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EXPLORING FACTORS AFFECTING PERFORMANCE OF BACHELOR OF EDUCATION (EDUCATIONAL ADMINISTRATION, PLANNING AND POLICY STUDIES) STUDENTS IN EDUCATIONAL STATISTICS: CASE STUDY OF ZIMBABWE OPEN UNIVERSITY, MASHONALAND WEST REGION

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ABSTRACT

This explorative study was motivated by Bachelor of Education (Educational Administration, Planning and Policy Studies) abbreviated B.Ed (EAPPS), students who failed in assignment one, educational statistics course code EA3DC201, in 2005. The aim of the study was to identify factors which affected students' performance in educational statistics.

An analysis of 28 assignment one, intake 17 and 15 end of semester marked examination scripts for educational statistics, was done to identify students' difficulties and sources used. This was followed by an evaluation of instructional content in Module EA3DC201, pages 48 to 53. A questionnaire was administered to 28 B.Ed (EAPPS) students intake 17, in Mashonaland West region, to establish factors which affected their performance. Three tutorials were observed to identify the tutorial aims, content, activities and source of matter. This was followed by interviews seeking students' evaluation of the tutorial.

The study found that, B.Ed (EAPPS) students' performance in educational statistics was affected by the following factors: mathematical misrepresentations in module EA3DC201, assignment bunching, lack of content validity and delayed student feedback. Students' loss of touch with mathematical concepts, limited resources and improper orientation to distance learning also affects them. The study recommends a review of module EA3DC201, educational statistics, orientation of students into distance learning, even spacing of assignments, tutor staff development in systematic, capita-selector, supplementary and capsule tutorials. Further research is required on the role of English language and its influence on the performance of B.Ed (EAPPS) students in educational statistics.

Introduction

For more than eight years, the researcher has been involved in distance education, as a Zimbabwe Open University student, lecturer and tutor. The researcher is disturbed by poor performance in educational statistics assignments submitted by students.

A typical case is the educational statistics assignment one, intake 17, submitted on September 17, 2005. The marks of 13 repeating students in tutorial group B ranged from 21% to 89%. For a repeating student, an assignment mark of 21% in a compulsory course is disturbing. In that assignment, 23 out of 28 students or 82% of the students did not attempt question 4, which required them to compute the mode, median and standard deviation of grouped data.

At the end of semester examinations, 18 out of 33 (55%) of the sampled scripts did not attempt to construct a Histogram with a superimposed polygon. This was a compulsory question 3c, carrying ten marks. One finds it difficult to explain why such omissions should exist.

Contextual Analysis

Zimbabwe Open University (ZOU) is a distance teaching and open learning institution, which was founded in 1993 and was formalised by an act of parliament in 1999. At its conception in 1993, ZOU's vision was to educate every primary and secondary school head up to a masters' degree level by the year 2000, (Maenzanise, Mahlangu and Pfungwa, 2003: 2). This vision has not yet been achieved. Some students are failing educational statistics, repeating and dropping out of the programme. There is need to explore factors affecting students' performance so that interventions which increase retention rate and accelerate the attainment of the vision can be formulated and implemented.

One should also consider that, in a distance teaching and learning situation, the student is physically separated from the tutor. Students' ability to learn on their own makes ZOU products unique. In addition to their adult responsibilities as parents and workers, they demonstrate high potential for life-long learning. Zimbabwe Open University is open in the sense that, it has no fixed physical boundaries, no age limit and is not fixed anywhere. It is everywhere in the form of its modules and students. Such a measure of scatter makes ZOU the most popular university in Zimbabwe.

In its mode of teaching, ZOU was influenced by a combination of a dissemination and developmental orientation to open learning. The dissemination approach

aims to open up access to quantitative and qualitative knowledge, while the developmental orientation encourages individual academic development to self-actualisation levels.

These complementary objectives, individual development and access, are achieved by using the module, its principal teacher. The mode is written to address requirements of the university course outline. Tutors facilitate student learning by interpreting the module, marking assignments and providing feedback to students and other stakeholders. This tutor's function motivated the researcher to explore factors affecting the performance of *B.Ed* (EAPPS) students in educational statistics.

Research Problem

The researcher noted that, large numbers of *B.Ed* (EAPPS) students experience difficulties with educational statistics. Such difficulties manifest themselves in poor performance in educational statistics course code EA3DC201 assignments and examinations. Some students pass all other courses and fail educational statistics. Those students who fail, either repeat the course or decide to be one of the drop-out statistic. In tutorial group B, 13 out of 28 (46%) students are repeating educational statistics. Failing and repeating any course has negative effects on the candidate whose objectives are shattered. His/Her ego is affected as he/she starts doubting his/her capabilities as an adult learner. His/Her social image as an academic diminishes.

