

**AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF
GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF
MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA**

by

FOLETSI JAN MOLEPO

submitted in accordance with the requirements for the degree of

MASTER OF ARTS

in the subject

SECURITY MANAGEMENT

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: Mr MA Mahambane

FEBRUARY 2024

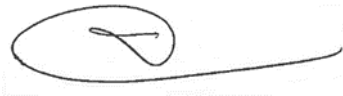
COPYRIGHT STATEMENT

The rights are mutually held in reserve by the University of South Africa (UNISA) and Mr. Foletsi Jan Molepo. According to the Copyright Act 98 of 1978, no share of this material may be duplicated, kept in any retrieval system, be communicated in any form or be printed, redeployed or vetted by any means (mechanical, electronically photocopying, recording or else) without preceding written consent from Mr. Foletsi Jan Molepo and the University of South Africa. Though, consent to use in these ways any material in this work that is resulting from other sources must be obtained from the original source. For that reason, original information may be used and referred to for research and academic purposes as long as it is referenced properly and recognized.

© UNISA 2024

DECLARATION

Foletsi Jan Molepo with student number 36955280 hereby states that the dissertation “AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA” is my own effort and that all the sources that I have utilised have been specified and recognised employing comprehensive references and that this work has not been submitted in the past for any other degree at any academic establishment.



23 February 2024

SIGNATURE

DATE

(MR) FOLETSI JAN MOLEPO

DEDICATION

I dedicate this dissertation to my late father Lesiba Molepo, and my late sister Monawa Molepo. You always believed in me when I was younger, and sometimes I felt under pressure to live up to your expectations. You still had faith in me, even if I did nothing tangible for you, and I've never understood why. I had no notion that what God had in store for me was already obvious to you.

ACKNOWLEDGEMENTS

- Above all, I would like to express my gratitude to the all-powerful God the Father, God the Son, and God the Holy Spirit for giving me the knowledge, strength, and capacity to complete my degree successfully despite all of the obstacles I faced along the way. Habakkuk Chapter 2 verse 2–3 reads: “Then the Lord replied: ‘Write down the revelation and make it plain on tablets so that a herald may run with it. For the revelation awaits an appointed time; it speaks of the end and will not prove false. Though it lingers, wait for it; it will certainly come and will not delay’”.
- Secondly, I want to express my gratitude for my late father, Mr. Lesiba Molepo, and my sister, Ms. Monawa Molepo, for their belief in me. I express my gratitude to my surviving parent and mother, Mrs. Ramasela Molepo, for her caring and Godly upbringing that have shaped who I am today. My dear wife, Cheliwe Molepo and my two (2) beautiful daughters, Josinah and Lesedi Molepo deserve my deepest appreciation for their unwavering support and tolerance of my constant departure from the sitting room while I was studying. Sincerely, I would like to thank my three (3) brothers, Madimetja, Malose, and Matsobane, as well as my two (2) sisters, Moshopiadi and Mantlangoane Molepo for their inspiration and support throughout my adventure. Without them, I could not have completed this dissertation. Consequently, I would like to thank my whole family including my nephews and nieces for their support.
- Thirdly, I would like to express my sincere gratitude to my supervisor, Mr. Abel Mahambane, for his unwavering support, motivation, patient, and extensive expertise in helping me with my studies. During the research process, your guidance was really helpful. I appreciate your eloquence, which made studying easier for me.
- Finally, I would want to express my sincere gratitude to every participant who helped with this study particularly the staff from the Department of Education in Mpumalanga Province. Without your help, I could not have completed my research and reached my objectives.

EXECUTIVE SUMMARY

Examinee impersonation at exam centres, bribery, and the unlawful purchase and sale of Grade 12 exam papers to minors are among the main issues that the government and interested parties are concerned about. This study examined the reasons for question paper leaks for the Grade 12 exam. The study demonstrates the continuous concerns about exam fraud. The study's findings demonstrate the variety and ongoing evolution of the cheating techniques found. Furthermore, this study aimed to evaluate current vulnerabilities and pinpoint risk factors in order to reduce the possibility of Grade 12 exam question papers leaking in the Mbombela Municipality of Mpumalanga Province South Africa. A qualitative case study was used in the research, which was ideal for investigations into intricate social phenomena. Fifteen (15) participants took part in the study. Focus groups and one-on-one interviews using semi-structured interview schedules to gather verbal and written responses were used to gather data for this study.

The investigation revealed the following:

- Leakage of examination question papers occur during printing and packaging.
- There is insufficient oversight, simultaneous printing of several papers, and simultaneous packaging of multiple exam papers.
- When question papers are being sent to districts, circuit offices, and schools, two question papers are transported: one for the morning and one for the afternoon.

The recommendations include:

- The Department ought to refrain from printing several questions papers concurrently.
- Question papers, such as Mathematics papers 1 and 2, should be delivered individually and not together.
- Question sheets should be sent out twice a day, right before the exam begins.

KEY TERMS: Examination, Examination leakage, Theft, Security, Vulnerabilities.

LIST OF ABBREVIATIONS

ANDRE	Advanced Near-field Detection Receiver
BRICS	Brazil, Russia, India, China and South Africa
CCTV	Closed Circuit Television Video
CES	Chief Education Specialist
COVID-19	Coronavirus diseases
DB	Distribution Box
DBE	Department of Basic Education
DCES	Deputy Education Specialist
DPCI	Directorate for Priority Crime Investigation
ENEM	Exame Nacional do Ensino Medio
GP	Gauteng Province
IAT	Institutional-anomie Theory
ICASA	Independent Communication Authority of South Africa
IRB	Institutional Review Board
KNEC	Kenya National Examination Council
MDE	Mpumalanga Department of Education
MEC	Member of Executive Council
MISS	Minimum Information Security Standards
MP	Mpumalanga Province
MPSS	Minimum Physical Security Standards
NEIC	National Examination Irregularities Committee
NSC	National Security Certificate
PEIC	Provincial Examination Irregularities Committee
PEK	Personal Experience Knowledge
PHD	Doctor of Philosophy

PO	Police Officer
PPS	Physical Protection Systems
PSIRA	Private Security Industry Regulatory Authority
PTA	Parents Teachers Association
RF	Radio Frequency
SAMTRAC	Safety Management Training Course
SAO	Senior Administration Officer
SAPS	South African Police Services
SSA	State Security Agency
UMALUSI	Council for Quality Assurance in General and Further Education and Training
UNISA	University of South Africa
UPS	Uninterrupted Power Supply
WAEC	West African Examination Council

TABLE OF CONTENTS

COPYRIGHT STATEMENT	i
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
EXECUTIVE SUMMARY.....	v
LIST OF ABBREVIATIONS	vi
LIST OF TABLES	xii
LIST OF FIGURES.....	xii
CHAPTER 1: GENERAL ORIENTATION.....	1
1.1 Introduction.....	1
1.2 Problem statement	2
1.3 Rationale for the study	4
1.4 Research questions	6
1.5 Research aim and objectives	7
1.5.1 Research goal	7
1.5.2 Research objectives	7
1.6 Definitions of key concepts	8
1.7 Chapter layout	10
1.8 Summary	11
CHAPTER 2: METHODOLOGICAL FRAMEWORK OF THE STUDY	12
2.1 Introduction.....	12
2.2 Research approach	12
2.3 Research design	13
2.4 Population and sampling.....	14
2.4.1 Sampling	16
2.4.2 Purposive non-probability sampling	16
2.4.3 Case study	17
2.5 Data collection.....	17
2.5.1 Semi-structured interviews.....	18
2.5.2 Personal experience	20
2.6 Data analysis.....	22
2.7 Reliability and validity	23
2.7.1 Transferability.....	23
2.7.2 Dependability	24
2.7.3 Confirmability	25
2.7.4 Credibility	26
2.8 Ethical considerations	26
2.8.1 Confidentiality.....	27
2.8.2 Non-maleficence	27

2.8.3 Beneficence	28
2.8.4 Voluntary participation.....	28
2.8.5 Transparency	28
2.9 Limitations of the study	28
2.10 Summary	29
CHAPTER 3: THEORETICAL FRAMEWORK AND LITERATURE REVIEW	30
3.1 Introduction.....	30
3.2 Theories and the proponent of the theories as a basis for the manifestation of examination leakages	30
3.2.1 Institutional Anomie Theory (IAT)	32
3.2.2 Agnew’s general strain theory.....	33
3.2.3 Deterrence theory	35
3.3 The vulnerabilities and risks of the leaking of examination papers.....	37
3.4 Conceptualising examination question papers	38
3.4.1 Definition of examination.....	39
3.4.2 Examination leakage.....	40
3.4.3 Examination malpractice.....	41
3.4.4 Security risk factor and security measures	43
3.5 Examination leakage perspective in Africa	43
3.5.1 Nigerian perspective on examination leakage	43
3.5.2 Zambian perspective of examination leakage	44
3.5.3 Kenya’s perspective on examination leakage.....	45
3.5.4 Ghana’s perspectives on examination leakages	46
3.6 Examination leakages in BRICS countries	47
3.6.1 Crime statistics in Mpumalanga Province	49
3.7 The purpose of examination.....	50
3.8 Effects and impacts of examination leakages.....	51
3.9 Punishment for examination leakage	54
3.10 Literature review.....	56
3.11 Summary	56
CHAPTER 4: PRESENTATION OF DATA ANALYSIS, EXPLANATION AND CONCLUSIONS.....	58
4.1 Introduction.....	58
4.2 Data analysis and administration	58
4.3 Section A: Biographical details.....	59
4.3.1 Participants	59
4.3.1.1 <i>Gender of participants</i>	59
4.3.1.2 <i>Age of participants</i>	60
4.3.1.3 <i>Marital status of participants</i>	62
4.3.1.4 <i>Educational qualifications of participants</i>	63
4.4 Section B: Vulnerabilities associated with leakage of Grade 12 examination question papers	64
4.4.1 What is your understanding of the concept of “leakage of Grade 12 examination question papers”? (See Annexure “C” Question 6)	64
4.4.2 What is your understanding of the concept ‘vulnerabilities’ regarding leakage of	

Grade 12 examination question papers? (See Annexure “C” Question 7).....	65
4.4.3 Which vulnerabilities to your knowledge contribute to the leakage of Grade 12 examination question papers? (See Annexure “C” Question 8).....	66
4.4.4 What are some of the vulnerabilities associated with the handling of Grade 12 examination question papers? (See Annexure “C” Question 9).....	68
4.4.5 What are some of the vulnerabilities associated with the printing of the Grade 12 examination question papers? (See Annexure “C” Question 10).....	69
4.4.6 What are some of the vulnerabilities associated with the delivery of the Grade 12 examination question papers? (See Annexure “C” Question 11).....	70
4.4.7 What are some of the vulnerabilities associated with the storage of the Grade 12 examination question papers? (See Annexure “C” Question 12).....	71
4.5 Section C: Security risk factors associated with the leakage of Grade 12 examination question papers.....	73
4.5.1 What is your understanding of the concept ‘security risk factors’ associated with the leakage of Grade 12 examination question papers? (See Annexure “C” Question 13).....	73
4.5.2 What types of security risk factors to your knowledge are associated with the leakage of Grade 12 examination question papers? (See Annexure “C” Question 14) ...	74
4.5.3 How many people are involved in the handling of Grade 12 examination question papers in Mpumalanga Province? (See Annexure “C” Question 15)	75
4.5.4 Who are the different persons responsible for the handling of the Grade 12 examination question papers in Mpumalanga Province? (See Annexure “C” Question 16).....	76
4.5.5 Who is responsible for the delivery of the Grade 12 examination question papers? (See Annexure “C” Question 17)	77
4.5.6 What happens if a delivery vehicle is involved in an accident while delivering the Grade 12 examination question papers to schools in the Province? (See Annexure “C” Question 18)	77
4.5.7 Are the Grade 12 examination question papers printed by private or government printers? (See Annexure “C” Question 19)	79
4.5.8 Who is involved in the printing of the Grade 12 examination question papers? (See Annexure “C” Question 20)	79
4.5.9 What procedures are followed during the printing of the Grade 12 examination question papers? (See Annexure “C” Question 21)	80
4.5.10 What facilities are used for the storage of the Grade 12 examination question papers? (See Annexure “C” Question 22)	81
4.5.11 How secure is the storage facility against theft and unlawful breaking and entering? (See Annexure “C” Question 23)	82
4.5.12 For how long is the Grade 12 examination question papers stored in the storage facilities until they are delivered to the schools? (See Annexure “C” Question 24).....	83
4.6 Section D: Security measures to mitigate leakage of Grade 12 examination question papers.	84
4.6.1 What security measures are in place to prevent the leakage of Grade 12 examination question papers? (See Annexure “C” question 25).....	84
4.6.2 Explain the effectiveness of these security measures. (See Annexure “C” Question 26).....	84
4.6.3 Do all personnel handling the Grade 12 examination question papers (officials, printing, delivering, storing guarding) undergo background checks and screening? (See Annexure “C” Question 27)	86
4.6.4 What are the measures that are put in place during the delivery of examination question papers? (See Annexure “C” Question 28)	86
4.6.5 What is the contingency plan if vehicles delivering Grade 12 question papers are	

hijacked? (See Annexure “C” Question 29)	87
4.6.6 Is the strong room register in place to record the movement of the Grade 12 examination question papers when in the storage area? (See Annexure “C” Question 30).....	89
4.6.7 Does the strong room have a locking door mechanism? (See Annexure “C” Question 31).....	89
4.6.8 What security measures are taken to prevent cell phones and laptops from being brought into a printing facility, where the Grade 12 examination question papers are printed? (See Annexure “C” Question 32)	90
4.6.9 Are officials being subjected to body searches upon entering the printing facility? (See Annexure “C” Question 33)	91
4.6.10 What are the ideal security systems that can be put in place to prevent examination paper leakage? (See Annexure “C” Question 34).....	92
4.6.11 Are the norms and standard of handling Grade 12 examination question papers adhered to? (See Annexure “C” Question 35).....	93
4.7 Section E: General	94
4.7.1 Is there anything further you would like to add?	94
4.8 Observation (See Annexure “B”).....	94
4.9 Summary	95
CHAPTER 5: FINDINGS AND RECOMMENDATIONS.....	96
5.1 Introduction.....	96
5.2 A summary of the research	96
5.3 Findings related to the research questions	97
5.3.1 Findings of research question 1	97
5.3.2 Findings of research question 2.....	99
5.3.3 Findings of research question 3.....	100
5.4 Recommendations	101
5.4.1 Recommendations based on the findings research question 1:.....	101
5.4.2 Recommendations based on the findings of research question 2:.....	102
5.4.3 Recommendations based on the findings of research question 3:.....	102
5.5 Recommendations for additional research	103
5.6 Conclusion.....	103
LIST OF REFERENCES	105
ANNEXURE A: Ethical clearance certificate	122
ANNEXURE B: Department of Education permission letter	124
ANNEXURE C: Semi-structured interview schedule	125
ANNEXURE D: Informed consent letter to conduct interviews	132
ANNEXURE E: Observation checklist	134
ANNEXURE F: Letter requesting permission to conduct research in the Department of Education.....	136
ANNEXURE G: Confirmation of language editing	137
ANNEXURE H: Turnitin report.....	138

LIST OF TABLES

Table 2.1: Sample of population.....	15
Table 3.1: Crime statistics in Mpumalanga Province.....	49

LIST OF FIGURES

Figure 4.1: Gender of participants.....	60
Figure 4.2: Age of participants.....	61
Figure 4.3: Marital status of participants.....	62
Figure 4.4: Educational qualifications of participants.....	63

CHAPTER 1: GENERAL ORIENTATION

1.1 Introduction

Mass failure of examinations in public schools is associated with exam malpractice such as question paper leakage, and this has become a serious concern for society. Teaching and learning outcomes are assessed through examinations in the South African school system. This has become the most valuable option in assessments of Grade 12 learners (Omoniyi, 2014:448).

