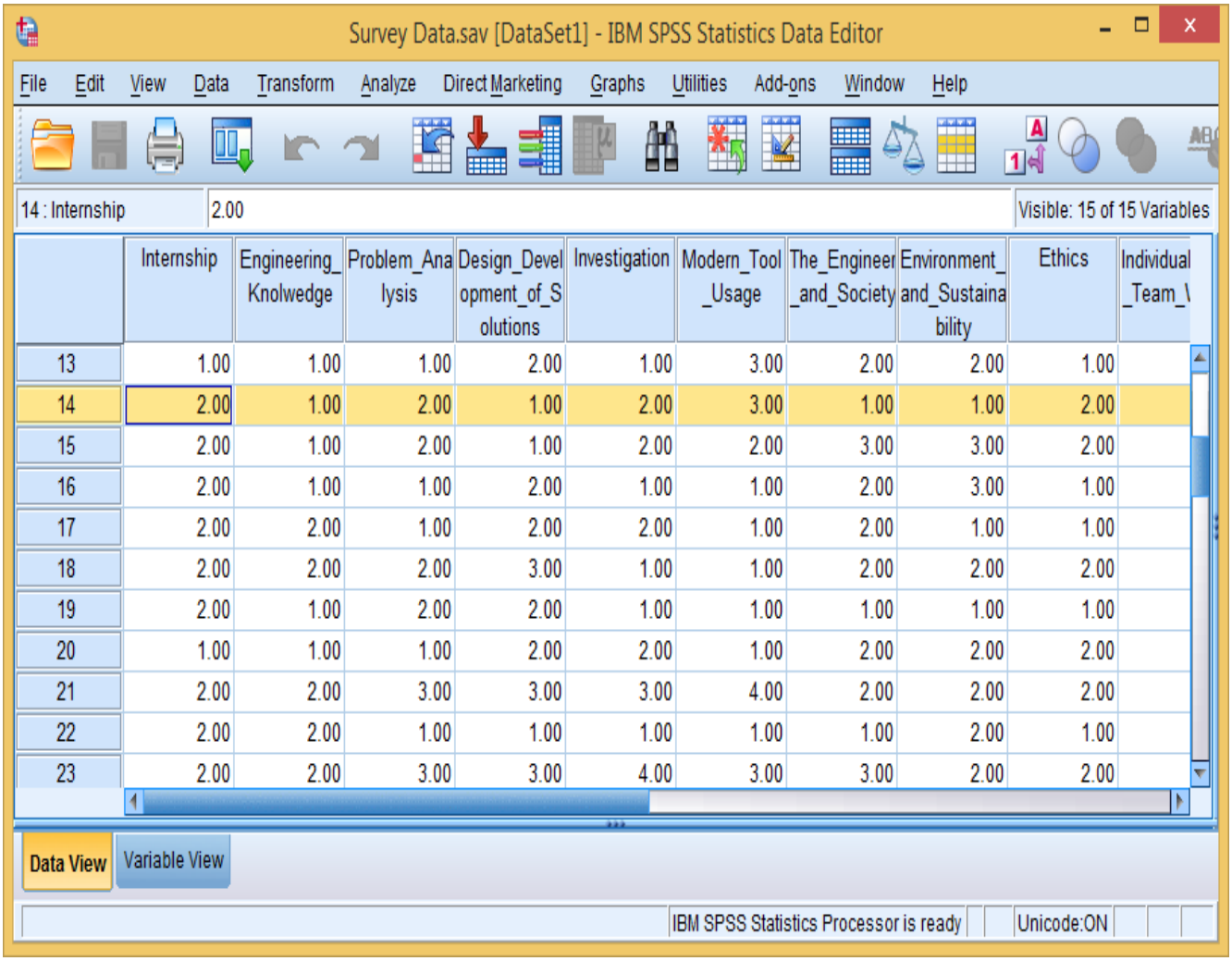
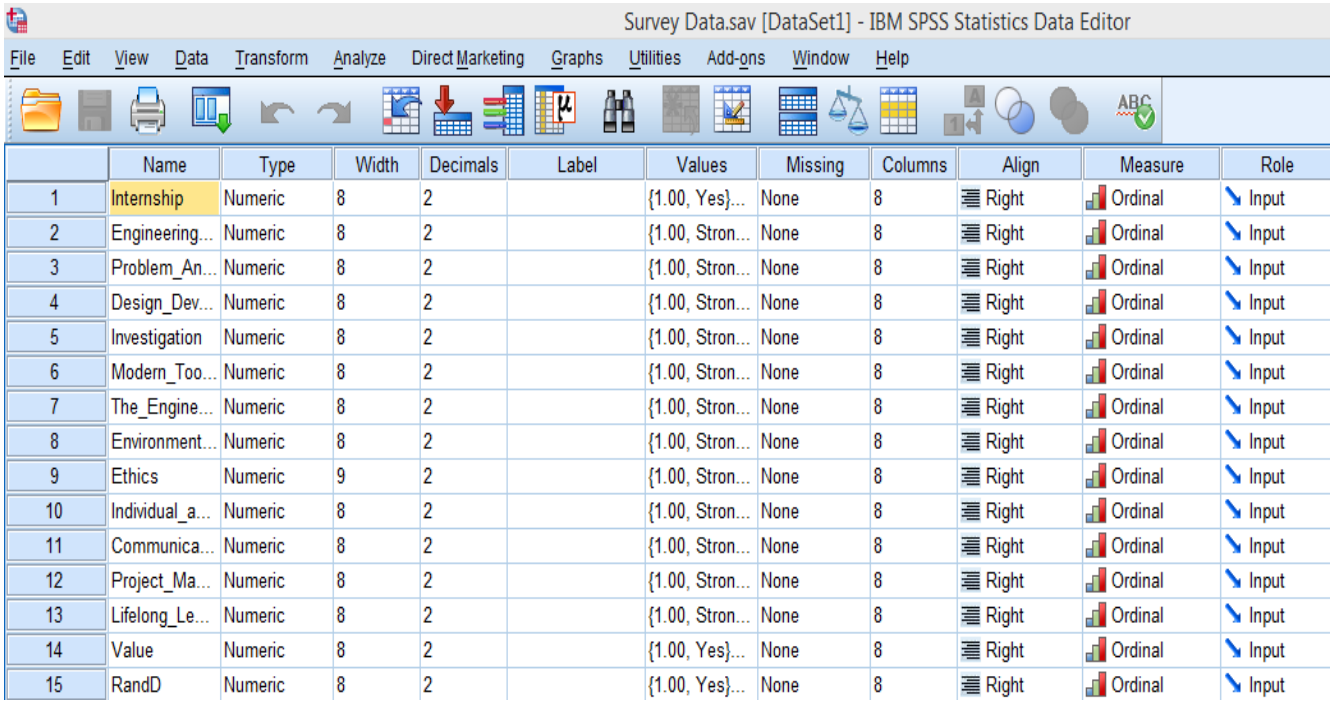


