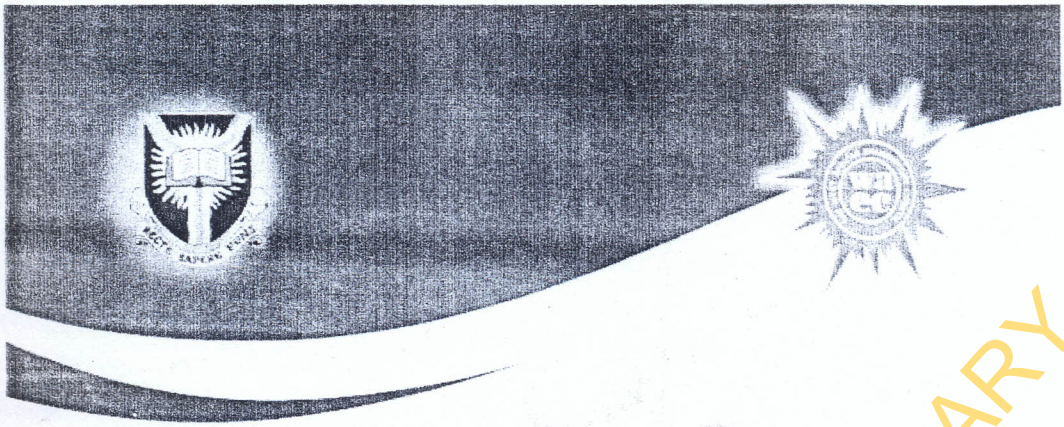

WORKSHOP ON EFFECTIVE CONDUCT OF RESEARCH

WEST AFRICAN EXAMINATION COUNCIL (WAEC) STAFF

Training Service Provider

Institute of Education,
University of Ibadan,
Ibadan, Nigeria

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Workshop on Effective Conduct of Research for WAEC Staff

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MODULE NINE

PRESENTATION OF RESULTS/ FINDINGS, DISCUSSION AND CONCLUSION

Dr. Adeleke, J.O

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Introduction

Systems in the world are driven by research. If the world then relies heavily on findings of various research works then, such should be valid reliable and well presented. This module therefore centres on three major areas, namely: (i) Presentation of Research Results and Findings, (ii) Discussions and (iii) Conclusions.

Objectives

At the end of this Presentation, the participants should be able to:

i. Confirm Validity and Reliability of Research Results and Findings
ii. Note and Avoid Biases in Result Interpretation
iii. Establish Consistency of results with the objectives of the original proposal
iv. Interpret research analysis output
v. Itemize Basic Components of a good discussion
vi. State the Purpose of a Conclusion
vii. Enumerate qualities of a Good Conclusion
viii. Present the structure of a good conclusion chapter

Pretest

i. State 3 sources of Bias in Result Interpretation
ii. How can the identified barriers in (i) be controlled for?
iii. Itemize Basic Conponents of a good discussion
iv. State the Purpose of a Conclusion
v. Enumerate qualities of a Good Conclusion
vi. Present the structure of a good conclusion chapter

UNIT 1: PRESENTATION OF RESULTS/ FINDINGS

"Interpreting Research Results and Findings" considers various aspects concerning the interpretation of results. Generally the section considers how to confirm the reliability

and analysis of results, the avoidance of bias or over-interpretation of results, and the identification from the results of potential areas of future research. "Documenting Research Results and Findings," examines methods of presenting research findings, the physical aspects of record keeping, and what should be recorded within research records to ensure their value to the researcher.

Confirmation of Validity and Reliability of Results

A. The most important initial stage is to be aware that your results may not be reliable. Blind faith does not make for good investigative research. Results may be misleading for a wide range of reasons, e.g. an atypical (Abnormal) sample, equipment error, or the simple vagaries (moods) of animal behaviour. The latter point is nicely summed up by the Harvard Law of Animal Behaviour:Given precisely controlled conditions, the animal will do as it damn well pleases.