According to Adow, Alio and Thinguri (2015:15), all of the major stakeholders in education are concerned about exam question paper leaks occurring at all levels, i.e., globally, regionally, and locally. They include policy makers, students, teachers, political leaders, and the general public. Some of the most common examples of examination malpractice include question paper leaks, careless impersonation in testing environments, desperate school owners bribing testing officials, and parents purchasing leaked papers ahead of time for their children (Chaminuka & Ndudzo, 2014:79).

Some of the major problems of concern to government and stakeholders include the leakage of Grade 12 exam papers, impersonation at exam centres, bribes and the illegal buying and selling of Grade 12 exam papers to the learners. These are some of the examination irregularities that makes schooling a source of concern for parents. These irregularities are influenced by inadequate preparation by Grade 12 learners, peer influence, social influence, poor learning facilities and poor parental support (Chaminuka & Ndudzo, 2014:83).

Considering the ambit of the problem and the manifestation of the irregularities, the involvement of employees within the Department of Education cannot be ruled out. It includes cheating in the examination, collusion, dubbing, assault of invigilators or supervisors and stealing of question papers. Examination leakage is occurring as a cover for poor learning and teaching (Adow et al, 2015:15).

This chapter discussed the research problem, the rationale for the research and provides the research questions that were used to achieve the research aims and objectives of this study. This is followed by key theoretical definitions and an outline

of the study.

1.2 Problem statement

Examination leakages are a grave concern because of their potential threat to education systems and certification, and the values that education stands for (Adow et al, 2015:15). Examination leakages threaten the integrity of examinations and damage the authority of those responsible for conducting the examination (Mashanyare & Chinamasa, 2014:47). There are also post examination leakages which occur when a candidate's original script is substituted with another, as well as alterations of scores to favour candidates. These examination irregularities are caused by the value system of the society; economic factors; psychological factors; an inadequate teaching-learning environment; and admission policies; among others.

Leakages in examinations make schooling a source of concern for parents. Considering the ambit and the manifestation of this problem, the involvement of employees within the Department of Education cannot be ruled out. Learners want to pass the examination at all costs (Halai, 2006:16). Ukpepi and Ndifon (2012:60) argue that if teachers do not teach effectively and the students must pass the examinations, this could result in leakages of examination question papers. Examination malpractice includes cheating in the examination, collusion, dubbing, assault of invigilators or supervisors and stealing of question papers. This means that examination leakage is occurring as a cover for poor teaching and learning .

According to Masondo (2015), Elijah Mhlanga of the Basic Education Department in Limpopo indicates that the department is not limiting its investigation to Life Sciences paper 2 since other papers may also have been compromised. Mpumalanga matric exam results came under scrutiny when five papers were leaked in October 2010. Mpumalanga matric results came under scrutiny when five papers were leaked in October. Thirteen people, including an official from the correctional services department, a worker at Clicks, a teacher and 10 learners, were arrested after police found the syndicate photocopying Maths, Physics and Accounting question papers at an internet café in Barberton (Gower, 2010).

According to Macupe (2016), pupils at a few schools in the Mopani District in

Limpopo gained access to the second Mathematics exam paper before it was written. The ministerial report found that every one of the 2009 matric exam papers was leaked in Mpumalanga, devaluing examinations in the province. It is evident that the leakage of question papers in the Mpumalanga Province was not limited to the five papers (Maths paper 1 and 2; Physical Science paper 1 and 2 and Accounting) that were replaced.

Creswell (2014:115) suggests that the research problem in a study begins to become clear when the researcher asks; “What is the need for this study”? or “What problem influenced the need to undertake this study?” The opening paragraphs of a proposal, which includes the research problem, must stimulate the reader interest. For example, in 2015, there were also leaked papers in Limpopo Province, which eventually spilled over into Gauteng and Mpumalanga Provinces (Tandwa, 2016). The following day after the exam, the pupils confirmed the paper they wrote was identical to the one that had been made available (Coetzee, 2015). The researcher’s perception of the situation is that the problem is not being addressed comprehensively and more empirical research needs to be done to address it. Leakage of examination papers results in an uneven playing field, where some students gain unfair advantages. This undermines the hard work of honest students and can lead to demotivation and distrust in the education system. By contextualising the research problem, clearly stating the problem, and justifying the research's contribution, this study aims to make a meaningful impact on the integrity of the Grade 12 examination process in Mpumalanga Province.

There were unlimited complaints from the Department and the community from Mpumalanga on the leakage of the Grade 12 exam question papers. This research will help the Department of Basic Education in Mpumalanga to address the vulnerabilities to mitigate the leakage of Grade 12 examination question papers in the province.

Since then, the Department finds it difficult to establish the factors leading to vulnerabilities associated with leakages of Grade 12 examination question papers for the past years and it continues to occur. These difficulties lead to the community’s lack of trust on the education system, damaging learners that are not engaged with leakages (Coetzee, 2015).

1.3 Rationale for the study

Leakage of Grade 12 exam question papers is a serious threat which impacts on the certification and values of what education stands for (Adow et al, 2015:16). Examination leakage is an example of actions that threaten the integrity of examinations. It is, therefore, damaging the authority of those responsible for conducting the examination (Mashanyare & Chinamasa, 2014:47).

In 2015, matric examination question papers were leaked in Limpopo Province, which eventually spilt over into Gauteng and Mpumalanga Provinces (Tandwa, 2016). Then the following day after the exam, pupils confirmed that the paper they wrote was identical to the one that had been made available to learners. Since then, the Department found it difficult to establish the facts associated with leakages of Grade 12 examination question papers for the past years and it continues to occur.

Examination leakage of Grade 12 exam papers can be seen as a threat to the integrity of examinations in Mpumalanga Basic Education Department. It is, therefore, damaging the authority of those responsible for conducting the examination (Mashanyare & Chinamasa, 2014:47). Leakages of Grade 12 examination question papers contravene the rules and regulations set by examination and regulatory bodies such as Council for Quality Assurance in General and Further Education and Training (UMALUSI) (Achio, Ameko & Kutsanedzie, 2012:145).

According to Tandwa (2016), pupils at a few schools in the Mopani District in Limpopo Province had gained access to the second Mathematics exam paper before it was written. The Ministerial report stated that every question paper for Grade 12 examination in the year 2009 matric exam papers was leaked in Mpumalanga Province, making exams in the province not worth the paper they were written on (Ministerial Report, 2010:5).

The Education department's efforts to prevent leakages of exam question papers, included the installation of biometric systems, CCTV cameras, body searching of the candidates before they enter the examination halls. In addition, invigilators were not allowed to take their cell phones or any other electronic devices in the examination halls. Principals were briefed that they will be held liable if any of their

candidates were caught with mobile phones or other electronic devices into the examination halls. These measures, together with the cancellation of all results of candidates who brought mobile phones into examination venues did not seem to yield significant results, as the leakage continued (Chux, 2018).

Leakage of matric exam question papers is a grave concern because of its potential threat to education systems and certification, and the values that education stands for (Adow et al, 2015:16).

There are specific question papers that are prone to leakages such as Life Sciences and Mathematics. The leakage of question papers in the Mpumalanga Province was not limited to the five papers (Maths Paper 1 and 2; Physical Science paper 1 and 2 and accounting paper) that were replaced (Chuenyane, 2010). Most of the leakages of Grade 12 examination question papers takes place during printing, packaging, delivery and within storage facilities (Akaranga & Ongong, 2013:87). Therefore, vulnerabilities associated with the leakage of Grade 12 examination question papers in Mpumalanga Province was no exception.

There is a high level of concern about the leakage of exam papers in general including universities (Ngqakamba, 2019:3). The University of South Africa has issued a statement regarding the reported leaking of examination question paper. This time over 17 modules have been compromised and leaked just before students sits for their final examinations. The leakage of exam papers at the University of South Africa (UNISA) was investigated by the South African police Service (SAPS) (Jordan, 2019).

Onah (2013:395) argues that leakages of Grade 12 examination question papers damage the education system despite the government's effort to prevent these practices. According to Akaranga and Ongong (2013:87), examination malpractice one of the major problems affecting the education system today. Leakage of examination papers is considered to be the most serious amongst all forms of irregularities as it is connected to the printing, packaging, delivery and storage of examination question papers. Another irregularity that happens during examinations is when learners copy from each other. This problem has been acknowledged by the Department and the community. There is a need to address the vulnerabilities

of the examination system to mitigate the leakage of Grade 12 examination question papers. Security measures should be put in place to strengthen the security of the examination question papers during printing, packaging and transportation.

Adding to that, Nigeria has also experienced examination leakages for decades. There was an increase in examination leakages in the last two decades in Nigeria (Nnekwu & Odochukwu, 2016:48). The problem of exam leakages has penetrated the educational system in Nigeria, from the primary school levels to the tertiary institutions of learning (Dada, 2014:20). According to Gbagolo (2011:1), examination leakages started unnoticed in Nigeria and has become a threat to the educational system.

Zambia over the years experienced a worrying rate of increase in examination leakages (Phiri & Nakamba, 2015:327). Maheka (2015:6) further indicates that every examination season witnesses new and ingenious methods of exam leakage. Parents, principals, examination officers and invigilators are expected to lead by example in discouraging examination leakage (Maheka, 2015:21).

According to (E &T Editorial Staff, 2019) "... in the UK summer examination series in 2017, there was an external breach of Maths A-level paper. Also, in 2018, C4 Maths paper leaked online a day before thousands of candidates were due to sit the exam. Students reported seeing the paper for sale online for £200, with the sellers sending over the first question to prove they had it but demanding the cash up front before they would reveal the rest". Since students are intent to overcome security control measures, the safeguarding of exam papers is reinforced and monitored by teachers on a continuous basis (E&T Editorial Staff, 2019).

According to Al-Nokee (2018), during the past few years, Bangladesh has also experienced problems with the leakage of examination question papers from within its education system.

1.4 Research questions

Research questions can be used to break the main problem down into questions to define sub-problems (Walliman, 2011:33). To this effect, Driscoll (2011:158); contends that a research question or hypotheses should be specific, narrow and

discoverable through primary research.

The research questions that were identified and used by the researcher for this study were as follows:

- Which vulnerabilities are presently associated with the leakage of Grade 12 examination question papers in Mbombela municipality in Mpumalanga Province, South Africa?
- What security risk factors are associated with the leakage of Grade 12 examination question papers in Mbombela municipality in Mpumalanga Province, South Africa?
- How should the vulnerabilities be eliminated to mitigate the leakage of the Grade 12 examination question paper in Mbombela municipality in Mpumalanga Province, South Africa?

1.5 Research aim and objectives

The research questions culminated into the formulation of a research goal and research objectives of the study (Kumar, 2005:192).

1.5.1 Research goal

This study assessed the present vulnerabilities to identify specific risk factors to mitigate the leakage of Grade 12 examination question papers in Mbombela Municipality in Mpumalanga Province, South Africa.

1.5.2 Research objectives

The research objectives included the following:

- To conduct an assessment of vulnerabilities presently associated with the leakage of Grade 12 examination question papers in Mbombela Municipality, in Mpumalanga Province, SA.
- To identify security risk factors associated with the leakage of Grade 12 examination question papers in Mbombela Municipality Mpumalanga Province, SA.
- To determine security measures to eliminate the vulnerabilities so that the

leakage of the Grade 12 examination question paper may be mitigated.

1.6 Definitions of key concepts

1.6.1 Examination leakage

The prior illegal accessing of an exam question paper by an individual, who is to sit for the same examination is referred to as 'examination leakage' (Mashanyare & Chinamasa, 2014:47). According to Chux (2018) leakage of exam question papers occurs when students are in unlawful possession of exam question papers before they can write the exam.

1.6.2 Examination

Akintunde and Musa (2016:110) define examination as a formal test used to assess students' knowledge of a particular subject to tailor the teaching-learning process.

1.6.3 Theft

Liebenberg (2020:16), define theft as "unlawful appropriation with intent to steal something capable of being stolen. In respect of its purpose and function, it is defined as the secretive taking and carrying away of property from the owner's possession and control."

1.6.4 Security

Jore (2019:157) argue that term security is defined as "perceived or actual ability to prepare for, adapt to withstand, and recover from danger and crises caused by people deliberate, intentional, and malicious acts such as terrorism, sabotage and organised crime". Security is defined as the feeling of being safe and secure, the lack of threats, and the management of future risks (Jore, 2019:158).

1.6.5 Physical Protection Systems (PPS)

Physical protection systems involve a number of features that are put in place to prevent theft, leakages and dissemination and distribution of leaked question papers (Van Jaarsveld, 2011:5).

1.6.6 Information security

According to Alnatheer and Nelson (2009:6), information security involves “the prevention of, and recovery from, unauthorized or undesirable destruction, modification, disclosure, or use of information and information resources, whether accidental or intentional.”

1.6.7 Security vetting

Mdluli (2011:3) refers to security vetting as doing a careful or critical examination of someone or something of a person, before employment or a process of examination and evaluation, generally referring to the performance of a background check on someone before offering that person employment or conferring an award. In this context, the personnel working on examination question papers need to undergo a vetting process in order to protect the integrity of the examination paper.

1.6.8 Access control

The concept of access control is described by Mahambane (2018:4) as to how a person is granted or denied access to restricted areas. In this context, access should be restricted at the printing facilities, storage rooms, exam rooms and in transit.

1.6.9 Vulnerabilities

Paul (2013:3) argues that it can be defined as “an internal risk factor of the subject or a system that is exposed to hazard and corresponds to its intrinsic tendency to be affected or susceptible to damage”. For the purpose of this study, question papers are vulnerable to theft.

1.6.10 Security measures

Alshboul (2010:2) defines security measures as an “intention of implementing security measures, controls, and policies to guard information security objectives and information assets”. Security control reduces the impact of security threats and vulnerabilities to a level acceptable to the organisation. In this context, the aim of implementing security risk control measures is to prevent examination question paper leakage.

1.6.11 Security risk

Kole (2015:12) defines security risk as a “likelihood of suffering harm or loss, exposure to the possibility of loss or harm, a component of insecurity, or the likelihood that effects an act that may not be reliable with the intended or anticipated results”. For the purpose of this study, question paper leakage is a security risk.

1.6.12 Security risk factors

Amundrud, Aven and Flage (2017:286) define security risk factors as “the relationship between threats towards a given asset and these assets vulnerable to the specified threat”. In this context, are those risk factors that give rise to the leakage of the Grade 12 exam questions paper such as, deployment of same security guards over and over, poor infrastructure, lack of vetting for officials involved in handling of the question papers, temptation to sell question papers and lack of training on handling of question papers, bribery, corruption, theft, poor safeguarding of question papers, too many persons handling question papers and making copies of question papers.

1.7 Chapter layout

The study was divided into the following five chapters:

CHAPTER 1: GENERAL ORIENTATION

The reason for the study, problem statement, research questions, research purpose, research goals, definitions of essential terms, and dissertation layout were all introduced in this chapter.

CHAPTER 2: RESEARCH METHODOLOGY

The methodological framework used in this dissertation are all covered in this chapter.

CHAPTER 3: VULNERABILITIES ASSOCIATED WITH THE LEAKAGE OF EXAMINATION QUESTION PAPERS

This chapter presents a detailed review of the literature study on theoretical framework on the leakage of examination question papers, looking at best practices

used nationally and internationally.

CHAPTER 4: ANALYSIS AND INTERPRETATION OF DATA

The analysis and interpretation of data from semi-structured and focus group interviews is the emphasis of this chapter.

CHAPTER 5: FINDINGS AND RECOMMENDATIONS

The findings and recommendations of this study are discussed in this chapter.