Repeating a course is also costly in terms of re-registration fees, delayed salary increments, resources reallocation and extra time spent for the repeat year. The regional and national university pass rate and quality of product is reduced. If the student drops out of the programme, a national human resource is lost. Such social and economic effects of poor performance can be reduced by focused interventions based on research answering the following question:

> What factors affect the performance of Bachelor of Education (Educational Administration, Planning and Policy Studies) students in educational statistics?

Significance of Study

The issue of poor performance is critical at any level of education in Zimbabwe. Its negative effects are more pronounced for adult students. Newspaper headings such as; "ZOU suspends exam cheats" *(The Herald: 29/10/2005).* "Lecturers suspended over leaked papers" *(The Herald: 15/11/2005)* and "Two teachers jailed for Exam cheating" *(The Sunday Mail: 27/12/2005)* bear testimony to the

fact that, adults wish to avoid failing at all costs in Zimbabwe. These problem cases damage the credibility of the Zimbabwean education and examination system, which stakeholders should protect.

On the gravity of the above national problem, this study becomes important in the following ways:

1. It provides an informed basis on which interventions to reduce poor performance in assignments and examinations cheating among ZOU students can be based.
2. It is the first study to explore factors affecting the performance of *B.Ed* (EAPPS) students in educational statistics.
3. Implementation of proposed recommendations is hoped to be a positive intervention for management, tutoring and students who are the focal indicators of the programme's success and quality.
4. The study supplements scanty literature on distance education in Zimbabwe and will be a source of hypotheses for further research.

Literature Review

Not much research has been done on the performance of ZOU students in Zimbabwe. However following works can provide a comfortable springboard.

Jaji (1992: 275) found that, form two pupils in Zimbabwe were not acquiring mathematical reading skills. That was found to affect their perception of mathematical symbols, attaching literal meanings, analysis of relationships and solving of word problems.

Ntata (1999: 59) identified four factors which contribute to low achievement in mathematics among form three pupils in Malawi and these were,

1. pupils' negative attitude and lack of confidence which can be a result of poor mathematics background;
2. lack of resources and qualified mathematics teachers in schools;
3. heavy workloads on both pupils and teachers which make it difficult for remedial lessons to be done;
4. lack of proficiency in English language.

Other researchers namely, Githua and Ngeno (2004: 184) found pupils' mathematics
self-concept to be an important factor in learning mathematics. It influenced learners' academic effort, educational aspirations and persistence in mathematical tasks.

One can deduce that, factors affecting pupils' performance in mathematics can be within the pupil, resources, environment and instructional process. Factors affecting formal school pupils cannot be directly accountable for adult distance education students. Differences in the nature of the population, locality and learning mode call for fresh investigations to establish factors affecting Bed (EAPPS) performance in statistics.

According to Chander (1991), distance education students' performance in assignments is affected by academic isolation, lack of time and comprehension problems. The three researchers, Chander, Jaji and Ntata, concur that, language has a role to play in the performance of formal school students. Mudavanhu, et al (2004: 242), found that, students, tutors, and administration staff had different views on distance education and that these views negatively impacted on distance teaching and open learning. One wonders if such differences exist between students and tutors in Mashonaland West and whether it is contributing to poor performance in educational statistics.

Research Design

A qualitative case study was used to explore and describe factors affecting performance of *B.Ed* (EAPPS) students in educational statistics.

A case study is an in-depth analysis of a unit, group, event or nation. The method is applicable to small groups due to its emphasis on intensive descriptions and explanations of linkages and processes within the group in its natural setting. Common case studies include: observational, historical, clinical and educational case studies. They rely on inductive reasoning for the formulation of concepts, generalisations or hypotheses.

A qualitative approach enhanced descriptions of variables and their effect within the group. It was found ideal for this diagnostic study, exploring factors affecting the performance of a group of students. It allowed a holistic perspective of the group to be built using several research methods. Insights arising were used as a basis for research hypotheses about distance teaching and learning in Zimbabwe.