Case study 1: During a study on malpractice habits.The researcher found that it was difficult to obtain reliable data on involvement in examination malpractice. She could ask till she was blue in the face, and in as any different ways as she could think of: one-on-one interviews, focus groups, whatever. All interviewees reported 100% non-involvement. Yet it was obvious to the researcher that there were students who get involved in the practise.

Way out

Peer review is a basic step in checks of reliability. Asking colleagues who have a sound knowledge of the field, but have not been as close to the work as yourself, is an essential and basic check of reliability. Better to have a colleague pick up a discrepancy at an early stage rather than a paper or grant referee at a later one.

Refer to previously published work and review your results within the context of previous publications to obtain a feel for general trends. They are some trends which may be expected to emerge. You must ensure adequate quality controls to avoid bias, i.e., inadvertently creating the result expected from 'trend'. Bear in mind when checking reliability in the light of previous trends that many breakthroughs in research have at first been regarded as completely implausible. Plausibility is determined by present knowledge.

B. It is important to be thoroughly familiar with the background and content of the project. This is especially important where moving into new fields, where some less than obvious fact may pass unnoticed.

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Case study 2: Dr. Oke, A staff of WAEC, started a study on Electronic methods of examination malpractice. She included various methods in her instrument and administered to a sufficient sample of SS 3 students. She was on Result presentation stage when she went to Ghana to attend International Conference on Education and Development Holding at University of Ghana, Legon, 28-31, May, 2013. During her interaction with Prof. Menser, a lead presenter from United State of America, she realised that much information can be stored on looking glasses which she did not originally include while collecting her data Fortunately the researcher had not published the study, and learnt a valuable lesson cheaply. What advice do you have for the researcher.

Way out

- Bear in mind that your results may not be as you need them.
- Check all results thoroughly.
- Use alternative techniques to check results.
- Examine your results in the light of other work.
- Know your background information well.
- Keep up with the literature.
- Networking is essential.
- Look to other fields for inspiration.
- Cast a critical eye over your methodologies, identify the weak points, seek alternatives which ameliorate them.

Avoiding Biases in Result Interpretation

A. Bias can arise in the construction of the experiment rather than in the interpretation. It is important to ensure that the experimental design, or the behaviour of the researcher, does not introduce bias long before the interpretative stages are reached.

B. In interview-based research, the perception of the interviewee/interviewer and his/her experience of life, has considerable potential to radically colour his/her interpretation of events around them.

Case Study 3: Roseline, a master student of Educational Evaluation, commenced a study on WAEC aggressiveness in curbing examination malpractice. She was interested in interviewing the stakeholders on the subject. Only twenty principal officers of WAEC were focused and she presented her findings based on their responses. How valid will her findings be? How better could she have handled the study?

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Way Out

- Take advice on your interpretation, especially from colleagues with a different view of things to yourself.
- Be aware that your perception of the results is coloured by her life experiences and expectations or that of interviewees.
- Equally you must be aware that just as your interpretation is biased by your experiences, so can the interviewee's responses be biased by their perception of the interviewer.
- Do not accept historical wisdoms/logic blindly.

Consistency of results with the objectives of the original proposal

A. It is important not to let your expectations of results predetermine your view of them. Firmly drawn conclusions should be sustainable by the data alone, and not reliant on the theories of previous work. A common error is to confuse a correlation between two variables and an actual cause and effect. Strong positive correlation may exist between highest qualification and income but if Qualification is a causal of income, Dangote, Adenuga and Alakija should be PhD. Holders. Researchers should watch their interpretations and conclusions.

B. Perhaps the most common reason for conclusions and discussion not being justified by results occurs when the discussion is extrapolated well beyond the limitation of the results.

Way out

- Avoid any confusion in data recording.
- Correlation is not proof of causality.
- Do not allow your expectations to predetermine your conclusions.