Figure 1. SPSS Data Entry

2.2.1 Coding in SPSS

Data view is coded in variable view by altering variables, measure, label, values, type, role, align, width and other features.



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Internship	Numeric	8	2		{1.00, Yes}...	None	8	Right	Ordinal	Input
2	Engineering...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
3	Problem_An...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
4	Design_Dev...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
5	Investigation	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
6	Modern_Too...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
7	The_Engine...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
8	Environment...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
9	Ethics	Numeric	9	2		{1.00, Stron...	None	8	Right	Ordinal	Input
10	Individual_a...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
11	Communica...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
12	Project_Ma...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
13	Lifelong_Le...	Numeric	8	2		{1.00, Stron...	None	8	Right	Ordinal	Input
14	Value	Numeric	8	2		{1.00, Yes}...	None	8	Right	Ordinal	Input
15	RandD	Numeric	8	2		{1.00, Yes}...	None	8	Right	Ordinal	Input

Figure 2. Variable View

Name column accepts only unique name for variable. Underscore is used instead of hyphen and dots that are unacceptable in SPSS, it also looks beautiful to code variable with underscore. Values for each variable is set to Numeric because digits are being dealt; width is skipped as default with up to two decimals; alignment is set to right. Ordinal scale is used as level of measurement because scale values are rank-ordered, in this survey 1=Strongly Agree; 2=Agree; 3=Neutral; 4=Disagree; 5=Strongly Disagree.

Entering values is crucial step of coding because upon the basis of it Cronbach's alpha value will be calculated. As explained earlier, ordinal scale is used in this survey that is why ordered values are used. Label is a string of text used to identify in more clear way what a value represents. In order to remove a pair, first select it and click on remove.