Population

A total of 75 Bed (EAPPS) students were registered for educational statistics course code, EA3DC201, in 2005 in Mashonaland West region. Twenty-five of these students were repeating the course. Tutorial group B, for educational statistics, had 28 students, distributed by intake as shown in the table below:

Group B, Student distribution **n = 28**

INTAKE	12	13	14	15	16	17	TOTAL
FREQ	1	5	1	3	3	15	28

It is disturbing to note that, there is a repeating student from each of the five preceding intakes and some students have repeated the course more than four times. A census of tutorial group B (n = 28) was considered suitable and normally distributed, since the composition of students is natural in terms of the variable. Thirteen of the students were repeaters. Ten were Females and eighteen were Males. This was considered a natural representation of the student population for the course by gender. The group was small enough and accessible for in-depth analysis of factors affecting their performance in educational statistics.

Procedures

The intensive analysis of this qualitative case study called for documentary analysis, survey, observation and follow up interviews.

Documentary Analysis

Twenty-eight assignment-one scripts and 33 end of semester two 2005 examination scripts for educational statistics were analysed for student performance errors and sources used for the assignment. Assignment one was submitted before tutorials hence, any errors detected were a result of the student's own misunderstanding of the materials or a misrepresentation in the sources used. Script analysis was followed by an analysis of referenced sources to identify possible sources of errors shown. Module EA3DC201, pages 48 to 53 was targeted because the module is the student's teacher at a distance.

Survey

A questionnaire was structured and administered on October 22, 2005. It was responded to by 28 *B.Ed* (EAPPS) students in tutorial group B, for educational statistics. It used both open ended and closed questions to gather information on five student's variable, namely,

1. mathematical background as shown by the student's 'O'-Level or 'A'-Level grade in mathematics;
2. self-concept and confidence in educational statistics;
3. strategies used to do assignment one;
4. factors viewed as affecting performance in educational statistics;
5. ways in which students thought performance in educational statistics could be improved.

Observations

The researcher observed three educational statistics tutorials for group A, C and D on November 19, 2005. Observations were done to identify tutorial aims, content, activities and source of matter delivered.

Interviews

Fifteen students were interviewed after tutorials on November 19, 2005. The interview collected students' evaluation of tutorials, assignment submission and collection, module content and assignment marking.

FINDINGS

ASSIGNMENT SCRIPT ANALYSIS

The marks of 28 students whose assignment scripts were analysed are shown on the Stem and Leaf diagram below:

Students' Performance **n = 28**

STEM	LEAF	FREQUENCY
2	1	1
3		0
4	2 4 8	3
5	2 2 6 7 8	5
6	0 1 1 3 6 7 8 9	8
7	0 1 1	3
8	1 1 3 7 8 8 9	7
9	1	1

KEY: 5/6 = 56% and 8/**3** = 83%, a repeater's mark

An analysis of the marks showed that, repeaters' mean mark, x_r = 65.4% and their standard deviation s_r = 20,5.The group mean mark, x_g = 65.9% and their standard deviation s_g = 16.7. New students had a mean mark, x_n = 66,3% and their standard deviation s_n = 13.3

A comparison of these measures of central tendency and spread shows that; $x_r < x_g < x_n$ and $s_n < s_g < s_r$. This suggests that, repeating students' performance is below that of the group and new students. There is need for further comparative studies of repeating and new students to explain such variations in performance.

The bimodal distribution was a result of students' failure to get full marks on question 2 (iii), (iv) which required a Histogram with a superimposed polygon and question 4 (ii), (iii) and (iv) which asked students to compute the mode, median and standard deviation for grouped data. The mode and median of grouped data is not in the students' module.

Twenty-three out of 28 (82%) did not attempt to answer the question, which makes it very important for assignment and examinations for distant learners to have content validity.

The table below shows students' responses to assignment one question 2 (iii), (n =28) and exam question 3c (i), (n =15). The two questions required students to construct a Histogram for a given set of data.

Students' Responses for the Histogram

CONCEPT REQUIRED	ASSIGNMENT N= 28	EXAM N =15	COMMENT
a TITLE: -provided	18	12	Correct = 70%
-missing	10	3	Incorrect = 30%
b VERTICAL AXIS			
-Not labeled	5	4	
-labeled as			
Y-Axis	6	2	
Absolute Frequency	7	2	
Frequency	8	6	Correct = 7%
Frequency density	2	1	Incorrect = 93%
c HORIZONTAL AXIS			
-Not labeled	5	2	
-Labeled as			
X- Axis	2	0	
Class width	3	1	
Mid-point	2	3	
Scores	1	1	Correct = 12%
Range	4	2	Incorrect = 88%
d BARS -Continuous	21	10	Correct = 72%
-Separated	7	5	Incorrect = 28%
e CALCULATIONS			
Frequency density	0	1	Correct = 2%
Not done	28	14	Incorrect = 98%
f Question not attempted	0	18 /33	55% got zeros

From the responses in the table, it can be deduced that B. Ed. (EAPPS) students cannot label the vertical and horizontal axes of a Histogram correctly. Forty out of 43 (93%) and 38 out of 43 (88%) respectively got the concept wrong. One can conclude that, students are not sure of the variables that they are presenting on the Histogram. The variations show lack of an understanding of what actually is correct.