Audience Interest

A. Try to target your audience's interests, tailor your presentation accordingly. Talking to members of the audience will give some idea of the sort of language they use, what they are likely to be interested in, and what they will understand. If you are talking to a group of people who know little of your subject then it becomes especially important to avoid jargon. Use clear, plain English. Get a non-expert to review your presentation or paper. How you dress may be important, the more casual dress code common in academia will certainly be less acceptable to potential funders from industry.

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Case Study 4: Mike carried out a longitudinal study on the effects of Mid-day meal on enrolment, attendance, retention and Learning outcomes. Two groups were constituted- experimental and control. During data analysis, he realised that the treatment enhanced cognitive outcome in Numeracy and literacy among primary four pupils. Mike isolated that and presented the same during a forum where achievement of MDGs was the central theme. After his presentation, funding partners, UBEC/UNICEF requested for the effects the experiment had on the other dependent variables- enrolment, attendance, and retention which relate directly to their focus. He altered the emphasis of his presentation when he had second opportunity and he was given a grant to carry out the same study in all the states of the federation.

Way Out

For a larger audience one researcher remarked that he would use Power point and a slide projector, but for a smaller more informal audience, a board and a pen or overheads. If the lights are on you can better gauge if your audience is interested and enjoying your presentation. Standing and writing also has the further advantage/disadvantage of adding to the informality of the proceedings.

As all who have written a thesis or a major report will know, most people will never read them in their totality. One solution may be to present an executive summary of the research. This increases the likelihood of its being read by focusing all of the ideas into a short and concise section, but of course it leaves out all the proof, evidence, arguments and counter arguments. Multi-media productions offer considerable potential in this area. Although more complex and expensive to produce, they allow readers to look through your research and pick out what interests them, by jumping from one point to the another.

When seeking funding consider emphasising the 'benefits' rather than the 'features'. Thus instead of a fully integrated software package which is easy to use, highlight the benefits, e.g. minimal training required, financial savings.

- Know your audience
- Target the interests of your audience and be prepared to vary your approach according to those interests.
- Attend informal workshops set up by relevant industries.
- Always produce executive summaries of large reports.
- When presenting to industrial and other end users keep it simple and straight to the point.
- Avoid jargon.
- Do not exclude data which you only think may be significant in the future, err on the side of caution.
- Keep record keeping consistent.

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- Remember that you must be able to recognise data files not just next year but in three or four years time.
- You can use your records not only to record experimental details, but also to cover yourself against future unfair accusations.

Identification of further research from the results

The identification of weakness in present techniques, e.g. high cost of production, or the potential to develop a more efficient system, will often provide new avenues of research.

- Keep an eye focused on the longer term objectives of your project.
- Monitor the shift in public and political priorities, the timing of a proposal can be vital.
- Look for weakness in the existing and preferred techniques.
- Keep discussing your work, its progress and its potential with your colleagues.

Examples on Result Presentation

1. **Paired T-Test**

Table 1: Pair t test on Malpractice habit

Conflict	N	Mean	SD	df	t-cal	t-crit	p-value
Before	220	52.67	7.19	219	7.576	1.960	.000*
After	220	47.86	6.11				

Decision rule: *if $p<.05$ reject H_o, else retain H_o. *= Significant, $p<.05$*

Table 1. shows that there is significant difference in malpractice habit before and after war against malpracticecampaign ($t_{(219)}$=7.576 p=.000), The null hypothesis was rejected. The mean difference was significant the effect of the campaign.

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1. Independent -test

Table 2: Independent -test on the difference malpractice habit after campaign between targeted and untargeted schools.

Schools	N	Mean	SD	df	t-cal	t-crit	p-value	Decision
Untargeted	200	53.85	15.77	398	16.247	1.960	.000	S
Targeted	200	31.30	11.31					

Decision rule: *if $p<.05$ reject H_o, else retain H_o. S= Significant, $p<.05$*

Table 2 shows that there is significant difference in the malpractice habit of students between targeted and untargeted schools. $t_{(398)}= 16.25$, p=.000), the null hypothesis was rejected. The mean difference revealed significant reduction in malpractice habit of targeted schools.