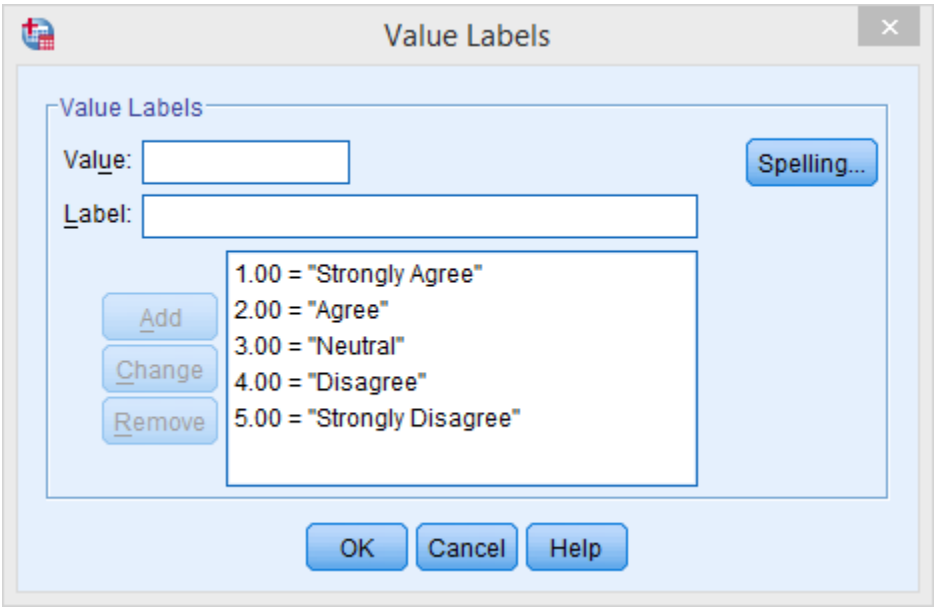


Figure 3. Value Labels

Coding is completed here and an environment for Cronbach's alpha and other statistics computation has been set so far. To verify coding, switch to data view and change values to labels using Value Labels button, cells must show associated labels of values.

2.3 Implementation: Reliability Analysis

Go to Analyze > Scale > Reliability Analysis and a pop up is appeared as shown in Figure 4.

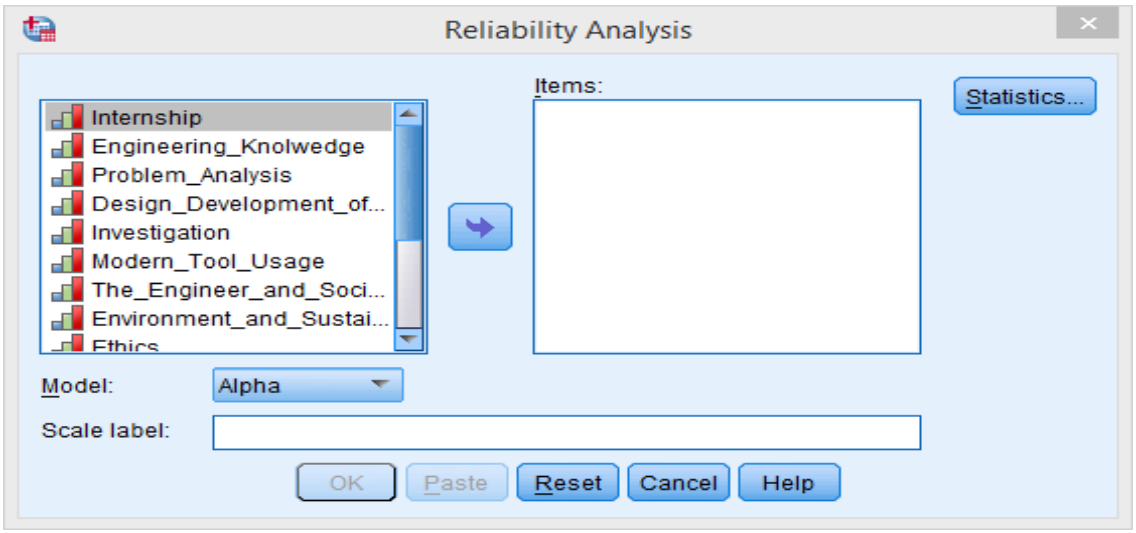


Figure 4. Reliability Analysis

Items to be included in analysis are imported using the import arrow button as shown in Figure 5. All of the items are shifted to the second box. And model selected is Cronbach's alpha because internal consistency of items is being measured. To get desirable results, changes are made in statistics section by clicking on Statistics button.