Hugill (1985: 8) clarifies the confusion when he said, "the vertical axis cannot be labelled `frequency.' It is in fact, frequency density which is the frequency per unit of class width," Only one candidate got this correct in the examination scripts analysed. The 18 out of 33 (55%) students who did not attempt the compulsory question 3c (i) in the exam could be showing accepted incapability to present data on a Histogram.

RESPONSES for Polygon

	CONCEPT REQUIRED	ASSIGNMENT N = 28	EXAM N = 15	% AGE
A	PLOTTING Class Mid-points -Correct -In correct	 20 8	 11 4	 72% 28%
B	JOINING Mid- Points -Used ruler (Correct) -Used free hand (Incorrect)	 11 17	 5 10	 37% 63%
C	POLYGON -Closed (Correct) -Open at ends (Incorrect) -Dotted lines (Incorrect)	 12 10 6	 7 6 2	 44% 37% 19%

The table shows that, students are able to identify and plot Mid-points of classes. They failed to superimpose the polygon. Sixty-three percent of the students used free hand to draw the polygon and 46% failed to close the polygon. The 56% who did not join the first and last class mid-point to the base, actually constructed a line graph. One can conclude that, they cannot distinguish a line graph from a polygon.

Sources Referenced

An analysis of students' reference lists for assignment one, reveals that, every student used the module. Students also used other sources as indicated in the table below.

REFERENCED SOURCES

SOURCE	FREQUENCY	Percentage (N =28)
Module EA3DC201	28	100%
New G. Maths BK 3 Channon	10	36%
New G.Maths Bk 4, Chasakara'	20	72%
A'-Level Statistics Books	13	46%
Research TextBooks	6	21%

The high frequency (72%) of students using O-Level text books, show an effort by the student to link new knowledge to previous concepts. Source availability may have been a pull factor explaining the high frequency of New General Mathematics book 4 .

Module EA3DC 201 Evaluation

An evaluation of the module, pages 48 to 53 which provides the instructional content for the Histogram and Polygon for ZOU students, suggests that, this Module is the major source of misconceptions and errors shown by students in assignments and the exam questions requiring the Histogram and superimposed polygon.

Histogram

The module's definition of a histogram does not distinguish it from a bar graph. The following statements suggest that the Histogram and Bar graph are one and the same thing:

> "A histogram consists of continuous columns... It is a form of a bar graph, the total area of each bar denotes the number of scores (frequency) in each interval" (page 48).

This definition contradicts Hugill (1985: 8), who argues that, "the Histogram should have Frequency Density, not Frequency because Area is proportional to class frequency."

Another misleading statement in the module is, 'This bar graph where frequency is plotted against continuous data is called a histogram" (page 49).

Figure 3.5 (page 50) also has this misleading heading, "Bar graph for distribution of pupils' scores," which emphasise the misconception that, a Histogram is a bar graph, hence, bars can be separated or joined, as shown by 28% of the students. The relationship and distinction between discrete and continuous data, bar graph and histogram respectively is missing in the module. The module does not show specific situations where a histogram or bar graph is most appropriate.

Polygon

Module EA3DC201 (page 53), define a frequency polygon as, "the line or curve connecting the middle of the top of the rectangles." To start with, a line and a curve are mathematically different. This definition contradicts, Oxford Dictionary of Mathematics which says: "A polygon is a plane figure bounded by straight sides joining successive class mid-point frequencies."

This dictionary definition rules out "curve" or "free hand" diagrams because a polygon has straight sides. It requires us to close the polygon by joining the first and last class mid-points to the base line, because the polygon is bounded. The module's figure 3.8 on page 53, emphasises the misconception of a frequency polygon as a curve. It looks like a free-hand drawing which missed the mark 2. Unfortunately 63% of the candidates who did free hand diagrams lost all the five marks in both assignment one and the November examination of 2005.