3. Analysis of Covariance (ANCOVA)

Table :'Analysis of Covariance (ANCOVA) of Treatment on Pupils' achievement in Mathematics

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.	Eta Squared
Corrected Model	3125.052(a)	12	260.421	22.008	.000	.585
Intercept	8355.680	1	8355.680	706.117	.000	.791
Pretest	7.319	1	7.319	.619	.433	.003
Treatment	2173.046	2	1086.523	91.819	.000	.495
Level of numeric ability	.979	1	.979	.083	.774	.000
Level of attitude	41.185	1	41.185	3.480	.064	.018
Treatment * level of numeric ability	23.856	2	11.928	1.008	.367	.011
Treatment * level of attitude	.120	2	.060	.005	.995	.000
Level of numeric ability * level of attitude	.001	1	.001	.000	.992	.000
Treatment * level of numeric ability * level of attitude	15.996	2	7.998	.676	.510	.007
Error	2212.823	187	11.833			
Total	30091.000	200				
Corrected Total	5337.875	199				

a R Squared = .585 (Adjusted R Squared = .559)

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Table 3 shows the summary of Analysis of Covariance (ANCOVA) of tests of between-subjects effects. The table reveals that the observed mean difference among the three treatment groups was statistically significant $F_{(2, 187)} = 91.819$; $P < .05$, partial eta squared $\eta^2 = .495$. Therefore, the effect size (49.5%) of treatment on pupils' achievement in mathematics is moderate. This means that there is statistical significant main effect of treatment on pupils' achievement in mathematics. In order to determine which group differs significantly among the three treatment groups, Pair wise Comparison Post hoc test (sidak) was conducted and the results are presented in table 2

4. Multiple Regression

Table 4: Regression Summary Indicating Composite Contribution of Students' Demographic Factor and Pre Admission Qualification to Students' Achievement in Mathematics.

Model	Sum of Square	Df	Mean Square	F	Sig
Regression	9429.188	8	1178.648	6.673	.000
Residue	68888.802	390	176.638		
Total	78317.990	398			

$R = .347$
$R^2 = .120$
Adjusted $R^2 = .102$

Table 4 shows the multiple regression correlation coefficient (R) indicating the relationship between the independent variables (sex of the student, age of the sex, father's highest qualification, mother's highest qualification, father's occupation, mother's occupation, SSCE grades, UTME scores) and dependent variable (achievement test in mathematics). The table shows that R = .347 and adjusted R square is .102 which indicates that the independent variables jointly account for 10.2% of the variation of student achievement in mathematics. Further verification using Multiple regression ANOVA produced $F_{(8,390)} = 6.673$; $P < .05$. also show that the composite effect of the students demographic factors and pre admission qualification is significant on student achievement in mathematics.

Research question

How does demographic factors and pre admission qualification relatively serve as precursor for students' achievement in mathematics?

Table 3: Coefficient Indicating Relative Contribution of Independent Variables on Students' Achievement In Mathematics

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.104	9.620		.738	.461
	age	2.011	1.658	.058	1.213	.226
	sex	.085	.465	.009	.183	.855
	father's highest educational qualification	-.231	.526	-.023	-.438	.661
	mother's highest educational qualification	1.586	.531	.155	2.984	.003
	father's occupation	.260	.878	.015	.296	.768
	mother's occupation	-2.961	.839	-.176	-3.528	.000
	SSCE SCORES	.195	.198	.047	.982	.327
	UTME SCORES	.189	.041	.224	4.612	.000

a. Dependent Variable: Achievement Test

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Table 3 shows that among the students demographical factors and pre admission requirement; students age, students sex, father's highest qualification, mother's highest qualification, father's occupation, mother's occupation, SSCE grades and UTME scores ;only mothers educational qualification ($\beta = .155$; $t = 2.984$; $p < 0.05$), mother's occupation ($\beta = -.176$; $t = -3.528$; $p < 0.05$) and UTME scores ($\beta = .224$; $t = 4.612$; $p < 0.05$) were found to have significant contribution to students' achievement in Mathematics.

