

UNIVERSITY OF ESWATINI



FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND

MANAGEMENT 2019

FIRST SEMESTER EXAMINATION PAPER

28 NOVEMBER, 2019

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

Question 1

Compare and contrast qualitative and quantitative research approaches highlighting their applicability in educational research? [Total 25 marks]

Question 2

- (a) Explain the processes involved among different types of variables in an experimental research design in education. (12 marks)
- (b) Describe four types of validity used in experimental research in education. (13 marks)
- [Total 25 marks]

Question 3

Outline and explain four strengths and four weaknesses of focus group interviews as a data collection method. [Total 25 marks]

SECTION B

Question 4

- (a) Explain each of the four types of measurement scales in research using practical examples (8 marks)
- (b) Suppose a small company has around 50 employees working in the plant and office who earn around E30,000 per year. However, there are five executives, the president and four vice-presidents, who earn over E175,000, each per year. Why would the median be a more informative measure of central tendency than the mean for this salary distribution? (4 marks)

- (c) In a small high school, an attitude toward mathematics and mathematics-related professions scale is administered to the students. The mean score on the scale is 52.6 for boys and 50.9 for girls. The standard deviation of the distribution of scores for boys is 5.7, and that for girls is 14.6. The maximum possible score on the scale is 130. The scores in each distribution are normally distributed. Interpret these descriptive statistics. (8 marks)

Table 1:

Attitude towards Mathematics and mathematics related professions

	Mean	Standard Deviation	Max. score
Boys	52.6	5.7	130
Girls	50.9	14.6	130

- (d) For the following pairs of variables, indicate whether the correlation between the two variables would be, positive, negative, or zero. (5 marks)
- (i) Performance on an intelligence test and time required to solve concept attainment problems.
 - (ii) scores on an anxiety measure and those on a statistics test
 - (iii) level of unemployment and hire purchase sales over a period of time
 - (iv) scores on an intelligence test and distance a baseball can be thrown
 - (v) shoe size and performance on a high school geometry test

ANALYSIS OF VARIANCE (ANOVA) FORMULAE

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

$$2. \quad SST = SS(\text{Treatment}) = SS(\text{Btwn Grps}) = \sum \frac{T_i^2}{n_i} - \frac{(\sum x)^2}{n} = \frac{T_1^2}{n_1} + \frac{T_2^2}{n_2} + \dots + \frac{T_p^2}{n_p} - \frac{(\sum x)^2}{n}$$

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

[N.B. $SSE = SS(\text{Error}) = SS(\text{Within Groups}) = SS(\text{Residual})$]

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

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

$$6. \quad F_{calc} = \frac{MST}{MSE}$$

ONE-WAY ANOVA TABLE

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

n = total number of observations

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

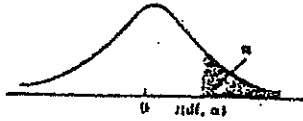
$p-1$ = numerator degrees of freedom

$n-p$ = denominator degrees of freedom

T_i = total for group i ($i = 1, 2, 3, \dots, p$)

n_i = number of observations in group i ($i = 1, 2, 3, \dots, p$)

Table 2 The entries in this table are the critical values for Student's t for an area of α in the right-hand tail. Critical values for the left-hand tail are found by symmetry
 Critical values of Student's t distribution



df	Amount of α in One-tail					
	0.25	0.10	0.05	0.025	0.01	0.005
1	1.000	3.08	6.31	12.7	31.8	63.7
2	0.816	1.89	2.92	4.30	6.97	9.92
3	0.765	1.64	2.35	3.18	4.54	5.84
4	0.741	1.53	2.13	2.78	3.75	4.60
5	0.727	1.48	2.02	2.57	3.37	4.03
6	0.718	1.44	1.94	2.45	3.14	3.71
7	0.711	1.42	1.89	2.36	3.00	3.50
8	0.706	1.40	1.86	2.31	2.90	3.36
9	0.703	1.38	1.83	2.26	2.82	3.25
10	0.700	1.37	1.81	2.23	2.76	3.17
11	0.697	1.36	1.80	2.20	2.72	3.11
12	0.695	1.36	1.78	2.18	2.68	3.05
13	0.694	1.35	1.77	2.16	2.65	3.01
14	0.692	1.35	1.76	2.14	2.62	2.98
15	0.691	1.34	1.75	2.13	2.60	2.95
16	0.690	1.34	1.75	2.12	2.58	2.92
17	0.689	1.33	1.74	2.11	2.57	2.90
18	0.688	1.33	1.73	2.10	2.55	2.88
19	0.688	1.33	1.73	2.09	2.54	2.86
20	0.687	1.33	1.72	2.09	2.53	2.85
21	0.686	1.32	1.72	2.08	2.52	2.83
22	0.686	1.32	1.72	2.07	2.51	2.82
23	0.685	1.32	1.71	2.07	2.50	2.81
24	0.685	1.32	1.71	2.06	2.49	2.80
25	0.684	1.32	1.71	2.06	2.49	2.79
26	0.684	1.32	1.71	2.06	2.48	2.78
27	0.684	1.31	1.70	2.05	2.47	2.77
28	0.683	1.31	1.70	2.05	2.47	2.76
29	0.683	1.31	1.70	2.05	2.46	2.76
z	0.674	1.28	1.65	1.96	2.33	2.58

NOTE: For $df \geq 30$, the critical value $t(df, \alpha)$ is approximated by $z(\alpha)$, given in the bottom row of table.