The concept of a polygon and histogram are O-Level concepts. Syllabus 4008/ 4028, section 6.7.3 page 8 and section 6.11.1 page 11, require these concepts. Unfortunately old text-books do not have them and most of ZOU students did not do them at school. Lewis (1999: 194-196) has included illustrations of the histogram with superimposed polygon more clearly.

Survey

Data from the questionnaires revealed that, students have a good mathematics background for educational statistics. Fifteen out of the 28 students (54%) have a grade C or better in mathematics. Unfortunately 29 of the students did mathematics syllabus B, which had no statistics. Only 2 of the 28 (7%), expressed a dislike for statistics. The table below shows the distribution of their passes.

Mathematics Background (n = 28)

O-Level Grades	A	B	C	D	E	U	Have not yet written
Frequency	0	5	7	5	3	3	2
A-Level Grades	A	B	C	D	E	F	
Frequency	0	1	1	1	0	0	

Professional Qualifications

The 28 respondents were distributed into four professional categories as shown in the table below:

QUALIFICATION	Frequency	Percentage
Teacher, primary	19	68%
Teacher, secondary	6	22%
Accountant (HND)	2	6%
Adult Education	1	4%

None of the respondents is involved with statistical mathematics on a day to day basis, this could affect their performance. Some (52%) indicated that it was their first time to do statistics. Others (47%) indicated that it was a long time since they did mathematics at school. One percent blamed tutors for not teaching the basics.

It was encouraging to find that 17 out of 28 (61%), projected a positive self-concept. They were positive that they will pass educational statistics. The remaining 11 out of 28 (39%) were not sure.

To do assignment one, all students read the module and other books. A few got help from those who know (41%), and 27% indicated that they had copied the assignment because it was due and they had no time and books to research.

FACTORS AFFECTING PERFORMANCE

From the questionnaire, the following factors were identified as affecting Bed (EAPPS) students' performance in educational statistics.

FACTOR	Frequency	Percentage
Limited textbooks	17	61%
Too much work and family pressure	14	50%
Lack of tutor guidance	20	71%
Module lacks suitable examples	26	93%
No discussions with other students	11	39%
Its [sic] too long since I did MathematicsLimited time for	10	36%
assignments	19	68%
First time to do statistics	13	46%
Don't like statistics	2	7%

The majority (93%) complained about the module lacking appropriate examples. Question 4(ii) and (iii) which required students to compute the median, mode and standard deviation was identified as an example of content and concepts not in the module EA3DC201 and were not attempted by students for the assignment and examination.

Seventy-one percent of the students require tutor's guidance, while 68% complained of limited time for the two assignments, which were all due on September 17, 2005. Students are not satisfied with the resource books which they have and 61% considered it a negative factor affecting their performance in educational statistics.

Ways to Improve Performance

From the questionnaire and interview, students raised the following ways of improving performance in educational statistics:

1. The module EA3DC201, should be reviewed. Statements such as these were made: "More examples should be given in statistics module, and the formulae should be correct" (Student J). Another student supported the idea when he said, "Module sometimes present [sic] different formulas for similar problems."

2. An increase in formal lectures conducted by tutors was called for instatements such as , "Lecturers should conduct lessons, as in a lecture room not just assist."

   "Lecturers should do weekend lessons in statistics" (Student N). "Tutors should give mock examinations to provide more practice with tutor guidance to solve statistics problems."

3 An even spacing of assignments was called for, to improve performance. "Separate assignment due dates" (Student E.) "Provide more time to research for assignments" (Student B) "Assignments should be submitted after students have been given lessons in Statistics" (Student P).

4. Provision of student feed-back in the form of marked assignments and discussion should be done on time to benefit the Student. "Up to now (November 19, 2005), I have not yet got any of my first assignments"(complained student T) Tutors blamed ZOU National Centre for dispatching assignment marking schemes late.

5. Formation of student study groups at district level to discuss assignments was suggested in statements such as:

   "Discussions of assignments in study groups help a lot" suggested (student K). "I think those doing statistics for the first time, need a lot of tutorial guidance and group discussions are really important." advised, (student W).

OBSERVATIONS

Three tutorials observed on November 19, 2005, were all systematic lectures. Their aim was to focus students on examinations and question tackling techniques. Past examination questions were used as the source of data. Lecturers delivered information to generate understanding. Discussions of solutions were done and accepted answers written on the board and students note books. Students approved such tutoring .

Summary of Findings

The study found out that, Bed (EAPPS) students under perform in educational statistics because of some or all of these reasons:

1. Their reading and attending of lectures is done to get answers for assignments and examinations, not for life-long understanding and utility value.