UNIT 2: DISCUSSION OF RESEARCH FINDINGS

This section of the Research shows you how to discuss the results that you have found in relation to both your research questions and existing knowledge. This is your opportunity to highlight how your research reflects, differs from and extends current knowledge of the area in which you have chosen to carry out research. This section is your chance to demonstrate exactly what you know about the topic by interpreting your findings and outlining what they mean. At the end of your discussion you should have discussed all of the results that you found and provided an explanation for your findings. A Discussion section should not be simply a summary of the results you have found and at this stage you will have to demonstrate original thinking.

1. Highlight and discuss how your research has reinforced what is already known about the area. Many researchers make the mistake of thinking that they should have found something new; in fact, very few research projects have findings that are unique. Instead, you are likely to have a number of findings that reinforce what is already known about the field and you need to highlight these, explaining why you think this has occurred.
2. You may have discovered something different and if this is the case, you will have plenty to discuss! You should outline what is new and how this compares to what is already known. You should also attempt to provide an explanation as to why your research identified these differences.
3. You need to consider how your results extend knowledge about the field. Even if you found similarities between your results and the existing work of others, your research extends knowledge of the area, by reinforcing current thinking. You should state how it does this as this is a legitimate finding!

A competent researcher who will present an adequate discussion should be assisted to:

- interpret the research – the key to a good discussion is a clear understanding of what the research means. This can only be done if the results are interpreted correctly;
- discuss coherently – a good discussion presents a coherent, well-structured explanation that accounts for the findings of the research, making links between the evidence obtained and existing knowledge.

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It is necessary for a researcher to understand the demands on him/her with regards to discussion. For example the discussion demand on a PhD. Students will be higher compared with a journal article author though the both work on the same title. Hence:

- there are sources that outline the purpose of a discussion section and provide information on how this can be structured and organised. This is important as it helps the reader to understand what your research has found.
- there are sources that outline strategies for presenting your discussion by highlighting various techniques to presenting a logical, coherent argument.
- they outline ways of using the evidence that you have found, to present your arguments and therefore allow you to make the most of your research data.

Hints on Discussion Writing

i. do you know what form your discussion section can/must take?
ii. is there a word limit? What is it?
iii. will your supervisor/project referee read a draft?
iv. is there work from previous students you can look at?
v. were they assessed by the same criteria as you?
vi. have you provided a brief summary of your results at the start of the section to remind the reader what you have found?
vii. have you explained the key findings of your research?
viii. have you placed your results in the context of existing knowledge by comparing your findings with the existing literature?
ix. have you considered your findings in the light of your research questions?
xi. have you provided a convincing explanation on the findings of your research?

UNIT 3: WRITING CONCLUSION OF A RESEARCH WORK

The conclusion of a research thesis/project reaffirms the thesis statement, discusses the issues, and reaches a final judgment. The conclusion is not a summary; it is a belief based on your reasoning and on the evidence you have accumulated. This is the place to share with readers the conclusions you have reached because of your research.

The conclusion attempts to carry the examiner or reader to a new level of perception about the thesis. A summary of what you have said in the thesis is not satisfactory. After all, the reader will hardly need reminding of things just read. The nature of the study can dictate overall content of the conclusion. However, it should particularly reaffirm the thesis statement and seek to offer answers to the questions raised in the research and justification for the approach used by the study as well as pathways forward.