1.8 Summary

The research problem showed the problem the Department of Basic Education in in Mbombela municipality Mpumalanga Province is faced with. The Department of Basic Education in in Mbombela municipality Mpumalanga Province is concerned about the continuous leakage of Grade 12 examination question papers. Moreover, the rationale to conduct this study was to assist the Department of Basic Education in Mbombela municipality in Mpumalanga in addressing the vulnerabilities to mitigate the leakage of Grade 12 examination question papers and to protect the integrity of education system.

This study used the research questions as a point of departure to conduct the research so that the objectives can be achieved and realised. The rationale for this study and the key concepts defined in this chapter guided the literature study. The next chapter discusses the research design and methodological approach of the study.

CHAPTER 2: METHODOLOGICAL FRAMEWORK OF THE STUDY

2.1 Introduction

The study's problem statement, justification, research questions, goals, and objectives, as well as the arrangement of the dissertation and explanation of essential terms, were all covered in the preceding chapter.

This research is built on constructivist scholarship which is the philosophical assumption that people make sense of reality through their interactions with the world (Denzin & Lincoln, 2011:67). Creswell (2013:42) opines that the core idea of constructivism is that reality is constructed in the interactions and minds of individuals and that there are multiple, equally valid realities.

“A researcher’s worldview can have a significant impact on the outcome of the study” (Corbin & Strauss, 2015:45). A qualitative-exploratory research design and a purposive non-probability sampling technique were employed for the study. Participants were considered knowledgeable on the topic under investigation and were chosen according to their readiness and willingness to participate in the study.

2.2 Research approach

The researcher employed an exploratory study as informed by the qualitative approach (Denzin & Lincoln, 2011:67). The researcher followed a qualitative research approach using the interpretivist phenomenological strategy to capture participants’ voices on the phenomenon under study. Qualitative research mostly uses descriptive or narrative statements as the units of measurement whereas quantitative research measures responses on one of the four measurement scales, i.e., nominal, or classificatory scale; ordinal or ranking scale; interval scale; and the ratio scale (Creswell, 2013:45). The sole aim of the researcher was to obtain the views of different participants and understand how this can elucidate the topic under study, which is an assessment of vulnerabilities to mitigate the leakages of Grade 12 examinations using a constructivist-interpretivist/relativist approach. According to this worldview, reality is constructed in the interactions and minds of individuals; thus, there are multiple, equally valid realities.

Qualitative methods value the uniqueness of people and settings and do not aim

for, nor claim, generalisability, nor are they bound by statistical necessities of random sampling strategies (Creswell, 2013:23). The study assessed the vulnerabilities to mitigate leakages of examination question papers of Grade 12 in Mbombela Municipality, Mpumalanga Province, South Africa by using an interpretivist phenomenological strategy with the focus on understanding the experiences of the staff members attached to examination and assessment directorate and the Department of Education as participants in this study rather than an interpretation of events (Edmonds & Kennedy, 2017:168).

2.3 Research design

The research employed a qualitative case study, which is appropriate for studies exploring a complex social phenomenon. A defining characteristic and advantage of a case study approach is a focus on depth to obtain a rich complete picture, often requiring a variety of data tools. In this study, the staff members were thus the “units of analysis”. Their experiences of assessment of vulnerabilities of exam leakages, in relation to their career pathways and leadership experiences and practices, were explored in-depth in their district and provincial contexts and allowed for conclusions to be drawn about these students in their specific contexts. The study intended to assess the causes and effects of examination malpractices/leakages using a descriptive study design with students in Mbombela Municipality, Mpumalanga Province, South Africa in order to make narrative/descriptive statements about the social phenomena under study. The qualitative study followed an interpretivist approach. According to Cohen, Manion and Morrison (2011:34), “A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure”.

The researcher collected qualitative data from officials working at Mbombela Municipality, Mpumalanga Department of Education at the Examination and Assessment Directorate and other stakeholders on their practical experiences with examination management. Data were also collected through one-on-one interviews in the form of written and spoken language using semi-structured interview schedules and through focus group interviews. The data were analysed by identifying and categorising them into generalised themes and categories. This allowed the researcher to study selected issues in depth, with openness

(transparency), and in detail, as the researcher identified and understood the categories of information that emerged from the data. The study was flexible; data collection was less structured and more accessible. This reduced the data into sub-properties, for example, for the category, “sources used to collect security information”; its properties included open and closed sources of information. Open sources can include public documents and closed sources may include classified documents. Each of these documents can be further dimensional if analysis calls for it. The researcher was able to make the necessary adjustments straight away. This meant that the whole study was more flowing, naturalistic, participatory, and interpretive. A case study methodology was also used in this study to aid the researcher in ensuring validity and dependability.

2.4 Population and sampling

The population is the entire group included in the study (Creswell, 2014:45). Creswell (2014:78) defines a population as a well-defined or investigated category of individuals, resources, components, activities, and groups of items or entire aggregation of respondents that meet a designated set of criteria. A population includes all people or items with a specific characteristic.

The research was conducted to understand participants’ views on vulnerabilities to mitigate the leakage of Grade 12 examination question papers in Mbombela Municipality, Mpumalanga Province, South Africa. Thus, the population for this study included 30 officials in Mbombela Municipality, Mpumalanga Department of Education who are responsible for administration of examination question papers (see Table 2.1). Out of the 30 officials, a total of 15 officials constituted the sample for the study. The officials included Chief Education Specialists, Deputy Education Specialists and Senior Administration Officers in charge of item development and question paper printing, examiners responsible for setting question papers, the examination security manager responsible for security services of question papers, circuit managers responsible for receiving and dispatching of question papers, drivers responsible for delivering question papers to the circuit offices, print room managers and printing machine operators responsible for printing question papers and physical guarding at the print room.

While there are several employees at Mbombela Municipality, Mpumalanga Department of Education, inter alia, those in human resources, Accounting, etc., this study drew the sample from employees in the Examinations Department handling the Grade 12 national examinations. Thus, a purposive sampling technique, a form of non-probability sampling, guided the inclusion and exclusion of participants. Purposive sampling identifies and selects participants based on their characteristics and are information-rich regarding the cases that the researcher is interested in. In this study, only employees in the Examinations Department handling Grade 12 national examinations were purposively selected and subjected to face-to-face, semi-structured interviews. Therefore, the sample and population that were observed are shown in Table 2.1 below.

Table 2.1: Sample of population

UNIT OF ANALYSIS	POPULATION NUMBER	SAMPLE NUMBER
Department of Education		
1. Chief Education Specialists (Item development and question papers printing)	2	1
2. Deputy Education Specialist (Item development and question papers printing)	2	1
3. Examiners	3	1
4. Security Manager	1	1
5. Senior Administration Officers (Item development and question papers printing)	3	1
6. Circuit Managers	4	1
7. Drivers	4	2
Private Printing Firm		
8. Print Room Manager	1	1
9. Printing Machine Operator	4	2
10. Data capturers	3	1
Private Security Company		
11. Grade B Security Supervisor	1	1
12. Grade C Security Officers)	2	2
TOTAL	30	15

2.4.1 Sampling

Sampling, according to Sarantakos (2002:139), is the process of choosing the analytical units from the target population that will be used in the research project. To sample is to select some cases from a population in such a way as to be representative of the population (Creswell, 2014:89). Sampling enables the selection of data points from within the larger data set to estimate the characteristics of the whole population.

2.4.2 Purposive non-probability sampling

There are three (3) categories of sampling designs: random/probability sampling designs, non-random/non-probability sampling designs and “mixed” sampling designs. Explaining each design is beyond the scope and objectives of this research study. The researcher chose non-probability sampling where some elements of the population have no chance of selection (these are sometimes referred to as “out of coverage” or “under covered”), or where the probability of selection cannot be accurately determined (Leedy & Ormrod, 2000:150).

“Non-probability sampling designs do not follow the theory of probability in the choice of elements from the sampling population. Non-probability sampling designs are used when the number of elements in a population is either unknown or cannot be individually identified” (Cohen et al, 2011:34).

Leedy and Ormrod (2000:150) suggest that “it is imperative for you to determine an aspect of the population to be involved in your study”. Participants identified for this research were selected by employing non-probability sampling and purposive sampling techniques (Cohen et al, 2011:53). The purposive technique is also called “judgmental sampling” (Babbie, 2016:187). This sampling is based entirely on the researcher's judgment that a specific sample contains the most typical attributes of the population being studied (Adler & Clark, 2015:121). Non-probability sampling involves a non-random selection based on convenience or other criteria, where not every individual has a chance of being included, allowing the researcher to easily collect initial data (Creswell, 2014:34). All participants were purposively sampled. Grinnell and Unrau (2014:297) add that, in using a non-probability technique, the

units in a sampling frame do not have an equal chance of being selected for a particular study. This is particularly acute with interpretive/hermeneutic versions of the phenomenological method, where the semi-structured interview is almost hegemonic (Creswell, 2013:62). This is understandable – and indeed, sensible – given the focus in phenomenological methodology on first-person experience (Braun & Clarke, 2013:80).

2.4.3 Case study

The exploratory case study design was used to study present-day standards in examination management, both nationally and internationally. The researcher collected many documents relevant to the case study by pursuing combinations of procedures, such as examining, categorising, tabulating, testing, or otherwise recombining (narrative and numeric) evidence. According to Braun and Clarke (2013:80), the analysis of case study evidence is one of the least developed aspects of doing case studies. The researcher decided to use the collective case study type that, according to Fouche and Schurink (2011:322), “is an instrumental case study which may be extended to several cases.” The reason for using the collective case study type was to learn more about present-day standards being used in other similar institutions, more specifically, to get to know how examinations are conducted both nationally and internationally.

2.5 Data collection

In-depth interviews were conducted by using semi-structured interview questions and topic guides. “Data collection is the process of gathering and measuring information on targeted variables in an established system to answer relevant questions and evaluate outcomes” (Creswell, 2014:59). Leedy and Ormrod (2000:158) mention that qualitative a researcher may use multiple forms of data collection methods in any single study. Different kinds of data collection methods – interviews, case studies and literature studies – were used in this study. The quality of research reports depends on the authenticity of data collection. The collected data is the basis for compilation and analysis to reach conclusions.

2.5.1 Semi-structured interviews

Leedy and Ormrod (2000:15) define an interview as “collecting responses (verbal and non-verbal) from a case study participant; [they] are usually conversational and guided by the researcher’s mental agenda, as the interview guide does not follow the same verbalization with every participant interviewed”. There are three (3) types of interviews, namely: structured; semi-structured; and unstructured interviews. For the purpose of this research, the researcher chose semi-structured interviews.

In a semi-structured interview, the researcher sets the outline for the topics covered, but the interviewee’s responses determine the way in which the interview is directed. This is the most commonly used type of interview used in qualitative research and many studies illustrate its use. The semi-structured interview guide provides a clear set of instructions for interviewers and can provide reliable, comparable qualitative data. The strength of unstructured interviews is the almost complete freedom they provide in terms of content and structure. This is in contrast to semi-structured interviews where the researcher asks a predetermined set of questions, using the same wording and order of questions as specified in the interview schedule. An interview schedule is a written list of questions, open-ended or closed-ended questions, prepared for use by an interviewer in a person-to-person interaction (this may be face to face, by telephone or through other electronic media). Before visiting participants, the researcher prepared an interview guide with predetermined questions (Ellis, 2016:104). According to Ellis (2016:112), “semi-structured interviews facilitate the collection of rich and thick descriptions and a detailed exploration of topics from smaller samples”.

Interviews are the dominant tool for collecting qualitative data in social sciences research (Creswell, 2014:40) because they allow for probing participants’ experiences that could not be revealed by problem-solving tasks. In this study, the semi-structured interviews captured participants’ experiences that might have been the result of engaging. According to Ellis (2016:104), with semi-structured interviews, the researcher enters interviews with a firm overview of the relevant literature and has prepared numerous open questions. With this in mind, the researcher prepared pre-determined questions to be asked during the interviews. The primary disadvantage of semi-structured interviews is that they are time-

consuming for both the researcher and the participant (Braun & Clarke, 2013:80). After collecting the data, it was first edited (Creswell, 2014:75). Biases were acknowledged in the research report so that readers could take them into account.

According to Hernandez, Wambura and Ngunjiri (2013:75), “scientific research involving humans requires ethics approval from an Institutional Review Board (IRB)”. In this research, the researcher obtained ethical clearance from the University of South Africa (UNISA) to conduct field work before collection of data. The certificate of ethical approval is included as Annexure A. The researcher further applied for permission to conduct research from the Mpumalanga Department of Education (MDE), and it was granted. Please refer to the permission letter to conduct research from Mpumalanga Department of Education, which is attached as Annexure B. The researcher carried out qualitative interviews which are appropriate for a study that “investigates people’s reports of their subjective opinions, attitudes, beliefs, or reflections on their experiences” (Percy, Kostere & Kostere, 2015:78) and that emphasises staying close to the original data with minimal interpretation (Sandelowski, 2000:65). The goal was to gain direct knowledge of a range of people’s experiences about a topic or issue (Percy et al, 2015:42), which aligned with our purpose of gaining preliminary information about the research.

On the 18th of March 2019 at 13h00, the researcher made an appointment in person and through emails to the participants to meet them on 27th of March 2019 at 09h00, also on 16th of April 2017 at 09h00, again on the 17th of April 2017 at 11h00 and on the 18th of April 2019 at 10h00. They were provided with the dates of the start and finish of the interviews and had to choose dates which suited them. A day before the interviews, they were phoned to confirm the appointments. On 27th of March 2019, at 09h00, the researcher used the researcher’s own vehicle and travelled to the Mpumalanga Department of Education District office A to conduct one-on-one interviews with two (2) officials and one (1) security officer. The interviews were held in the boardroom. The interview schedule questionnaire is attached as Annexure C. A comfortable environment for the participants to feel safe to talk was created. The researcher began by using personal greetings. The participants were informed of the aim and objectives of the study. They were also informed that the research was not funded by any organisation. The participants were given an informed consent

form to read and sign if they agreed to the rights contained in the interview schedule. The letter of informed consent is thus included as Annexure D.

In addition, the researcher asked the participants for their permission to use an audio tape recorder and were informed that it was only used to ensure that the conversations between the researcher and the interviewees was recorded for later use for the purpose of analysis.

On 16th of April 2019, at about 09h00, the researcher travelled to another Mpumalanga Department of Education District office B to interview two (2) officials and one (1) driver. The researcher went through the identical procedure (explaining the purpose of the study and the features of informed consent) that was used with participants from the district office A of the Mpumalanga Department of Education. Then again, on the 17th of April 2019, at 11h00, the researcher interviewed five (5) officials in Mbombela Department of Education Provincial office. The same steps (explaining the study's goals and the requirements for informed permission) that were taken with participants from the district offices A and B of the Mpumalanga Department of Education were repeated with the new group of participants. On the 18th of April 2019, at 10h00, the researcher travelled to another Department of Education district office C in Mpumalanga Province and conducted the interviews with four (4) officials. With the new group of participants at Mpumalanga Department of Education district office C, the same procedures (explaining the study's objectives and the prerequisites for informed consent) that were used with participants from the district offices A, B of the Mpumalanga Department of Education and Mbombela Department of Education District office were repeated. The interviews took place at the offices of the department. The interviews allowed the researcher to interact closely with the participants.

2.5.2 Personal experience

Clandinin and Connely (1994:413) describe Personal Experience Knowledge (PEK) as a reflection of the flow of thoughts to immediate situations as it relates to the field of experience. In addition, PEK is a potent source of information, as evidenced by the fact that academic research interests may be based on professional, academic, personal, and developmental experiences. A crucial component of authenticity is

experience. In light of this, the following researcher's experiences were pertinent to the study.

The researcher has twenty-two (22) years of experience in the field of security. The researcher is currently employed by Independent Communication Authority of South Africa (ICASA) as a Security Manager since the 07th of August 2017 till to-date. The researcher was previously employed by Mpumalanga Department of Education as a Security and Risk Manager from 01 of March 2011 to 31 July 2017. The researcher was responsible for the protection of Grade 12 examination question papers in the Mpumalanga Province, Department of Education. Therefore, the researcher has the necessary experience with regard to the study topic as the researcher was also a former Police Officer (PO) who was responsible for the protection of dignitaries in Gauteng Province.

