UNIVERSITY OF ESWATINI

FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND

MANAGEMENT   2021

FIRST SEMESTER EXAMINATION PAPER

APRIL, 2021

TITLE OF PAPER: INTRODUCTION TO EDUCATIONAL RESEARCH

COURSE CODE: EFM 515

TIME ALLOWED: Three (3) hours

INSTRUCTIONS   :   1. THIS PAPER IS DIVIDED INTO **TWO SECTIONS (A AND B)**. ANSWER **ANY TWO** QUESTIONS FROM EACH SECTION

2. UTILISE THE ATTACHED STATISTICAL FORMULAS AND TABLES WHERE NECESSARY.

TOTAL MARKS   :   100

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION TO DO SO HAS BEEN GRANTED BY THE INVIGILATOR.

SECTION A

Answer any two questions in this section.

Question 1

Using practical examples, differentiate among four kinds of research questions which indicate different purposes of educational research. [Total 25 marks]

Question 2

Compare and contrast longitudinal survey research designs and cross-sectional survey research designs according to their six characteristics. [Total 25 marks]

Question 3

Describe eight steps in analysing textual data through the constant comparative method in qualitative educational research. [Total 25 marks]

SECTION B

Answer any two questions in this section.

Question 4

An educational researcher exploring Mathematics anxiety administered a Mathematical test to 12 learners who scored the marks listed below.

| 64 | 58 | 75 | 82 | 75 | 82 | 74 | 40 | 59 | 82 | 64 | 96 |

a) Calculate the mean mark (4 marks)

b) State the mode and its type (3 marks)

c) Compute the median (3 marks)

d) Calculate the variance (7 marks)

e) State any 2 advantages of the mean (4 marks)

f) Give 2 disadvantages of the median (4 marks)

[Total 25 marks]

Question 5

Distinguish between the following scales of measurement

a) Nominal scale and Ratio scale (4 marks)

b) Ten educational research students at a certain institution wrote a class test, one in Measurement and Testing, and the other in Research Methods where they obtained the scores shown in table 1.

Table 1:

Measurement and Testing and Research Methods scores

Student	A	B	C	D	E	F	G	H	I	J
Measurement & Testing	80	74	56	53	78	90	73	65	40	75
Research Methods	40	52	75	74	50	54	59	60	71	48

Using information in Table 1 above, determine the relationship between the students' performance in Educational Psychology and Research Methods using the appropriate measure of association. You should also comment on the outcome or measure of association found. (21 marks)

[Total 25 marks]

Question 6

A lecturer claimed that the students' performance in Educational Psychology is significantly different from their performance in Educational Management. Using the data on Table 2 below, including the relevant hypothesis testing procedure, establish at 5% significance level if the lecturer's claim that there is a significant difference between the two courses is justified.

[Total 25 marks]

Table 2:

Educational Management and Educational Psychology scores

STUDENT	A	B	C	D	E	F	G	H	I	J
Educational Management	74	82	70	91	54	69	84	81	75	67
Educational Psychology	70	64	68	92	53	69	82	82	72	70

T Test

TABLE II   Critical Values of t: Student t-test

	Level of significance for a directional (one-tailed) test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for a non-directional (two-tailed) test					
df	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Find the row corresponding to the indicated degrees of freedom, find the column corresponding to the chosen level of significance, taking into account the type of H_1 (directional or non-directional). The critical value t_{crit} is at the intersection of that row and that column. If $t_{obt} \geq t_{crit}$ then H_0 is rejected.

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STATISTICAL FORMULAE

Sample Variance: $\quad S^2 = \frac{\sum(x-\bar{x})^2}{n-1}$

Sample Standard Deviation: $\quad s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$

Pearson product moment correlation coefficient:

$$r_{xy} = \frac{n\sum xy - \sum x\sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Spearman's rank order correlation coefficient: $\quad rho = 1 - \frac{6\sum d^2}{n(n^2-1)}$

Chi-squared Test Statistic: $\quad x^2 = \sum \frac{(O-E)^2}{E}$

Z-score: $\quad z = \frac{x-\bar{x}}{s}$

Standardisation: $\quad z = \frac{u-\mu}{\sigma} \quad$ Where Z ~N(0,1)

T-score: $\quad T = 50 + 10\left(\frac{x-\bar{x}}{s}\right)$

Student t-test: $\quad t = \frac{\sqrt{(n-1)}\sum d}{\sqrt{n\sum d^2 - (\sum d)^2}}$

ANALYSIS OF VARIANCE (ANOVA) FORMULAE

1. $SS\,(TOTAL) = \sum x^2 - \dfrac{(\sum x)^2}{n}$

2. $SST = SS(\text{Treatment}) = SS(BtwnGrps) = \sum \dfrac{T_i^2}{n_i} - \dfrac{(\sum x)^2}{n} = \dfrac{T_1^2}{n_1} + \dfrac{r_2^2}{n_2} + \cdots + \dfrac{T_p^2}{n_p} - \dfrac{(\sum x)^2}{n}$

3. $SSE = SS\,(TOTAL) - SST$

   [N.B. SSE = SS (Error) = SS (Within Groups) = SS (Residual)]

4. $MST = \dfrac{SST}{p-1}$

5. $MSE = \dfrac{SSE}{n-p}$

6. $F_{calc} = \dfrac{MST}{MSE}$

ONE-WAY ANOVA TABLE

Source of variation	Sum of squares	Degrees of Freedom (df)	Mean Square	F_{calc}
Between Groups (Treatments)	SST	$p-1$	$MST = \dfrac{SST}{p-1}$	
Within Groups (Error or Residual)	SSE	$n-p$	$MSE = \dfrac{SSE}{n-p}$	$F_{calc} = \dfrac{MST}{MSE}$
Total	**SS(TOTAL)**	**n-1**		

n = total number of observations

p = number of treatments (number of samples or groups)

p-1 = numerator degrees of freedom

n-p = denominator degrees of freedom

T_i = total for group i(i = 1, 2, 3, ..., p)

n_i = number of observations in group i(i = 1, 2, 3, ..., p)