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The Purpose of a Conclusion

The purpose of a conclusion is to tie together, or integrate the various issues, research, etc., covered in the body of the thesis, and to make comments upon the meaning of all of it. This includes noting any implications resulting from your discussion of the topic, as well as recommendations, forecasting future trends, and the need for further research. The conclusion chapter or section seeks to:

1. tie together, integrate and synthesize the various issues raised in the discussion sections, whilst reflecting the introductory thesis statement (s) or objectives
2. provide answers to the thesis research question (s)
3. identify the theoretical and policy implications of the study with respect to the overall
   study area
4. highlights the study limitations
5. provide direction and areas for future research

Qualities of a Good Conclusion

The conclusion should:

be a logical ending synthesizing what has been previously discussed and never contain any new information or material

It must pull together all of the parts of your argument and refer the reader back to the focus you have outlined in your introduction and to the central topic and thereby create a sense of unity.

be very systematic, brief and never contain any new information. It should be preferably less than or equal to about 5 pages for a dissertation and 15 pages for a PhD thesis.

add to the overall quality and impact of the research.

The Conclusion chapter is more than just a summary

of the chapters or data you have presented in the main thesis or dissertation. Alongwith providing a synthesis of the key findings and argument projected by the research, itshould make a stand regarding the thesis statement. To do this effectively requires that the conclusion is developed with a clear structure, each section providing a specific insight into the study. Hence, the conclusion should be able to stand on its own and provide a justification and defense of the thesis.

The structure of a good conclusion chapter

The conclusion must have a clear structure that is able to hold the attention of the examiner/reader/audience and provides a convincing sequence of the how the project is able to unequivocally and rigorously identified sound knowledge that can inform theory

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and or policy. Almost like a thesis on the study, it should have a beginning (introduction), a middle section (synthesis of empirical finding as answers to research questions), theoretical and policy implications and an end (future direction and direction of further research).

1. The Introduction of a good conclusion chapter
2. Empirical Findings
3. Theoretical Implication
4. Policy implication
5. Recommendation for future research
6. Limitation of the study
7. Conclusion of the conclusion

Generally, although a short pithy quote is sometimes recommended as being able to spice up your conclusion, the concluding paragraphs should be in your own words. Try to avoid direct quotations or references to other sources at this stage.

Table 3a : Analysis of Co – variance (ANCOVA) of Students' Attitude towards Mathematics by Treatments, Gender and Intelligence.

Source of Variation	Sum of Sq	Df	Mean Sq	F	Sig of F	Eta Sq
Corrected Model	9897.386[a]	8	1237.173	7.635	.000	.239
Intercept	49191.939	1	49191.939	303.582	.000	.609
Pre-Att Score	1701.891	1	1701.891	10.503	.001	.051
Treatment	2005.341	1	2005.341	12.376	.001	.060
Gender	37.030	1	37.030	.229	.633	.001
Intelligence	2504.600	1	2504.600	15.457	.000	.073
Treatment* Gender	26.983	1	26.983	.167	.684	.001
Gender * Intelligence	24.846	1	24.846	.153	.696	.001
Treatment* Intelligence	244.501	1	244.501	1.509	.221	.008
Treatment*Gender*Intelligence	99.076	1	99.076	.611	.435	.003
Error	31597.452	195	162.038			
Total	1965007.00	204				

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Corrected Total	41494.838	203				

a. R Squared = .239 (Adjusted R Squared = .207)

Table 3b: Marginal Mean Estimates on Post_Attitude score based on Treatment

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	99.932	1.371	97.229	102.636
Control	93.081	1.301	90.515	95.648

Covariates appearing in the model are evaluated at the following values: Pre_Attitude = 72.29.

Posttest

i. State 3 sources of Bias in Result Interpretation
ii. How can the identified barriers in (i) be controlled for?
iii. Itemize Basic Components of a good discussion
iv. State the Purpose of a Conclusion
v. Enumerate qualities of a Good Conclusion
vi. Present the structure of a good conclusion chapter

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