In terms of the relevant training, the researcher holds various courses such as Private Security Industry Regulatory Authority (PSIRA) certificate Grade "B", SAPS First phase of Basic Training, SAPS Tactical Policing: Level 1, VIP Protection Course, SAMTRAC course, National Diploma in Business Management, National Diploma in Policing, B-Tech degree in Policing and B-Tech degree in Security Risk Management. Therefore, the researcher is proficient with security terminologies hence his interest in pursuing this topic.

The researcher was able to access several materials, including security legislation and procedures, security manuals, security reports, and media articles on security topics because of his expertise in the field of security. The data gathered from these sources assisted the researcher in developing the conclusions and suggestions for this study. Due to the researcher's familiarity with security terminology from having studied security management as part of the researcher's qualification, the experience also aided the researcher in information search and definition of key concepts, among other tasks. This allowed the researcher to relate the study to the researcher's professional and academic experiences, and the researcher's accumulated knowledge. The researcher's experience was also beneficial during observation because the researcher was able to recognise the security measures currently being used by the Mpumalanga Department of Education to protect examination question papers while they are in its facilities and in transit to various

examination centres. The researcher's ability to quickly generate follow-up questions for both the participants and the researcher during the interviews was another benefit of the experience. As a result, the researcher's personal experience and knowledge were crucial to the study.

2.6 Data analysis

Qualitative analysis produces conclusions according to Schurink, Fouche and De Vos (2011:397). In doing so, it is necessary to condense the amount of raw data, separate the important information from the unimportant, look for important patterns, and provide a framework for explaining the main points of the data. When data are analysed by theme, it is called thematic analysis. The researcher “thematically analysed the interview transcripts, reading each one repeatedly to ensure that any identified themes were representative of study participants’ comments” (McGregor, 2018:110). Data analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense, recap, and evaluate data. The researcher analysed sources in the literature sample set through inductive content analysis by reading and rereading them. To analyse qualitative data, the researcher produced an interview summary form or a focus group summary form which was completed after each interview or focus group has taken place. The purpose of the analysis was to search for and identify text or phrases in the content which represented or discussed the keywords ascribed to them or associated with one or more of the other keywords in the semi-structured interview. An essential component of ensuring data integrity is the accurate and appropriate analysis of research findings.

The thematic analysis model was adopted as a tool for data analysis in this study. With this step, the researcher moved from casual, observational note-taking activities and code identification to systematic coding by labelling the text. The transcribed data from open-ended questions asked in focus group interviews were coded. Braun and Clarke (2013:207) explain that “data derived codes can also be seen as semantic codes as they are based on the semantic meaning of the data (i.e., they mirror participants’ language and concepts”. Select quotations from the data were used to develop the themes, appreciating that there should be enough quotes to provide evidence that the claim of a theme is sound; no quotes were used

twice (McGregor, 2018:89). Essentially, the codes-to-theory model for qualitative inquiry by Saldaña (2015:45) allowed the author to code, categorise, and align sources with the themes of participants' responses during the interviews. After these themes were identified, the researcher assigned codes to categories. The researcher analysed data manually to show the frequency of text through manual coding for reasons of consistency and validity of that particular code or category.

2.7 Reliability and validity

According to Sarantakos (2002:83), consistency and reliability are the same concepts. Reliability refers to a tool's capacity to provide trustworthy findings. Furthermore, reliability is defined as dependability or consistency by Kraska and Neuman (2008:191). Therefore, a method is considered dependable if it consistently yields the same outcomes, even when used by different researchers. For the purpose of this study, reliability and trustworthiness were strengthened by using guidelines recommended for descriptive qualitative research. Denzin and Lincoln (2011:105–117) suggest a framework of four criteria as a part of the constructivist paradigm paralleling “validity” and “reliability” in quantitative research. Conferring to Lincoln and Guba (1985:90), trustworthiness in a qualitative study is determined by four indicators, credibility, transferability, dependability, and confirmability, which reflect validity and reliability in qualitative research.

Validity, according to Sarantakos (2002:78), is the capacity to create outcomes that are consistent with theoretical principles; in other words, to produce accurate outcomes and measure what is intended to be assessed. In contrast, Delpont and Roestenburg (2011:171–205) refers to validity as “the truthfulness, accuracy, authenticity, genuineness, and soundness as synonyms for validity” and emphasises the fact that these terms describe validity. A valid measure produces true results that reflect the true situation and conditions of the environment it is supposed to study. The researcher made sure the information gathered through observation and interviews was reliable.

2.7.1 Transferability

According to Munyai (2022), “transferability” refers to the ability of research findings to be utilised in a similar setting in order to address the research problem. The

Examination Directorate officials' knowledge and abilities were obtained by the researcher through one-on-one telephone conversations. The research questions were structured to get unique responses from each participant. The consistency of information received from test administrators allowed the researcher to compare the results from each participant. Transferability was confirmed through a comparison of one-on-one interview results.

In addition, "Transferability" is the ability to apply the results to different contexts. This is called "external validity" in quantitative research and is used to prove that the study's conclusions are applicable to other contexts (Guba & Lincoln, 2011:72). This is achieved by providing a "rich description" of the research findings along with an overview of the potential applications of the findings to different studies and situations. Transferability in qualitative research is defined as the degree to which research findings can be applied in different research contexts, as opposed to external validity in quantitative studies. It is established by meticulous documentation of the research and its context within the larger body of research literature (Babbie, 2016:80).

2.7.2 Dependability

The fact that two researchers independently discovered comparable themes that were then examined by a third researcher lends weight to the idea of dependability, which relates to whether the conclusions are consistent and reproducible given the available data. Dependability relates to the consistency and repeatability of the outcomes, much like reliability does in quantitative research (Guba & Lincoln, 2011:23). An external auditor often examines and assesses the research procedure and the reliability of the findings to show this. The researcher must create a clear link between the data and the actions taking place at a specific site that produced the data in order to show its dependability. Dependability refers to the likelihood that the study will be repeated by other researchers and that the findings will be trustworthy.

Dependability is a measure of the calibre of the collected data (Munyai, 2022). The researcher outlined every step of the process, including choosing study participants, gathering data, analysing it, interpreting it, and reporting the findings. The data

management and collection techniques used in the study produced enough information to enable the researcher to draw conclusions.

Dependability is related to the documentation of the whole process of the study. The process of recording the interviews for this study resulted in dependability and transferability. Through the use of a journal and conversation recordings, the researcher examined his biases, beliefs, and values that might have an impact on the research in order to establish reflexivity in the study (Wantenaar, 2022).

- **Self-inclusion/self-exclusion**

For the purposes of this study, inclusion included all male and female Mpumalanga Department of Education employees working at one of the department offices, between the ages of 18 and 65. They are all aware of the security flaws associated with leakage of Grade 12 test question papers. Fifteen (15) examination authorities were interviewed after they responded. The selected persons arranged times and dates for interviews with the researcher. A data saturation led to the exclusion of fifteen (15) people from the research. Employees who discouraged others from participating or who had expectations of receiving compensation were excluded.

2.7.3 Confirmability

If results can be independently verified by other people and are unaffected by the researcher's values, this is referred to as confirmability. The researchers searched for negative situations that contradicted each of the themes in order to achieve these requirements. These all contribute to the validity and reliability of the study. Confirmability of the results employed an audit trail to make sure that the report's description of the data collection and data analysis methods were accurate (Nowell, et al, 2017:3). The researcher also described how the study was coded and how the data were collected, and the procedures of recoding, theming, and theme naming were appropriately covered. This conversation makes it very evident that the researcher has adhered to the study direction and has not taken the initiative to modify the research direction.

2.7.4 Credibility

For this study, the researcher included quotations from the participants' interviews that were transcribed verbatim to support the validity of the study. After analysis, the researcher preserved the raw data materials for a fair amount of time (Creswell, 2014:140). In this study, the participants' information was saved by the researcher in a locked filing cabinet and data stored in a computer were secured by a computer password and be destroyed when the study was over. Member verification was done to improve the validity of the data and analysis depending on the sample size. Creswell (2014:251) claims that the purpose of member checking was to assess the validity of the qualitative results by having participants re-evaluate the final report or descriptions or themes to see if they felt that the findings were accurate.

2.8 Ethical considerations

Ethics, according to Champion (2000:102), are the normative behaviours of good and wrong, the ideals of professional organisations. The prescription of an ethical code of behaviour that is normatively required of the members of a professional organisation is included in the field of ethics. The UNISA Policy on Research Ethics is discussed in this section together with other ethical issues (UNISA, 2007:11). Therefore, in this study, the researcher observed the UNISA policy on ethics. Therefore, ethical clearance to conduct the study was accorded by UNISA CLAW Ethics Review Committee, through ethical clearance. The Ethical Clearance Certificates is attached as Annexure A. According to the UNISA research ethics policy, ethical clearance should be in place before proceeding with the planned research. In this regard, the researcher applied for ethical clearance timeously to begin the research process. Participants signed a consent form indicating their voluntary participation in the study (consent form attached as Annexure D) and semi-structured interviews (semi-structured-interview schedule form attached as Annexure C). The consent form assured participants that their identities would be protected using pseudonyms, that they could discontinue their participation whenever they wished to do so and withdrawal from the study would not affect them in any way. Lastly, there was no risk involved for any participant. In terms of ethics, neither children nor animals were used in the study.

2.8.1 Confidentiality

The author signed a confidentiality agreement to guarantee that the privacy of participants was respected by ensuring that their identities and responses are not revealed and that the data records of participants and firms are confidential (Babbie, 2016:89). Further, participants were given an anonymous user ID that was used for group identification during the focus group and interview processes. Access to any proprietary, intellectual property and copyright aspects of documents was organised through the owner-manager.

The proposer used pseudonyms for participants as well as the institutions involved. As a rule, no third party that expressed an interest in analysing data obtained by the researcher was allowed access to the data, unless this was known before the data were collected and participants were expressly asked to consent to such use of data. The researcher ensured that written permission, usually after the aim of such analysis, was made known by employing a proposal. Creswell (2017:96) suggests that raw data be kept for a period of five to ten years in a safe environment, such as a locked room or safe. Confidentiality was deemed to be significant for the current study and therefore was carefully respected.

2.8.2 Non-maleficence

This means “to not harm”, whether done intentionally or unintentionally. It denotes an awareness of any potential harm participants may suffer during the study (Hardwick & Worsely, 2011:30). To ensure no harm to participants, the author was guided by Babbie’s (2016:62) guidelines. This included a general agreement between the researcher and participants about the appropriate and inappropriate conduct in the research process, e.g., participants were not paid for any time and effort they gave for answering questions. In addition, the researchers conducted a thorough investigation of the nature and scope of risks and benefits inherent to the study. This enabled the author to make the judgement as to whether any risks to participants were minimised and justifiable, as well as to provide participants with the information they need to decide whether to take part in the study.

2.8.3 Beneficence

The researcher ensured that participants in this study were treated ethically by having their decisions respected, being protected from harm, and having their well-being ensured (Creswell, 2017:60).

2.8.4 Voluntary participation

Participants were advised that their participation in the interview was entirely voluntary and that they may withdraw at any time. The researcher abided by good ethical research practices, and participants were not coerced to take part. The principle of reasonable expectation was observed by the author (Babbie, 2016:62). “This requires consideration of what information can reasonably be expected from a person in research participation” (Babbie, 2016:63).

2.8.5 Transparency

The aim, purpose and objective of the study were transparent to the participants, with no misleading/misrepresentation of facts by the researcher (Padgett, 2017:79). The researcher explained the aims and objectives of the research to the participants before the commencement of the interview, and if they were not comfortable in answering any questions during the interview, they did not need to answer the question.

2.9 Limitations of the study

There were several limitations to the present study. Key limitations were the dependence on purposive and snowballing sampling. One of the limitations was access to participants who postponed the dates. Participants had other commitments and could not adhere to the appointments. The researcher waited for the participants to complete their daily schedules to avoid rescheduling. Time constraints were also a limitation in that some of the participants did not show up as scheduled. The researcher had to reschedule the meeting many times before being successful. Future research could include conducting more in-depth interviews that focus primarily on researchers in other fields. These suggestions for future research can advance the understanding of examination theft research and further demonstrate the power and consequences of sharing personal experiences. The

last limitation was that some participants did not respond to all the questions, while others did, making it difficult for the researcher to draw accurate conclusions about the various features.

2.10 Summary

This chapter included research methods, information validity and dependability, the importance of this study, ethical issues, and the study's limits. It was essential that the researcher and the participants maintained the secrecy of the data they had obtained. The UNISA code of ethics was respected. Participants who had taken part in the research were given the chance to engage voluntarily without being coerced. Interviews were carried out skilfully and, as a result, participants expressed satisfaction when the interview was over. In this study, achieving the study's objectives was the researcher's main objective. The theoretical framework and literature review are covered in the next chapter.

CHAPTER 3: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

3.1 Introduction

The previous chapter dealt with research design and research approach which paved the way for the literature review on examination malpractices and examination question paper leakage. Exploring theories and proponents thereof, an overview of risks and vulnerabilities, understanding the concept of examination, the problems associated with examination leakage, and how it manifests beyond the borders of South Africa were explored. Finding solutions to examination leakage required extensive research into the problem. The literature study contributed to finding such solutions.

It then conceptualises examination question papers and considers examination question papers leaks from an African viewpoint in order to make comparisons with the perspectives of the BRICS countries. The impact of examination question papers leaks in South Africa was described. Discussions also included the purpose of exams, and the effects of examination question papers leaks in South Africa. Finally, it dealt with the sanctions for exam paper leaks.

3.2 Theories and the proponent of the theories as a basis for the manifestation of examination leakages

Robert Merton's anomie theory has seen many interpretations and adaptations over more than 70 years of its existence. The strain theories found the anomy theory beneficial to explain crime in a criminological context (Agnew, 2001:38).

Theory is defined as a set of interrelated constructs, concepts, definitions, and propositions that present a systematic view of phenomena by specifying relations among variables. This is used to explain and predict the phenomena and provide a common set of principles and standards that future researchers may build on to guide their professional and scientific work. This definition refers to three (3) assumptions, namely:

- A theory is a set of propositions consisting of defined and interrelated constructs;

- It sets out the interrelations among a set of variables (constructs) and, in so doing, presents a systematic view of the phenomena described by the variables; and
- A theory explains phenomena by specifying which variables are related to other variables and how they are related, thus enabling the researcher to predict variables from other variables (Kivunja, 2018:44).

As explained by Jaccard and Jacoby (2010:45), each theory, its assumptions, tenets, assertions, propositions, and predictions,

“comprise a common frame of reference that can be used by researchers in a particular discipline relating to what is understood to be true or a basis for searching for meaning and truth in our lived experiences and a well-grounded guide for research within the field”.

Alvesson and Gabriel (2013:56) opine that a theoretical framework is a structure which holds or strengthens a hypothesis/research problem and illuminates the reasons for carrying out the research. Examples of teacher/examination official-related methods of cheating include school authorities colluding with examination officials to assist students and the leaking of examination papers. In addition, Imenda (2014:43) describes a theoretical framework as a theory researchers choose to guide their research. Thus, a theoretical framework is the application of a theory, or a set of concepts drawn from the same theory, to explain an event, or shed some light on a phenomenon or research problem.

Nevertheless, for the rationale of this research, three theories that could be followed by the Department of Education in Mpumalanga Province in order to lessen the leakage of Grade 12 examination question papers at in Mbombela municipality Mpumalanga Province South Africa were followed. The three hypotheses are as follows:

- Institutional Anomie Theory (IAT).
- Agnew’s general strain theory.
- Deterrence theory.