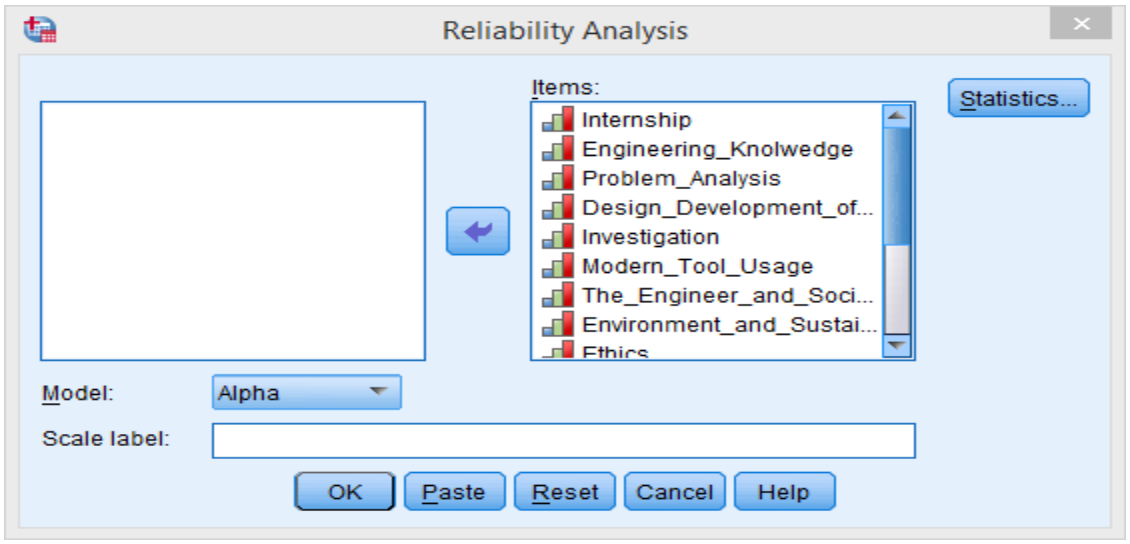


Figure 5. Imported Items

Descriptive required for item, scale, and scale if item deleted are selected. Correlations, means, and variances are also chosen to get included in the results of reliability analysis as shown in Figure 6.

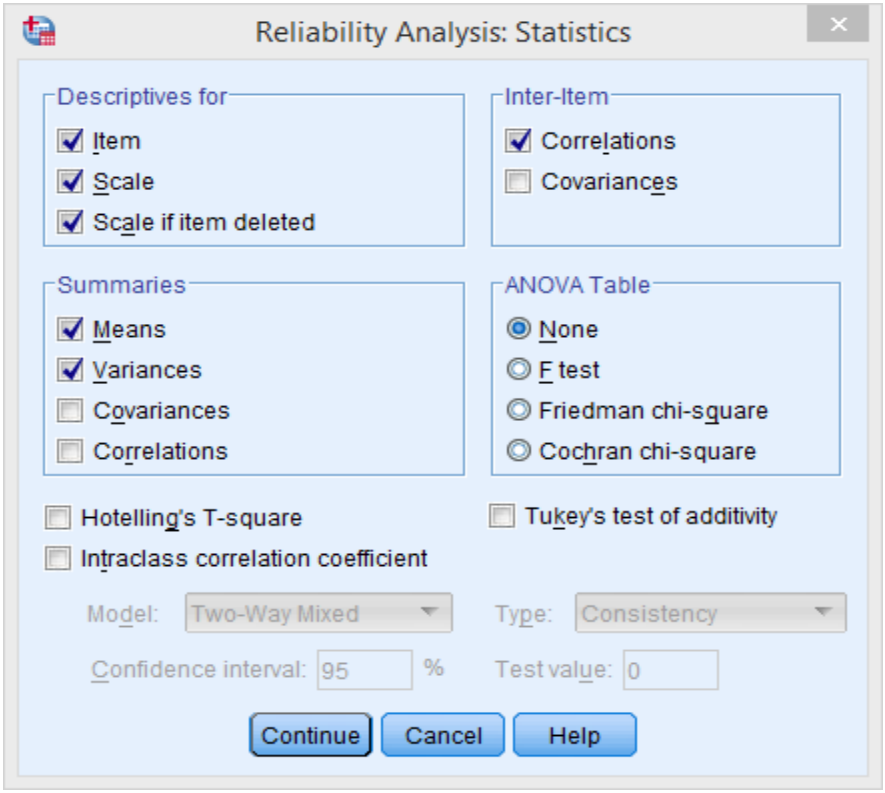


Figure 6. Reliability Analysis: Statistics

Click continue as shown in Figure 6 and OK as shown in Figure 5 to get expected results.