2. They do not attempt questions requiring concepts not covered in the module. Their reading is blinkered within the confines of their module. For example, assignment one question 4(ii), (iii) and (iv) which required the median, mode and standard deviation for grouped data, not in the module, was not attempted.

3. Students depend to a very large extent on the module EA3DC201, whose mathematical content is misrepresented and inaccurate. For example, the Histogram with superimposed polygon.

4. They got limited time for educational statistics assignments. Assignment one and two for intake 17,2005 were both due on September 17, 2005

5. There is a mismatch of learning orientation between students and distance education. Students prefer the conventional approach of being lectured to, while distance education requires them to learn how to learn on their own. This mismatch results in students hiring private tutors, copying assignments and pressurising tutors to lecture.

RECOMMENDATIONS

On the basis of these findings, the study recommends that:

1. Module EA3DC201, educational statistics be reviewed for instructional content accuracy.
2. Orientation programmes for students, emphasise the teaching and learning mode for distance learners, so that students are prepared to learn how to learn on their own.
3. Assignments be evenly spaced so that students have time to research and use feedback from marked assignment one to improve on assignment two and the examination.
4. Tutors should be staff-developed in the tutoring process, the structuring and delivery of:
   - 4.1 Capita-selector tutorials, which aim to provide in-depth treatment of a particular topic or problem in which selected topics are systematically analysed and explained.
   - 4.2 Supplementary tutorials, which aim to add to what is in the module.
   - 4.3 Capsule tutorials, which provide a summary or overview of all learning units.
5. Assignment and examination questions should be contextualised, to enhance the utility value of educational statistics as a branch of applied mathematics. Students should naturally find the use of statistics as a tool in their research project and life in general.
6. Further research should be carried out to:
   - 6.1 establish relationships between English language and performance of *B.Ed* (EAPPS) students in educational statistics.
   - 6.2 compare the performance of repeating students and that of students doing the course for the first time.

Recommendations for ZOU students

ZOU students can improve their performance in statistics if they:

1. Register early, collect their statistics modules and start reading them for understanding not reading to get assignment answers.
2. Attend all face to face tutorials for the course.
3. Work in a group and each member participates actively.
4. Repeat module and textbook examples until they are able to solve the problems, then teach each other, explaining the rationale for each stage of the working.
5. Write their own notes including procedural explanations.

6. Submit their assignments for marking on time.
7. Read all comments on their marked assignments and seek clarifications from the tutor who marked their assignment.
8. Compare their marked assignments with those of others who did better to bench mark their presentations and standards.
9. Seek the tutor's help and marked assignment marking guides from tutors and subject co-coordinators.
10. Read widely because a degree by Zimbabwe Open University is awarded for learning how to learn by yourself, not just for registering and attendance but passing assignments and examinations.

REFERENCES

Chander, N.J. (1991). *Management of Distance Educlation.* New Delhi: Sterling.

Daintith, J. (1981). Oxford *Dictionary of Mathematics.* London: Seymour.

Githua, B.N. and Ngeno, J.K. (2004). Differencies in pupils' Mathematics Self-Concept by class level and Gender in Upper primary schools: Some findings from Kenya, Kericho Municipality, in *Zimbabwe Journal of Educational Research* Volume 16 Number 3, 178-195.

Hugill, M. (1985). *A Comprenensive 'A' Level* Course*: Advanced Statistics.* London: Bell and Hyman.

Jaji G. (1992). Student performance in Mathematical tasks on IEA literacy study. *Zimbabwe Journal of Educational Research.* Volume 14 Number 3, 271-284.

Lewis S.J. (1999). *Focus on Maths: An O-Level Course Book 3.* Harare: College Press.

Maenzanise, J. L., Mahlangu, N. and Pfukwa, C. (2003). Zimbabwe Open University Student Handbook. Harare: Zimbabwe Open University.

Module EA3DC 201. *Introduction to Educational Statistics.* Harare: Zimbabwe Open University.

Mudavanhu, Y. et al (2004). Different views of Distance Education and how these Views

Affect Distance Teaching and Learning Within the Zimbabwe Open University. *Zimbabwe Journal of Educational Research.* Volume 16 Number 3, 241-261.

Ntata, L. (1999). Factors that contribute to low achievement in Mathematics among form three pupils in Blantyre and Zomba secondary schools, Malawi. *Zimbabwe Journal of Educational Research* Volume, PP 48-65.