3.2.1 Institutional Anomie Theory (IAT)

The Institutional-Anomie Theory (IAT) of Messner and Rosenfeld, and Agnew's general strain theory, which were both derived from the anomie theory, are discussed as they relate to the examination leakage phenomenon. Miller, Agnich, Posick and Gould (2014) argue that the impact that social structures have on human behaviour facilitates cheating across various contexts. Because the focus of strain theories is directed at the disjuncture between opportunity structures and the desire to achieve, they Miller et al (2014), concur with Merton that "frustration and thwarted aspirations lead to the search for avenues of escape from a culturally induced intolerable situation: or unrelieved ambition may eventuate in illicit attempts to acquire the dominant values". Thus, people will engage in criminal conduct (or cheat the system) if they are unable to achieve economic success through legitimate means.

Miller et al (2014), explain that variations in cheating across different contexts are related to the effects of social structures on human behaviour. Messner and Rosenfeld's "Crime and the American Dream" (1994 cited in Miller et al, 2014), an extension of Merton's anomie theory, argues that the American obsession with economic success leads to high levels of criminogenic anomie. Messner and Rosenfeld (2001 cited in Miller et al, 2014) postulate that, when economic deprivation is combined with weak non-economic institutions, criminogenic conditions are prevalent. Muftic (2006 cited in Miller et al, 2014) found that American born students, with higher adherence to the cultural values of universalism and a fetish of money, were more likely to cheat. Gordon (1975 cited in Miller et al, 2014) adds that the IAT also applies to the school environment, as pressure to achieve creates stress for students which causes them to behave more aggressively.

Social controls in schools are being undermined by the global rise of standardised testing. Teachers and administrators are therefore less able to effectively control their students' behaviour as a result of the education system focusing on economic concerns and neglecting to educate the "whole student" (Miller et al, 2014). As the IAT applies equally to the education environment, pressure to achieve causes stress and the obsession with economic success leads to high levels of criminogenic anomie that includes cheating by students.

Building on Merton's Strain Theory, Institutional Anomie Theory emphasises the role that societal institutions and their values play in the rise in crime. Institutional Anomie Theory suggests that the drive to succeed, including students' desires to pass exams, can push them to commit crimes, such as question paper theft, particularly in countries where material success is greatly prized. Because people in these countries may resort to illegal means of achieving economic success, this leads to a rise in crime rates and the undermining of social institutions (Kellegan & Greeney, 2020:229).

Bajinath and Singh (2019:3), contend that students' obsession with performance, pressures and incentives motivate them to cheat during examinations. This includes the pursuance of; academic accolades; scholarships or admission to postgraduate programmes; expectations of success by family and social circle; and competitive job environments. It also may be due to personal greed, dishonesty, and an underdeveloped moral compass.

The foremost reason for cheating is when examination results are used for competitive purposes that could have a profound impact on the course of an individuals' life, especially for future prospects. Economic circumstances dominate the reason for cheating, but they also include the potentially low risk of getting caught, high expectations of parents and family members, and the pressure to get into competitive areas of tertiary qualifications, such as the medical profession, law and engineering (Kellegan & Greeney, 2020:224).

Miller et al (2014), report that "principals of schools with high numbers of economically disadvantaged students also report higher levels of cheating, which indicates that economic disadvantage may strain schools' abilities" to effectively combat cheating.

3.2.2 Agnew's general strain theory

Agnew's general strain theory is a criminological explanation that can be logically applied to cheating behaviour in pursuance of academic excellence. Smith, Langenbacher, Kudlac and Fera (2013) and Robert Agnew (1985, 1992) furthered Merton's anomy theory to exceed the traditional disjuncture between economic aspirations and expectations by stretching the concept of strain to encompass

additional sources of stress or frustration. Deviance is prompted by an inability to cope, in accordance with lawful means, with negatively perceived events that produce negative emotions, such as anger.

Smith et al (2013), analysed Agnew's general strain theory which identified the following three (3) deviance producing sources of strain:

Strain is produced from a failure to achieve positively valued goals

In support of his deviance producing pathway, Agnew describes three (3) strain-producing subtypes:

- (a) Keeping true to the traditional view of the strain concept, he postulates that, when a wide gulf exists between an individual's aspirations and expectations, it may give rise to stress.
- (b) Expanding on the classic view of strain, the focus on idealistic goals would include more imminent goals. These goals are not necessarily aimed at achieving monetary success.
- (c) Personal goals not achieved because of blocked opportunities or personal inadequacies. Poor study habits or a learning disability could be contributing factors.

Second, strain can be produced when a wide gap occurs between expectations and actual achievements

Realistic goals should be set to eliminate frustration, anger, and disappointment when a person fails to achieve a goal that they realistically expected to accomplish. A student, who reasonably expects to pass a test but fails, may be driven to cheat on future tests.

Strain occurs when an individual perceives an outcome to be unjust or unfair.

A person may compare themselves unfavourably to others in the same situation and believe that their outcome was unequal to their effort. Strain is also produced by the removal of positively or negatively valued stimuli. Individual responses to traumatic or toxic situations may be very different.

Bajnath and Singh (2019:2) report on the Vyapam scam, one of the biggest education scams in the history of Indian education. The scam involved test-fixing of the admission examination for certain medical schools and administrative positions in the state. The cause of this scam may have been the wide gulf between individual candidates' aspirations and expectations that gave rise to stress and resulted in cheating behaviour.

According to Smith et al (2013), the hypothesis highlights how emotional reactions to stress, such as rage and frustration, can cause people to commit criminal acts as a coping technique. The Institutional Anomie Theory focuses on a wider variety of strains and unique reactions to them, extending Merton's Strain Theory. According to this theory, people suffer from stress if they cannot accomplish important tasks, such as passing their Grade 12 final examination. This stress causes Grade 12 learners unpleasant feelings, such as rage or frustration, which can make them cheat during final examinations or buy final examination question papers from corrupt exam officials to accomplish their objectives. This connects feelings of stress and unfavourable emotions with criminal activity. People who are under a lot of stress and do not have healthy coping strategies may turn to crime as a way to deal with their emotions. In addition, when students believe they are taking part in an unjust exam system where cheating is rampant, this can lead them to cheat in subsequent exams or get involved in examination related misconduct.

Some students experience strain when they feel that they are participating in an unfair examination system where cheating is endemic. In this situation, they might believe that their outcome was not equal to their effort and be prompted to cheat in future examinations.

3.2.3 Deterrence theory

Deterrence theory suggests that a specific punishment for cheating will deter offenders and others from committing future crimes. In a legal context, deterrence refers to a situation in which a person considers committing criminal conduct "but decides against it or limits it because he or she perceives a risk of legal punishment and is afraid of the consequences" (Gibbs, 1986:45). This means that the harsher the punishment, the more likely a rational person will refrain from unlawful conduct.

Deterrence theory was revived when criminologists began to speculate about the topic again, not only as an explanation for why people commit crime, but also as a solution to crime. The principal assumptions made by the theory include a message relayed to a target group, secondly, the message the target group receives and perceives it as a threat, and lastly, the group makes rational choices based on the information received. The conjecture is made that everyone will be threatened by the sanction for the crime. But, for some people, crime is a way of life and they become used to coming in and out of jail. In addition, people who are addicted to drugs or alcohol may not make rational choices.

It must be noted that deterrence theory is both micro and macro level-based theory. It proposes that individuals who commit crime and are caught and punished will be deterred from future criminal activities. It also proposes that “the population will be deterred from offending when they are aware of others being apprehended and punished” (Tomlinson, 2016:33).

According to the deterrence theory, increasing the severity of punishments is the most effective approach to preventing crime (Tomlinson, 2016:36). It explains how harsh punishments work to discourage criminal activity. The three elements that make up the deterrence theory of punishment are as follows:

- **Certainty:** The victim must be aware that punishment will be meted out. Therefore, in this context, Grade 12 learners must be made aware that, should they be caught involved in question paper scandals, they will be punished should they be found guilty.
- **Celerity:** In order to prevent the repercussions, the penalty needs to be applied as soon as possible. In this study context, disciplinary processes for learners and exam officials caught in examination scandals should be processed within a specific period and should be treated as matter of urgency with penalties attached to perpetrators in order to serve as a deterrent.
- **Severity:** The penalty needs to be harsh enough to discourage future offenders from committing the same offence. In the context of this study, the theory implies that harsh sanctions should be imposed on learners (for example, suspension of learners from sitting for Grade 12 examinations for a particular period) and

officials (who should be dismissed from employment and be given jail sentences). These sanctions will discourage future offenders from partaking in Grade 12 examination question paper scandals.

The likelihood that a criminal will be apprehended, which determines the certainty of punishment, is often the weakest component of deterrence. The chance of punishment rises with an increase in this element, strengthening the deterrent effect of crime. This result is corroborated by empirical observation. As a result, policies that boost police presence during the Grade 12 examination processes should be expected to reduce crimes, such as the theft of Grade 12 examination papers, because of the increased likelihood of detection and apprehension. In some circumstances, the deterrent may be harsh to lower the rate of offences. Laws that harshly punish people who steal Grade 12 examination question papers will lower the rate of these offences. Similarly, shorter lead times to facilitate speedier trials of examination question paper crimes will reduce the commission of these crimes (Crump, 2018).

In this context, learners will be deterred from stealing question papers once they realise that there will be a serious punishment or sanction like being suspended at school or sent to jail. The fear of attending courts and long trials will deter the students from stealing the question papers.

3.3 The vulnerabilities and risks of the leaking of examination papers

Examination malpractices and the leaking of examination papers, in particular, hold certain vulnerabilities and risks. Kennasecurity (2021) distinguishes between risk, threat, and vulnerability. Risk is the potential for loss, damage or destruction of assets or data caused by a threat. Threat is a process that magnifies the likelihood of a negative event, such as the exploitation of vulnerability. Vulnerabilities, on the other hand, are weak spots within an environment and assets that are exposed to potential threats and increased risks. A risk-based approach to vulnerability management isolates an organization's top risks for particular attention.

Vulnerabilities or weak spots in the context of examination leakages could be found in system defects, poor management of examination processes, people in the education system or institution, and students cheating.

Risk, as defined by ISO 31000, is the “effect of uncertainty on objectives” and an effect is a positive or negative deviation from what is expected. The traditional definition of risk combines three (3) elements: a potential event and then a combination of its probability with its potential severity (Praxiom, 2018). Airmic (2010), mentions that the definition set out in ISO Guide 73 is that risk is the “effect of uncertainty on objectives”. Placing it in context means that an effect may be positive, negative or a deviation from the expected. Risks can also be described by an event, a change in circumstance or a consequence. In the context of this research, the risk would be examination question papers leakage.

Crossman (cited in Baijnath & Singh, 2019:4), classifies the risk of examination cheating as an international issue which demands an international response, and Baijnath and Singh (2019:5) ask the question: “How many institutions of higher learning have identified examination cheating as a risk on their Strategic Institutional Risk Registers?” All institutions of higher education should scrutinise the integrity and credibility of institutional examination processes and create an organisational awareness of the risks of cheating, fed by technology, human greed and student creativity. The management of the Wollongong University in Australia pointed at the risks brought about by technology in examination cheating, saying that the digital age brought about more opportunities for cheating (Baijnath & Singh, 2019:2).

Kellegan and Greeney (2020:232) believe that tackling real and potential security breaches require technical expertise and budget. Although funding technology experts may be expensive, it can prevent potential damage caused by the questioning of the credibility and qualifications of an institution. Baijnath and Singh (2019:3) caution that institutions of learning will have to establish appropriate treatment plans and resource risk mitigation strategies. The Makhare University degree fraud of 2015 set a precedent of what happens when risk assessment initiatives are not in place. In a risk mitigation initiative for examination fraud, the University of Maastricht developed a number of multiple-choice examination papers.

3.4 Conceptualising examination question papers

The concepts of examination, examination leakage and examination malpractice are defined below.

3.4.1 Definition of examination

Suleman, Gul, Ambrin and Kamran (2015:166) defines examination in the context of scrutiny, inspection, inquiry, investigation, and measurement. Nnekwu and Odochukwu (2016:48) outline examination as a “process of testing and judging by standard”. This means that the learner’s level of competence of the subject is tested. Nnam and Inah (2015:52), maintain that examination is a yardstick against which students’ competence and progress are formally measured and appraised in the education sector. Tawiah, Alberta, Bosman and Ata (2015:145) state that examination is a procedure of assessing the amount of learning an individual has achieved over a certain period.

Examination is a tool used around the education systems (Akaranga & Ongong, 2013:88). Sadiq and Saeed (2017:102), concur that effective examination is the key to quality education. It is an exercise in academia to determine the level of students’ understanding of particular concepts encountered during the learning process (Funso, 2016:624). However, Mashanyare and Chinamasa (2014:47) indicate that an examination is used as a tool for objective evaluation and assessment of “students’ learning outcomes, ability to demonstrate knowledge, understanding and potential for other employment skills”. An examination is a practical way of determining the extent at which a student has achieved instructional objectives in a particular course of study, according to the planned standards (Suleman et al, 2015:166). Bhirangi and Bhor (2016:28) express the view that examinations prepare learners in their quest for knowledge.

Njoku and Njoku (2016:161) explain that “examination is one of the major means to assess and evaluate student’s skills, knowledge and attitude in both general and specific areas of studies” and Dabone, Graham, Fabea and Dabone (2015:145) describe an examination as an authentic process used to ascertain the degree to which learning targets have been inbred by students so that they can be offered some assistance in their future studies. Examination is a formal test given to students to evaluate their knowledge in a given subject (Kemunto, 2016:11).

Munachonga (2014:3) indicates that examination is when a student is tested on a certain subject in order to establish the extent of their understanding and knowledge

of a subject. An examination is also a measuring instrument designed to verify both a candidate's value and the value of the teaching outcomes (Suleman et al, 2015:167). Anzene (2014:2), mentions that examinations consist of a formal test of one's knowledge or ability in a particular subject especially by means of answering questions or oral exercises. The regulations of the Department of Basic Education (DBE, 2014:3) define examination as "the National Senior Certificate examination conducted at the end of the year".

For the purpose of this study, examination means the formal instrument measuring the mastering of a subject. In the context of this study, examination is a tool used by high schools in Mpumalanga Province South Africa to test the knowledge and understanding of learners on what has been taught over the academic year.

3.4.2 Examination leakage

The leakage of examination question papers manifests in many ways and for various reasons. Makaula (2018:54, 59) and Muchai (2014:10), state that question paper leakage occurs when learners have prior knowledge of the questions that they will answer in an examination. It involves getting examination questions illegally before the start of the examination.

Mashanyare and Chinamasa (2014:47) define question paper leakage as "illegal infiltration of an examination question paper from its system or accessing of the examination question paper by a learner before the paper is officially opened in the examination room." Gbagolo (2011:3), states that examination leakage is when question papers are seen by learners before the commencement of the examination. Examination paper leakage occurs when a learner or any unauthorised person gets unauthorised access to the contents of a question paper before writing the examination (Kobiowu & Alao, 2005:44; Muhammad, 2015:28).

Kobiowu and Alao (2005:44), explain that the sources of leaking question papers in public examinations include: the examiners, who set the questions; officers of the examination body, who process the question papers, handle the printing arrangements and transport; the printers of the question papers; the custodians who keep the question papers; and the supervisors. When the content of an examination or part of it is disclosed prior to taking the examination, this is regarded as

examination leakage (Maheka, 2015:16; Ushie & Ishanga, 2016:60). Muhammad (2015:29) believes that examination leakage occurs when learners access the contents of the question paper before the initial examination period. Examination leakage is a proven case of prior knowledge of the content of examination questions (Ufuoma, 2015:63).

The DBE (2014:1) describes cheating as dishonest acts carried out by candidates “that are identified before the commencement of the examination, while the examination question paper is being written or after the examination is written”. These acts include knowingly making a false statement in respect of the authenticity of a particular component of the internal assessment in a subject, or the internal assessment for the subject as a whole.