3. RESULTS AND DISCUSSION

As mentioned earlier, 32 cases (sample size) and 15 variables are used in this analysis, 32 cases are the respondents filled up the survey form. All the cases are 100% valid and no one is discarded from the results as shown in Table 4. Because none of the cases have any missing values on one or more variables.

Table 4. Case Processing Summary

		N	%
Cases	Valid	32	100.0
	Excluded[a]	0	.0
	Total	32	100.0

3.1 Reliability Statistics

The recommendations for Cronbach's alpha value are given in Table 5.

Table 5. Recommendations

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

All efforts are made especially for the value of overall Cronbach's Alpha required for the reliability and internal consistency of scale. Its value can be explained in lot of different ways. As the results in Table 6 show, overall alpha is 0.808 which is very high and shows the strong internal consistency among the 15 items.

Table 6. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.808	.794	15

This means respondents who tended to select high score for one item also tended to select high scored for the next item. Overall alpha falls in Good range of internal consistency. Its mean 80.08% of variability in composite score by combining those 15 items is true score variance, and internally consistent reliable variance while 20% is error variance The Cronbach's alpha and standardized alpha values are almost same, it little bit differs because of usage of combination of ordinal, internal ratio, and nominal items.

3.2 Item Statistics

Items statistics also provides great insight to know the internal consistency among respondents. As there are 32 respondents in total, the mean for variable Internship is 1.5, which means all of the respondents tried to rate the variable Strongly Agree. Most of the variable are rated between Strongly Agree and Agree except few which are rated between Agree and Neutral. Design development of solutions, investigation, modern tool usage, the engineer and society have ratings ranging between Agree and Neutral. Standard deviation is high for those items having high mean. Overall values for standard deviation are acceptable.

Table 7. Item Statistics

	Mean	Std. Deviation	N
Internship	1.5000	.50800	32
Engineering_Knolwedge	1.4688	.56707	32
Problem_Analysis	1.7500	.80322	32
Design_Development_of_Solutions	2.0625	.91361	32
Investigation	2.0313	.93272	32
Modern_Tool_Usage	2.0313	1.06208	32
The_Engineer_and_Society	2.1875	.78030	32
Environment_and_Sustainability	1.8750	.70711	32
Ethics	1.7188	.81258	32
Individual_and_Team_Work	1.5625	.56440	32
Communication	1.5625	.71561	32
Project_Management	1.8438	.84660	32
Lifelong_Learning	1.9063	.73438	32
Value	1.4688	.80259	32
RandD	1.8438	.36890	32

3.3 Inter-Item Correlation Matrix

Table 8, 9, 10 show correlation among items. This correlation is somewhere purely negative and somewhere positive. Let's take variable Ethics, the strength of relationship between ethics and internship is negative because ethics show no impact on internship. While there is positive correlation between ethics and engineering knowledge.

Table 8. Inter-Item Correlation Matrix

	Internship	Engineering_Knolwedge	Problem_Analysis	Design_Development_of_Solutions	Investigation
Internship	1.000	.056	.079	-.070	-.034
Engineering_Knolwedge	.056	1.000	.620	.627	.459
Problem_Analysis	.079	.620	1.000	.593	.527
Design_Development_of_Solutions	-.070	.627	.593	1.000	.565
Investigation	-.034	.459	.527	.565	1.000
Modern_Tool_Usage	-.269	.350	.614	.530	.585
The_Engineer_and_Society	-.326	.232	.489	.255	.302
Environment_and_Sustainability	-.180	.231	.170	.112	.202
Ethics	-.117	.225	.432	.242	.352
Individual_and_Team_Work	.113	.258	.178	.305	.211
Communication	-.089	.204	.421	.389	.408
Project_Management	.038	.225	.415	.388	.374
Lifelong_Learning	-.130	.264	.287	.297	.334
Value	.435	-.215	.138	-.129	-.020
RandD	.258	.207	.299	.221	.296