3.4.3 Examination malpractice

Mohlala (2005) reported that 61 educators were found to have been involved in matric examination cheating practices in Mpumalanga. They were from state as well as private independent schools across Mpumalanga Province.

Examination malpractice is a deliberate attempt to offer candidates an unfair advantage in an examination (Andafu, K’Odhiambo & Gunga, 2019:3). The term “examination malpractice” has been defined by Ituma, Nnandi and Nche (2014:2) as “any act of cheating or dishonesty in or outside examination halls aimed at gaining an advantage”. Examination malpractice is also defined as any form of cheating, like copying from one another, bringing in prepared answers, collaboration with the invigilator/lecturer, impersonation, illegal removal of answer scripts, manipulation of registration forms, the purchase or sale of certificates, as well as bribing and soliciting for help during and after an examination (Ituma et al, 2014:2). In addition, an “examination irregularity” means “any error, act or omission, or any alleged event, act or omission, which may undermine or threaten to undermine the integrity, credibility, security or the fairness of the examination process” (DBE, 2014:3).

Mthethwa, Govender, Shoba and Nombeme (2015) reported on matric examination malpractices in South Africa and found that examination cheating in certain schools in KwaZulu-Natal has been going on for years. Cheating included teachers and

invigilators providing answers to the learners. However, Ushie and Ishanga (2016:59) describe examination malpractice as a deliberate act of wrongdoing, contrary to the rules of an examination, designed to give a candidate an undue advantage.

The former Gauteng Education MEC, Panyaza Lesufi, mentioned that since the inception of COVID-19, learners have been using new methods to cheat during the examinations. Examples of these are: hiding answers in their masks, smart watches, and even on their medical certificates. During the November 2020 matric examinations, learners were caught cheating using their cell phones and crib notes (Seleka, 2020).

Examination malpractice is any illegal act performed by a candidate alone or in collaboration with others, such as “fellow students, parents, teachers, supervisors, invigilators, printers and anybody or group of people, before, during or after examinations in order to achieve illegal and unfair marks or grades” (Suleman et al, 2015:167). Nnam and Inah (2015:53) are of the view that examination malpractice is the direct or indirect use of illegitimate means to pass an examination/test to obtain grades or certificate(s) and the unlawful assistance rendered to students or candidates to attain an unmerited advantage before, during or after a knowledge competency testing exercise or competition.

Govender (2015) reports that aspects of malpractice, such as “group copying”, and collusion between teachers and their students, were uncovered in seven of the provinces of south Africa during the 2014 matric examinations. Mail & Guardian (2005), states that almost 900 Mpumalanga matric pupils, who had their 2004 exam results nullified for allegedly cheating, would get a second chance. This follows a finding that the learners were assisted by teachers and invigilators.

Examination malpractice is an improper or dishonest act in an examination to secure an unmerited advantage (Dada, 2014:21). Phiri and Nakamba (2015:325), contend that examination malpractices are illegal acts committed single-handedly, or in collaboration with others, such as fellow students, parents, teachers, supervisors, invigilators or other groups of people before or after examinations in order to obtain undeserved marks or grades. The discussion that follows puts examination leakage,

and the people facilitating these acts, into context.

3.4.4 Security risk factor and security measures

Amundrud, Aven and Flage (2017:286) define security risk factor as “the relationship between threats towards a given asset and these assets vulnerable to the specified threat”. In this context, are those risk factors that give rise to the leakage of the Grade 12 exam questions paper such as, deployment of same security guards over and over, poor infrastructure, lack of vetting for officials involved in handling of the question papers, temptation to sell question papers and lack of training on handling of question papers, bribery, corruption, theft, poor safeguarding of question papers, too many persons handling question papers and making copies of question papers.

Alshboul (2010:2) defines a security measure as an “intention of implementing controls and policies to guard information security objectives and information assets. Security control reduces the impact of security threats and vulnerabilities to a level acceptable to the organisation. In this context, the aim of implementing security risk control measures is to prevent examination question paper leakage.

3.5 Examination leakage perspective in Africa

The study discussed the manifestations of examination leakage at university level in African countries, such as Nigeria, Zambia, Kenya and Ghana, because there is a dearth of information about examination leakage at matric level. Beneath this sub-heading, the researcher discussed the African perspective of leakage of examination at schools. The following are four African countries, namely: Nigeria, Zambia, Kenya and Ghana were used in this study to ascertain the perspective of examination leakage in Africa.

3.5.1 Nigerian perspective on examination leakage

Nigeria has experienced examination leakage for decades. It is common knowledge that, in the last two (2) decades, Nigeria has witnessed a shocking rate of increase in incidents of examination misconduct (Nnekwu & Odochukwu, 2016:48). Examination leakage is a problem which has devalued the quality of the Nigerian

educational system, from primary school levels to tertiary institutions of learning (Dada, 2014:20). Gbagolo (2011:1), concur that examination leakages have reached a stage where it has become a threat to the credibility of the educational system.

Nwadike and Adimonyemma (2015:15) indicate that examination malpractice has become a rampant global phenomenon which includes the Nigerian educational system. Muhammad (2015:3) believes that examination leakage in Nigeria is a concern not only for teachers and school administrators, but also other citizens, parents, employers, and even international organizations.

Ifeakor and Anekwe (2010:357) maintain that examination leakage is endemic to the Nigerian education system led by the unethical values of students (Nwadike & Adimonyemma, 2015:17). Dada (2014:20) argues that examination leakage is a norm at all levels of the Nigerian education sector. This diminishes the quality of education in Nigeria as the education sector does not have the capacity to effectively deal with the problem of examination leakage (Raji & Okunlola, 2017:4).

Njoku and Njoku (2016:164) explain that examination leakages defeat the goals of education. Despite the importance attached to examinations in schools, and the stringent rules and regulations governing the conduct of examination processes and procedures, leakages are very prevalent in Nigeria (Nwadike & Adimonyemma, 2015:16).

The education sector in Nigeria has been tarnished through examination malpractice, resulting in qualifications losing their integrity, and undermining the education system. Learners who cheat obtain qualifications through any means rather than through the fair demonstration of skills, knowledge and understanding of the subject. This type of attitude has a negative impact on the education sector, employers, the labour force, and eventually the economic status of the country (Ushie & Ishanga, 2016:59).

3.5.2 Zambian perspective of examination leakage

Zambia has, over the years, experienced an increase in examination leakage (Phiri & Nakamba, 2015:327). Maheka (2015:7) states that in 2012, the Examination

Council of Zambia (ECZ) recorded five hundred and forty-two (542) cases of examination leakages. Seven (7) of these cases were reported at grade seven, two hundred and twenty (220) at grade nine, and three hundred and fifteen (315) at grade twelve. Maheka (2015:6) remarks that new and ingenious methods of cheating come to light every examination season. Although the schooling system in Zambia does not experience the same levels of examination leakage as Nigeria, it is evident from the sources studied that Zambia is experiencing worrisome levels of examination leakages.

Munachonga (2014:10) reveals that parents in Zambia who want good grades for their children go to the extent of bribing their way through the system, the teachers, and the administration for unearned grades. Teachers have to deal with learners who do not work but want to be praised and receive undeserved grades.

Maheka (2015:3) maintains that some teachers are involved in examination leakages because of the financial benefits gained from such illegal transactions. More role-players motivated by financial or other personal gain are getting involved in examination leakages. These include parents, teachers, invigilators, and school principals. Teachers who are lazy are also more likely to get involved in examination leakage, since a good examination pass rate would be to their credit.

3.5.3 Kenya's perspective on examination leakage

Owenga, Raburu and Aloka (2018:245) argue that "there has been a significant increase in examination cheating among students in public schools in Kenya, especially in Kisumu City". However, little has been done to curb this practice (Owenga et al, 2018:245). Apart from it being illegal, cheating in examinations has a negative effect on academic standards at both institutional and individual student level (Shibo & Gori, 2017:404).

Examination leakage in Kenya is a continuing problem that has prompted the national examinations body in the country, i.e., Kenya National Examination Council (KNEC), to institute a series of measures to combat it (Andafu et al, 2019:2). Despite all the efforts that have been made in the past to limit the spread of this problem, its prevalence has devastating effects on the Kenyan educational system (Permenus, 2015:18). Kenya, like Nigeria, does not seem to be gaining ground in the fight

against those involved in examination leakages.

Madara and Namango (2016:71) explain that cheating in Kenya is on the increase among students in secondary schools, colleges and universities, and the situation seems to be deteriorating to the extent where examination leakage has become the norm in Kenya. Nyamoita and Otieno (2016:3883), contend that examination malpractice constitutes one of the most disturbing problems facing secondary schools in Kenya. The phenomenon is reported every year when examination results are released. In Kenya, examination leakage occurs at all levels of education, from secondary school level to institutions of higher learning.

As for most developed countries, the high stakes placed on examinations in Kenya influences the prevalence of examination irregularities (Kagete, 2008:4). Examination leakages are clear indications of the competitiveness of the examinations, which cause anxieties in candidates, declining ethical standards, and an erosion of confidence among examinees and other guardians (Kagete, 2008:2). Madara and Namango (2016:72) explain that “students who are caught cheating face embarrassment and shame”. They may be banned from the university for a year; may be denied the right to take examinations at other universities; and may even be expelled. Thus, the risks associated with cheating are very real (Madara & Namango, 2016:72).

The education department in Kenya is not successful in eradicating examination leakages which amounts to corruption. The quality and credibility of qualifications are being questioned. Learners, parents, teaching staff, and administrators are all involved. The reason for the malpractice ranges from learners desperately wanting the qualification to teachers and schools needing the success rate to look good.

3.5.4 Ghana’s perspectives on examination leakages

Thompson and Ansoglenang (2019:8) state that any form of examination leakage is unacceptable, fraudulent, and implies an act of academic dishonesty with significant punitive consequences. Folsom and Awuah (2014:14) report that, since the establishment of the West African Examination Council (WAEC) in 1952, it has been in charge of almost all terminal examinations conducted in Ghana. Although Ghana experiences examination malpractices, there is a dearth of research on the

issue in Ghana.

Since lecturers require learners to repeat the learning material almost verbatim in the exams, students under pressure to memorise the work revert to examination malpractices such as paraphrasing lecture notes during exams. Knowledge gained in this fashion is forgotten soon after the exams (Tawiah et al, 2015:145). In other words, examination malpractice is encouraged by the fact that teachers expect their learners to reproduce what they have learnt and not to write on their own understanding.

3.6 Examination leakages in BRICS countries

Brazil, Russia, India, China and South Africa (BRICS) are all signatories to a convention to promote peace, security, development and cooperation (South Africa, 2021). The problem of examination leakages and measures taken to manage the phenomenon within the BRICS conglomerate was briefly discussed below.

Bajjnath and Singh (2019:2) report on efforts by the Rajiv Gandhi University of Health Sciences, and the Jawaharlal Institute of Post Graduate Medical Education and Research in India to mitigate the opportunities of examination cheating using technology. These measures include the use of technology jammers to prevent information sharing, and metal detectors to identify students carrying devices into examination venues. Wrist watches are banned, and students' earrings are inspected for hidden Bluetooth devices. Bangalore University and Rajiv Gandhi University have also considered installing CCTV cameras in the examination venues.

In South Africa, most of the big universities either prohibit students from wearing smart watches or require them to be switched off upon entering the examination venue; universities in China have introduced drones to observe the examinations, and scan for any suspicious radio signals from hidden earpieces (Bajjnath & Singh, 2019:3).

Hernandez (2016 cited in Kellegan & Greeney, 2020:225, 229) reports that the Chinese government has taken measures to combat examination cheating by deploying other state bodies, including the military and police, to provide support.

Eight police officers were deployed to each of the 96 examination centres in Beijing to monitor cheating in 2016. Other drastic measures include a new law that provides for a jail sentence of up to seven years and a ban from taking a national examination for three years for candidates found guilty of examination malpractices.

Denisova-Schmidt and Leontyeva (2014 cited in Kellegan & Greeney, 2020:224) report that Russia also experiences examination malpractices, citing a study in the far east of the Russian Federation where 31 percent of respondents had observed some examination cheating during the Unified State Examination. Russia faces the problem of students writing the same examination over different time zones, so those, who had already written the exam in Asia, leaked the questions via the internet to those who still had to write the examination. The solution was to write the examination at the same Greenwich Mean Time worldwide (Artemev, 2014 cited in Kellegan & Greeney, 2020:228).

An Indian board, in partnership with Microsoft, has piloted a technique of encrypted question papers. Examination centres are required to print the examination papers only half an hour before the exam starts (Kellegan & Greeney, 2020:227).

Information on examination leakages in South America and Brazil, in particular, are not readily available. It was however reported by the Brazilian news that eleven individuals were arrested during 2016 for using electronic devices during the high-profile National High School Examination – Exame Nacional do Ensino Médio (ENEM) (Security Worldmarket, 2017). Researchers from Brazilian's public universities and schools indicate that cheating in Brazilian universities is extremely common (Cavalcanti, Pires, Cavalcanti & Pires, 2012).

The Brazilian Minister of Education announced that their goal was to combat the electronic points that were still used in high-profile exams such as ENEM. A statement by the Brazilian Federal Police said that they were actively involved in repressing examination fraud. They added that, as organised crime increased, they would introduce new security solutions to address the increase in organised crime (Security Worldmarket, 2017). In an effort to address use of technology to facilitate examination cheating in Brazil, the Advanced Near-field Detection Receiver (ANDRE), a hand-held broadband receiver that detects nearby Radio Frequency

(RF) and other types of hidden transmitters, including mobile phones, has been introduced to detect and prevent examination fraud in Brazil (Security World Market, 2017).

In an effort to mitigate the damage caused to the education system by examination leakages, the South African DBE has issued government regulations to manage and regulate “the conduct, administration and management of the National Senior Certificate examination process” (DBE, 2014). It has also involved the most senior law enforcement investigative department, the Directorate for Priority Crime Investigations (DPCI), to investigate examination leakages (DBE, 2020:1).

3.6.1 Crime statistics in Mpumalanga Province

Table 3.1: Crime statistics in Mpumalanga Province

Crime	2018–2019	2019–2020	2020–2021	2021–22
Other Theft	16 858	15 884	13 447	13 359

Source: (SAPS, 2018/2019–2021/2022)

The table above represents the number of other thefts, such as theft of stationery including examination materials, in Mpumalanga Province reported annually by the South African Police Service (SAPS) for the past four (4) years. The table depicts a gradual decrease on this crime in the Mpumalanga Province. However, Kole (2010) argues that, although crime may decrease in terms of statistics, it increases in terms of the impact. This is corroborated by the fact that leakage of examination question papers has a significant impact in the Education sector.

Examination leakage in the BRICS countries manifests in other countries all over the world. Apart from India and South Africa, none of the other partners had introduced strategies at national government level to specifically address examination leakages. Merely introducing and applying legislation to combat the problem, but not using a multidisciplinary focused strategic approach, may not be sufficient to solve the problem.

3.7 The purpose of examination

Munachonga (2014:7) and Leonard, Alhaji and Linus (2019:44), mention that education systems around the world use examinations to evaluate and assess the learning outcomes and the ability of students to demonstrate knowledge and understanding of what they have learnt. The key reason for holding examinations is to determine students' level of understanding after taking a course (Thompson & Ansoglenang, 2019:8). Permenus (2015:17), indicates that examination is central to the teaching-learning process. Chaminuka and Ndudzo (2014:79) believe that examinations test learners' mastery of the subjects and thus increase their chances of employment. The employment sector requires people with competitive skills who can contribute to the economy and to the prosperity of the country.

Wanini (2018:2) mentions that an examination has the tendency to create anxiety, apprehension and uneasiness in some students. Permenus (2015:1), believe that examinations in schools are used to measure learners' understanding of the content taught to them. If this process is interrupted by examination malpractice, the purpose of examinations is derailed.

Examinations at schools are regarded as authentic means used to determine the extent to which learning targets have been achieved by students so that they can be offered assistance in their future studies (Tawiah et al, 2015:145). Chaminuka and Ndudzo (2014:79) note that an examination is an indicator of the success or failure of the education system. Examinations remain the best tool to objectively gauge what the learner has achieved after attending sessions, writing assignments, and performing other scholarly tasks. This is because examinations can objectively evaluate and assess learners' ability to demonstrate knowledge, understanding and potential for employment skills development (Mashanyare & Chinamasa, 2014:47). During examinations, some learners will pass, and some will fail. Examination failure indicates a lack of understanding of the subject. This could be an indication that the subject was not well presented to the proper understanding of the learners.

Learners are taught from the beginning of the year and thus at the end are tested if they understood such subject. However, learners are not encouraged to reproduce what they have being taught from the textbook, should be encouraged to write in their own words as a way to illustrate skills, knowledge and understanding of the

subject. The purpose of examinations is to test the progress of learners for the parents and policy makers (Ossai, Ethe, Okwiedei & Edougha, 2014:38). Ndifon and Cornelius-Ukpepi (2014:118) and Permenus (2015:17) state that examinations are a means of getting feedback and also serve as a yardstick for assessing and evaluating the effectiveness of instructional delivery.

Learning is only considered to have been achieved if it meets the requirements of the examination. Learners are awarded with certificates or reports detailing the marks obtained for an examination. Those who fail should be provided with the necessary support by the teachers in order to help them understand the subject and able to pass it at the end of the year. Examination malpractices can cause the education system to fail. Hardworking, dedicated learners deserve their accolades, and their success should not be clouded by the actions of irresponsible people with ulterior motives.

3.8 Effects and impacts of examination leakages.

Nwadike and Adimonyemma (2015:17) concur that examination leakage “has serious implications for the educational system, teachers, parents and the schools”, and particularly on students who cheat during examinations (Onuka & Durowoju, 2013:343). Ushie and Ishanga (2016:59) postulate that examination leakage has done a lot of harm to students since they have become accustomed to passing previous examinations. Examination leakages destroy the foundation and fabric of any educational system (Ifijeh, Onuoha, Ilogho & Osinulu, 2015:120).

Qualifications obtained in Nigeria are perceived to have been obtained through malpractice. Anzene (2014:6) indicates that examination malpractice has severe consequences for individuals and institutions of higher learning. Mulongo, Kimosop and Njoka (2019:2) mention that examination leakages have adverse effects. People who graduate tend to extent the vice to the workplace, because they had learnt to get undeserved benefits. Examination leakage means that examinations have lost their integrity and thus the qualification is devalued.

The negative effects of examination dishonesty affect individuals, examination bodies and the society at large (Wanini, 2018:6). Examination malpractice disrupts the purpose of an examination which is to assess students’ abilities in a specific

discipline (Ashiagbot, 2019:2). Munachonga (2014:19) state that Examination leakage also affects the education sector and the employment sector as employers are faced with a situation where they recruit qualified, but unskilled employees.

Examination leakages are clear indicators “of the competitiveness of the examinations, which induce high anxieties in candidates, declining ethical standards, and erosion of self-efficacy and confidence among examinees and other guardians” (Kagete, 2008:2). Permenus (2015:18) argues that examination malpractice is an unacceptable behaviour that is continually undermining the educational system. When examination malpractice occurs in a specific school, it also affects those who are not involved in the misconduct and diminishes their achievements.

Among the consequences of examination leakage is that the examination loses its value since people perceive students who pass as those who have cheated (Wanini, 2018:9). Munachonga (2014:1) argues that examination malpractices threaten the integrity of examinations and the authority of those responsible for conducting them. It decreases confidence in the educational system (Ushie & Ishanga, 2016:64).

Dambhare, Dahare, Namdagwali, Banait and Wanjari (2018:123) indicate that “question papers are one of the main issues for the students who suffer from the postponement or cancellation of the examination” and Sirisha and Syalamala (2018:841) confirm that the postponement/cancellation of the exam due to question paper leakage is announced every year. Leakage of question papers occurs in every institution of learning which negatively affects the academic performance of honest learners (Phiri & Nakamba, 2015:330). James, Olantona and Samuel (2015:22) argue that “leakage of examination question papers gives a learner an undue advantage of having a prior knowledge of the examination questions usually obtained through memorisation, copying and stealing of printed copies.”

Andafu et al (2019:4), mention that any examination irregularity attracts attention from the stakeholders as it may compromise the examination’s credibility and the teachers’ integrity. Nyamoita and Otieno (2016:3884) indicate that examination malpractices impact adversely on the standard of an educational system. They affect the integrity of the learning process, the individual’s long-term behaviour, and

the ability of academic institutions to achieve stated objectives (Nyamoita & Otieno, 2016:3884). Examination malpractices tarnish the image and standard of education. This means that examinations have lost their integrity.

Following the leakage of the Mathematics and Physical Sciences examination papers during November 2020, the Minister for Basic Education, Angie Motshega, said:

“It is unfortunate that people continue to be involved in something like this even though the consequences can be dire. We condemn in the strongest terms the conduct of persons who undermine the integrity of the examination because it causes untold stress on the learners who are looking forward to exiting the schooling system with a pass from an honest examination, not one associated with cheating” (DBE, 2020:1).

Examination leakage may render formal assessments unreliable (Ifijeh et al, 2015:120). Examination malpractices lead to potentially corrupt and incompetent future workers (Munachonga, 2014:2). The negative impact of qualifications obtained corruptly may result in the employer suffering from the incompetence of his/her employees which may affect the employer’s production. This means that past conduct could affect the future workforce. Thompson and Ansoglenang (2019:14), state that the danger of examination malpractice is that perpetrators who get jobs because they have high scores and were selected over their counterparts, fail to perform on the jobs and are unable to deliver at the workplace.

Due to examination leakage, certification has lost credibility (Maheka, 2015:6). To some learners, having a certificate is the key, irrespective of whether there were transfer of skills, knowledge and understanding of the subject. Qualifications obtained by hardworking and dedicated learners may be treated with circumspection since employers do not know if they were obtained legally. Social and economic pressures may be contributing factors for students to cheat in the examination. Being dishonest is a conscious decision to a self-serving end, focusing only on obtaining “the piece of paper”. The question remains: Do those cheating in exams ever consider the full impact, seriousness and risk to others of entering a job

or profession without the requisite skills and competence? (Bajinath & Singh, 2019:3–4). The impact of examination leakage has a detrimental effect on learners, the educational system, the image and credibility of qualifications, productivity and achievement of the workforce, the success of companies and businesses, and most of all the economic prosperity of the country.

3.9 Punishment for examination leakage

Madara and Namango (2016:72) mention that students who are caught cheating face embarrassment and shame; they may be banned from the university for a period, may be denied the right to take the exam at other universities, and possibly, expulsion. Thus, the risks associated with cheating are very real (Madara & Namango, 2016:72). The punishment for examination leakage differs from country to country. Considering the drastic sanctions by China, it is evident that it views examination malpractice in a serious light. The death penalty, as sanction for examinees and examiners, should they be found guilty of cheating, are reportedly imposed as preventative measure (Munachonga, 2014:8).

Mohlala (2005) indicates that Umalusi, the certification body for the matric exams, and the Mpumalanga Education Department nullified the results of 843 (eight hundred and forty-three) candidates after they were found guilty of compromising the integrity of the matric exams. Teachers involved in cheating, who were found guilty of misconduct during disciplinary hearings, received fines of R3 000 (three thousand rands) and written warnings.

Nigeria has introduced the Examination Malpractice Act 33 of 1999 in the Constitution of the Federal Republic of Nigeria (Udim, Abubakar & Essien, 2018:210). As per the Act, cheating at examinations, stealing of question papers, impersonation, obstruction of supervisors, forgery of results and conspiracy, among others, constitutes examination misconduct (Ajelabi, 2018:1258). The Act provides for penalties ranging from imprisonment, a fine or both for persons and bodies found guilty of involvement in aiding, abetting, negligence or dereliction in the conduct of examinations (Ossai et al, 2014:38). To date, little or nothing has been heard regarding the implementation of this decree (Ajelabi, 2018:1258). Ossai et al (2014:38), mention that the purpose of this Act is to ensure credibility in

examinations in Nigeria.

In South Africa, there is no form of legislation that deals with examination leakages. Regulations issued by the DBE provide directions on dealing with learners who transgress. Investigation into the transgression is done, and sanction may, for example, include that the learner be barred from writing examinations for a minimum of one and a maximum of three subsequent examinations, excluding the supplementary examinations, suspension from further participation during that academic year, or a re-examination (DBE, 2014:153–167). Teachers, invigilators, administrators and other perpetrators will be dealt with in accordance with legislation relevant to their misconduct. Minister Motshekga, in a press release announcing the leak of the Physics 2, and Mathematics examination papers, revealed that the Department had asked the Directorate for Priority Crime Investigations, The Hawks, to investigate theft and fraud cases (DBE, 2020:1).

In Kenya, candidates who copy other candidates' work, communicate with others with intent to assist another candidate, answer an exam question or be in possession of a textbook, electronic device or material in the exam room without lawful authority shall be disqualified from taking the entire exam (Permenus, 2015:23). The punishment for those involved in examination malpractice in Kenya is not as harsh as those in China and Nigeria. Kemunto (2016:38) reports that the Kenya National Examinations Council Act 2012 provides rules and regulations governing national examinations conducted in Kenya. Some of the penalties laid down include a jail term not exceeding ten (10) years or two million Kenya shillings or both for accessing examination materials and revealing their contents knowingly.

A learner caught cheating may be suspended from taking the examination during that period, or their examination results nullified. Other role players transgressing is being treated more harshly, which included criminal charges with sanctions as harsh as jail sentences. Some countries impose harsher sentences as cheating is regarded as a criminal offence. In South Africa, specialist law enforcement, like the DPCI (Hawks), are called upon to deal with transgressors. Most of the countries do not have examination leakage legislation.

3.10 Literature review

The researcher decided on the topic of an assessment of vulnerabilities to mitigate the leakage of Grade 12 examination question papers in Mbombela municipality in Mpumalanga Province at Mbombela municipality, due to the limited research on a similar matter. As a result, the study would provide a comprehensive picture on how to reduce and mitigate question paper leaks. A variety of literature sources, including government gazettes, journals, books, essays, and websites, were studied by the researcher in order to gather information for this study.

In order to obtain a worldwide perspective on question paper leakage, the researcher examined literature from a variety of countries, including Brazil, Russia, India, China, and South Africa, as well as Kenya, Nigeria, Ghana, and Zambia. The purpose of doing literature is to find published or unpublished information like articles, books, online publications, reports and the like, related to the conceptual focus of the research problem (Du Plooy, 2009: 60). Literature review is the pivotal element of a research project. It connects planned work to previous work, and it connects specific topic to a wider subject area, and it also connects specific findings to the findings of others (Adams, Khan, Raeside & White, 2007:53). Literature review helps to determine whether the topic is worth studying and it provides insight into ways in which the researcher can limit the scope to a needed area of inquiry (Creswell, 2009:23).

According to Walliman (2011:52) one of the first steps in doing a literature review; is to trawl through all the available information sources in order to track down the latest knowledge and to assess it for relevance, quality, controversy and gaps. The researcher views the concept of literature review as it explores the research available on an issue that is been researched and/or writing about.

3.11 Summary

The purpose of this chapter was to conceptualise examination question papers leakage, the impact of examination question paper leakage, examination malpractices, and the effects of examination leakage, with the focus on Africa, BRICS countries, and South Africa, in particular. The risks and vulnerabilities, and impact of leakage of examination question papers, punishment for examination

leakage and possible solutions to curb examination leakage were researched to find solutions. The next chapter discusses presentation of data analysis, explanations and conclusion.

CHAPTER 4: PRESENTATION OF DATA ANALYSIS, EXPLANATION AND CONCLUSIONS

4.1 Introduction

This section covers the data analysis, interpretation, and conclusions drawn from the study. The researcher looked over the qualitative information obtained from observations and interviews. We conducted fifteen (15) individuals in semi-structured interviews. The one-on-one interviews were recorded using a voice recorder, and the notes were taken in a diary. During the observation process, a checklist was used to record security procedures and exam centre management strategies. The researcher coded the data after transcribing all of the data. The information was categorized by categories and separated into digestible chunks. Following data interpretation, the researcher came to some conclusions. This chapter presents statistics using pie charts.

4.2 Data analysis and administration

The underpinning dissertation study was: “An assessment of vulnerabilities to mitigate leakage of grade question papers: Case study of Mbombela Municipality in Mpumalanga Province South Africa”. The problem of examination cheating behaviours poses a grave threat to education standards and credibility in Mbombela Municipality in Mpumalanga Province, South Africa. To maintain confidentiality and privacy of the participants, the researcher used the letters A1 up to O15 to represent the study participants on the transcripts and research log. For example, the first participant was coded A1, while the second and third participants were coded B2 and C3 respectively until the last participant. These unique pseudo identifiers assured the study participants that their identities were protected. The data analysed from the interviews was then shown by the researcher using a pie chart graphic, along with conclusions and interpretations. As a result, information gleaned from the observations was examined, analysed, and conclusions were drawn. The researcher was the only person who had access to all raw data collection files containing the interview recordings, transcripts, and notes.

A total of 15 interviews were conducted. In the analysis, these are referred to in shortened form. The researcher used the interview schedule during the interviews

with each participant.

4.3 Section A: Biographical details

The researcher discusses the findings of an examination of biographical data below.

4.3.1 Participants

Fifteen (15) participants took part in the study.

4.3.1.1 Gender of participants

According to Annenbaum, Greaves and Graham (2016:145), the rationale for routinely considering gender in research implementation is multi-fold. Gender is important in decision-making, communication, stakeholder engagement and preferences for the uptake of interventions. Gender roles, gender identity, gender relations, and institutionalised gender influence the way in which an implementation strategy works.

Mabitsela (2022:59) states that women face different challenges and are disadvantaged in a myriad of ways. A key reason for this is that there is a perception that women are ill-equipped to function in a masculine working environment. Generally, there is a perception that women in the education sector occupy supportive and administration roles rather than the actual printing of question papers because it involves intensive labour.

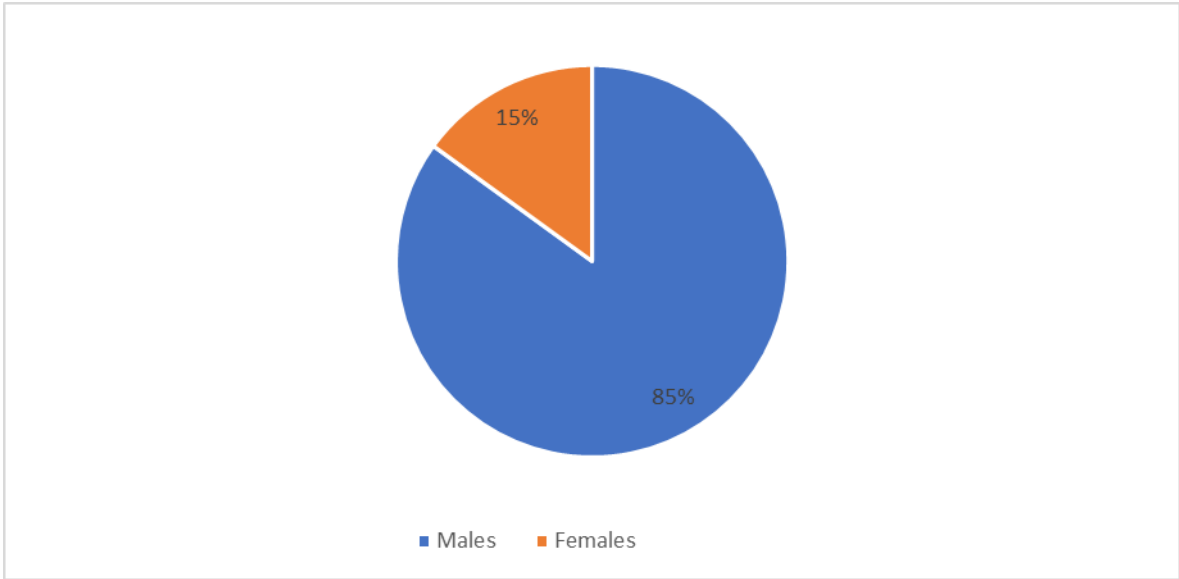


Figure 4.1: Gender of participants

Eighty-five percent (n=10) of the 15 participants who contributed to the study were males and 15 percent (n=5) of the 15 participants were females. Figure 4.1 above illustrates the gender distribution of the sample. As a result, the purpose of the participant's gender inquiry was to ascertain how well each gender was represented in the study. The study showed that female participants were underrepresented while male participants were overrepresented as alluded to by Mabitsele in paragraph 4.3.1.1 above.