Table 9. Inter-Item Correlation Matrix

	Modern_Tool_Usage	The_Engineer_and_Society	Environment_and_Sustainability	Ethics	Individual_and_Team_Work
Internship	-.269	-.326	-.180	-.117	.113
Engineering_Knolwedge	.350	.232	.231	.225	.258
Problem_Analysis	.614	.489	.170	.432	.178
Design_Development_of_Solutions	.530	.255	.112	.242	.305
Investigation	.585	.302	.202	.352	.211
Modern_Tool_Usage	1.000	.499	.349	.347	.077
The_Engineer_and_Society	.499	1.000	.512	.493	.119
Environment_and_Sustainability	.349	.512	1.000	.330	.020
Ethics	.347	.493	.330	1.000	.075
Individual_and_Team_Work	.077	.119	.020	.075	1.000
Communication	.358	.036	-.175	.336	.309
Project_Management	.544	.241	.128	.075	.122
Lifelong_Learning	.211	.257	.287	.279	.131
Value	-.131	-.196	-.178	.159	-.174
RandD	.013	.105	-.077	.279	.126

Table 10. Inter-Item Correlation Matrix

	Communication	Project_Management	Lifelong_Learning	Value	RandD
Internship	-.089	.038	-.130	.435	.258
Engineering_Knolwedge	.204	.225	.264	-.215	.207
Problem_Analysis	.421	.415	.287	.138	.299
Design_Development_of_Solutions	.389	.388	.297	-.129	.221
Investigation	.408	.374	.334	-.020	.296
Modern_Tool_Usage	.358	.544	.211	-.131	.013
The_Engineer_and_Society	.036	.241	.257	-.196	.105
Environment_and_Sustainability	-.175	.128	.287	-.178	-.077
Ethics	.336	.075	.279	.159	.279
Individual_and_Team_Work	.309	.122	.131	-.174	.126
Communication	1.000	.043	.226	.256	.221
Project_Management	.043	1.000	.235	.016	.126
Lifelong_Learning	.226	.235	1.000	-.087	.063
Value	.256	.016	-.087	1.000	.255
RandD	.221	.126	.063	.255	1.000

3.4 Summary Item Statistics

Table 11 explains Item statistics in more detail. It shows that respondents have tried to choose between Strongly Agree and Agree.

Table 11. Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	1.788	1.469	2.188	.719	1.489	.055	15
Item Variances	.580	.136	1.128	.992	8.289	.067	15

3.5 Item-Total Statistics

This is also one of the important statistics in terms of correlation as it gives the corrected item-total correlation. Problem analysis has positive correlation of .776 all the other items in the dataset. Each item has positive correlation with all the items except internship and value have negative correlation with all the other items.

Table 12. Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation
Internship	25.3125	35.512	-.064	.487
Engineering_Knolwedge	25.3438	31.652	.534	.637
Problem_Analysis	25.0625	28.125	.776	.763
Design_Development_of_Solutions	24.7500	28.452	.626	.588
Investigation	24.7813	27.918	.669	.530
Modern_Tool_Usage	24.7813	27.209	.636	.750
The_Engineer_and_Society	24.6250	30.823	.456	.630
Environment_and_Sustainability	24.9375	32.706	.269	.489
Ethics	25.0938	30.281	.497	.452
Individual_and_Team_Work	25.2500	33.484	.242	.350
Communication	25.2500	31.484	.422	.631
Project_Management	24.9688	30.547	.440	.484
Lifelong_Learning	24.9063	31.701	.380	.303
Value	25.3438	34.878	-.015	.558
RandD	24.9688	33.902	.313	.308

3.6 Cronbach's Alpha if Item Deleted

Overall Cronbach's alpha value will remain high if internship variable is deleted from the dataset. If variable investigation is eliminated from the dataset, the alpha value will be adjusted to .775 which shows the inconsistency among items. Consistency will remain high among items if internship, environment and sustainability, individual and teamwork, lifelong learning, value, and RandD are deleted for the reduction of size of dataset. Deletion of items other than mentioned above will create inconsistency among items.

Table 13. Cronbach's Alpha if Item Deleted

	Cronbach's Alpha if Item Deleted
Internship	.821
Engineering_Knolwedge	.792
Problem_Analysis	.769
Design_Development_of_Solutions	.779
Investigation	.775
Modern_Tool_Usage	.777
The_Engineer_and_Society	.794
Environment_and_Sustainability	.807
Ethics	.791
Individual_and_Team_Work	.808
Communication	.797
Project_Management	.796
Lifelong_Learning	.800
Value	.828
RandD	.805

CONCLUSION

From the value of overall Cronbach's alpha, that is, 80.08%, is concluded that the scale is reliable because of the alpha being in the good acceptable range. It's mean, every respondent has tended to choose the higher value option for each item. 80.08% of variability in composite score is reliable and is true variance. The correlation among most of the items is positive and acceptable correlation. The survey is valid to be used for curriculum design.

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