4.3.1.2 Age of participants

Figure 4.2 below shows the ages of the participants.

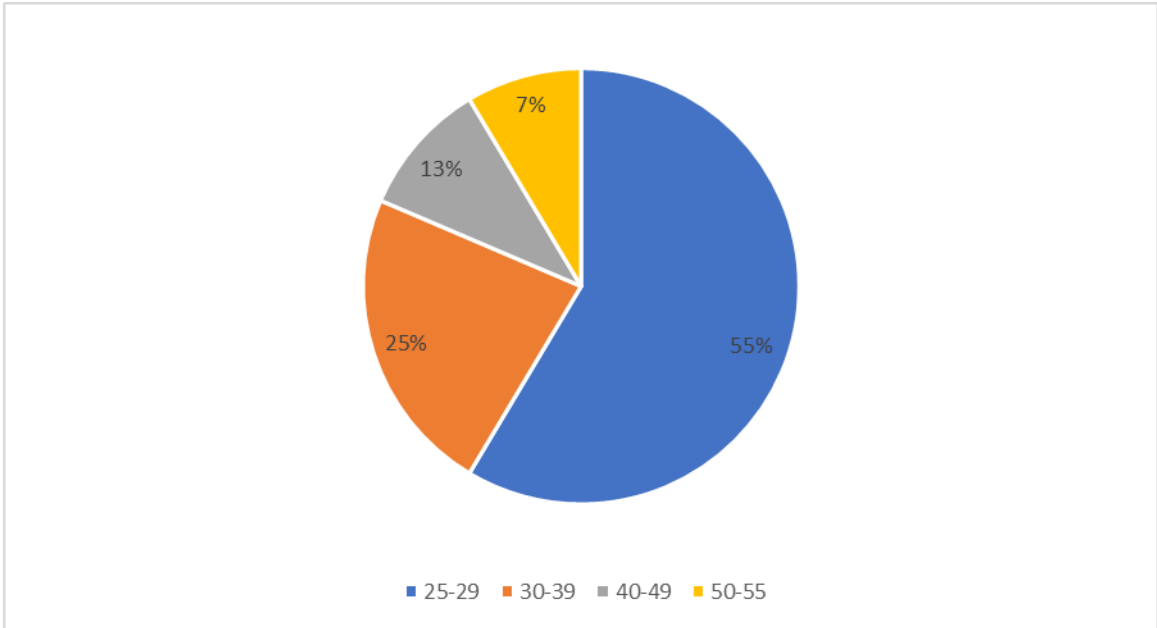


Figure 4.2: Age of participants.

Nichols, Timothy, Rogers, Fisk and West (2001:260) state that human factors researchers are dedicated to providing data to be used for designing safe, efficient, usable products and systems for human users. It is paramount that researchers understand their user population in terms of relevant variables. One of critical variables is age because age-related cognitive changes are less overt than accompanying physiological changes. Human factors researchers who work with populations of variable ages should be concerned with accurately accounting for related cognitive differences in their participant sample. In this case, the researcher preferred to work with participants of different age groups to gather a diverse range of variables regarding the working environment at the printing facility.

The participants' ages were categorised into four (4) groups of 25–29, 30–39, 40–49 and 50–55 years. Figure 4.2 above shows that there were no participants from the age group of 18–24 years and 56+. The age group of 25–29 years was represented by 55 percent (n=6) of the 15 participants. The age group of 30–39 years was represented by 25 percent (n=4) of the 15 participants. The age group of 40–49 years was represented by 13 percent (n=3) of the 15 participants. The age group 50–55 years was represented by 7 percent (n=2) of the 15 participants.

4.3.1.3 Marital status of participants

The researcher also wanted to know each participant's marital status:

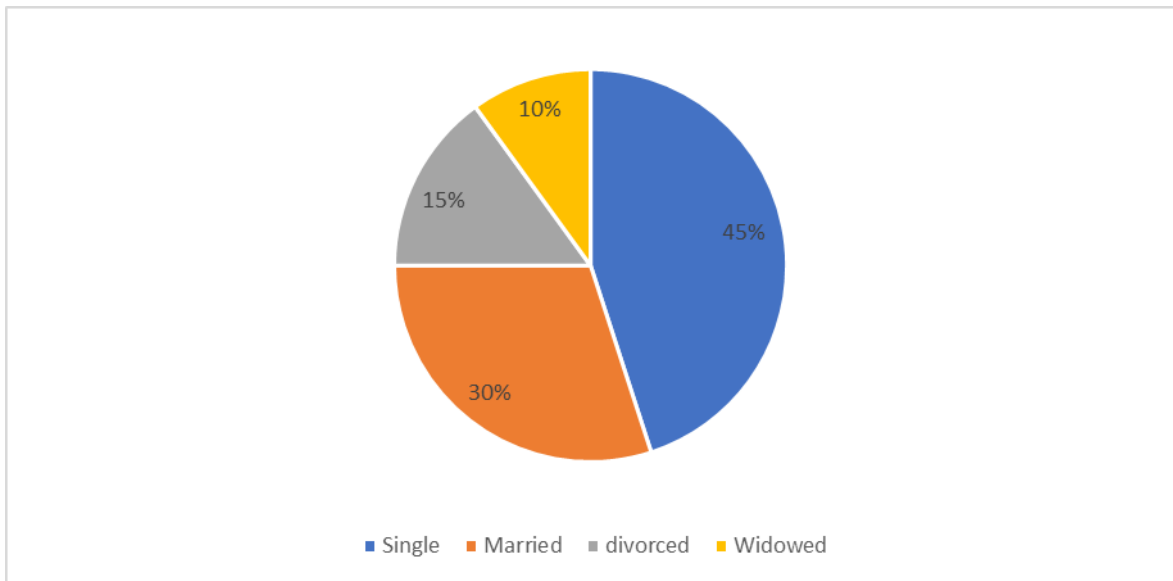


Figure 4.3: Marital status of participants

The relationship between women's employment and the risk of divorce is both complex and controversial. The role specialisation or interdependence view of marriage argues that the gains for marriage for both partners decrease when both are in the labour market and hence women's employment destabilises marriage. In contrast, the economic opportunity hypothesis asserts that a female labour force participation does not intrinsically weaken marriage but gives women resources that they can use to leave unsatisfactory marriages (Schoen, Astone, Kim, Rothert & Standish, 2002:643) In this context, the data show that the majority of the participants were either single or divorced.

Figure 4.3 above shows that the participants' marital status was divided into four categories. Furthermore, the table shows that 45 percent (n=6) of the 15 participants, which is the majority of the participants in the study, were single. The table also shows that 30 percent (n=4) of the 15 participants were married. Fifteen percent (15%) (n=3) of the 15 participants were divorced, whilst 10 percent (n=2) of the 15 participants in the study were widowed.

4.3.1.4 Educational qualifications of participants

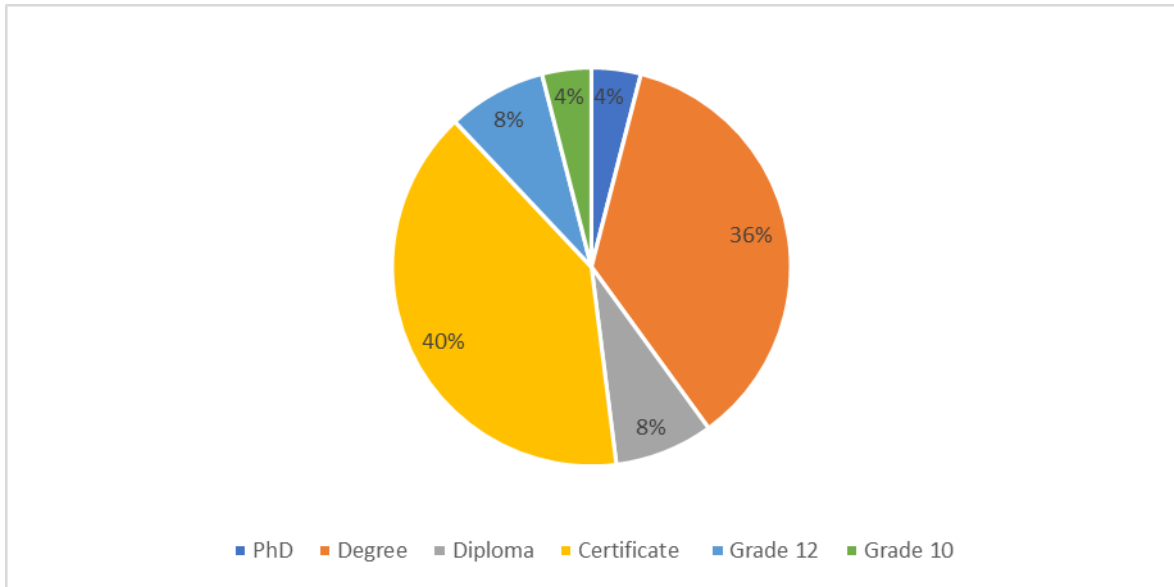


Figure 4.4: Educational qualifications of participants.

The participants' educational qualifications, as shown above in Figure 4.4 above, were divided into six (6) categories. Figure 4.4 above shows that 4 percent (n=1) of the 15 participants have a PHD degree. The diagram further indicates that 36 percent (n=4) of the 15 participants who participated in the study have degree qualifications, whilst 8 percent (n=2) of the 15 participants have diplomas and 40 percent (n=5) of the participants have certificates. Participants with Grade 12 certificates represent 8 percent (n=2) and participants with grade 10 certificates represent 4 percent (n=1) of the study.

Massing and Schneider (2017:6) state that educational qualifications and literacy skills are highly related. This is not surprising as it is an aim of educational systems to equip individuals with competencies necessary to take part in society. Because of this relationship, educational qualifications are often used as a proxy for human capital. It is clear that participants' educational backgrounds may have an impact on their contributions to the study.

4.4 Section B: Vulnerabilities associated with leakage of Grade 12 examination question papers

4.4.1 What is your understanding of the concept of “leakage of Grade 12 examination question papers”? (See Annexure “C” Question 6)

The researcher posed the above question to provide participants with a chance to elaborate on their experiences. These are the verbatim responses of the participants below:

- Participant A1: *“when the students receive the question papers before they can write that examination”*.
- Participant B2: *“when question papers are circulated before they can be written”*.
- Participants C3 and D4: mentioned that it is *“when students get the question papers before the scheduled date according to their timetable”*.
- Participants E5 and F6: said *“when learners have access to the question paper before the writing date”*.
- Participant G7: *“when students get the question papers before the date of the exam”*.
- Participant H8: *“when question papers reach the students before the actual date of the examination”*.
- Participant J9: *“leakage of question paper refers to accessibility of the question paper by wrong person prior to the exam date and time as prescribed by the timetable for the writing of the paper”*.
- Participants I10, K12 and N14: *“refers to the question papers being accessed by wrong person prior to the date on the timetable”*.
- Participant L11: *“when some of the learners get the question papers before the actual time, i.e. before their date on the timetable”*.
- Participant M13: *“when question papers are released unscrupulously, and other learners receive the question papers before the actual time of writing”*.
- Participant O15: *“when a group of learners receive the question papers before the actual time of writing the examination”*.

The purpose of this question was to establish whether the participants in this study were familiar with the definition of the leakage of question papers. It is evident that 100% percent (n=15) of the 15 participants in this study indicated that they understand the definition.

Interpretation

It is clear that each of the 15 participants in this study acknowledged their understanding of the idea of question paper leaks for the grade 12 exam. Exam leakage is the term used to describe someone who is taking the same exam but previously obtained an exam question paper illegally (Mashanyare & Chinamasa, 2014:47).

4.4.2 What is your understanding of the concept ‘vulnerabilities’ regarding leakage of Grade 12 examination question papers? (See Annexure “C” Question 7)

- Participant A1: *“this means lack of security to the examination question papers”.*
- Participant B2: *“when question papers are exposed to risks like being stolen and eventually leaked to the students”.*
- Participant C3: *“when good systems are not in place to ensure that all the weaknesses regarding the safe keeping of question papers are monitored and managed”.*
- Participant D4: *“when the measures in place are not good enough to sustain the protection of question papers and ultimately, they are lost”.*
- Participant E5: *“is the exposure of a question paper to a possible leakage”.*
- Participant F6: *“when there is a possibility that a question paper can be released unlawfully without authorisation”.*
- Participant G7: *“when there is a likelihood or possibility that question papers can reach the students before the scheduled time of writing”.*
- Participant H8: *“means lack of security measures to safeguard the examination question papers”.*

- Participant J9 and I10: mentioned that *“vulnerabilities relate to factors which may lead to the leakage of Grade 12 question paper”*.
- Participant L11: *“when security systems are not in place to guard against the leakage of question papers or there is poor management and control of question papers”*.
- Participant K12: *“when there is a possibility and weaknesses that question papers can be released without the authorisation and received by learners”*.
- Participant M13: *“the exposure of question papers which result in leakage”*.
- Participant N14: *“talks to factors which can lead to the leakage of question papers”*.
- Participant O15: *“means any factors like inadequate security measures which may lead or result into the leakage of a Grade 12 question papers”*.

The purpose of this question was to establish whether the participants understand the concept of vulnerabilities regarding leakage of Grade 12 examination question papers in the study. It is evident that 90 percent (n=14) of the 15 participants in this study are familiar with the concept whilst 10 percent (n=1) of the 15 participants are not familiar with the concept of vulnerabilities as it relates to leakage of question papers.

Interpretation

Evidently, most of the individuals involved in this research are aware of the notion of vulnerabilities in relation to exam leaks. Not a single person said they were unfamiliar with the idea. The definition of vulnerability, according to Paul (2013:3), is "an internal risk factor of the subject or a system that is exposed to hazard and corresponds to its intrinsic tendency to be affected or susceptible to damage."

4.4.3 Which vulnerabilities to your knowledge contribute to the leakage of Grade 12 examination question papers? (See Annexure “C” Question 8)

- Participant A1: *“lack of CCTV cameras and fingerprints access and poor training of security guards contribute to the leakage of question papers”*.
- Participant B2: *“can be due to lack of examination security policy and*

procedures which should direct the staff on how they should conduct themselves when dealing with question papers”.

- C3: *“they are so many I can think of like lack of infrastructure particularly at the rural areas”.*
- Participant D4: *“lack of protection for the question papers like deploying one group who print question papers instead of rotating them”.*
- Participants E5, G7, H8 and K12: *stated that “lack of proper maintenance plan to security systems contribute to the leakage of question papers”.*
- Participant F6: *“lack of screening of the officials who handle the question papers”.*
- Participant J9: *“not following the norms and standards of handling question papers contribute to the leakage of question papers”.*
- Participants I10 & L11: *mentioned “bulk printing of question papers and lack of monitoring at the printing facility contribute to the leakage of question papers”.*
- Participant M13: *“lack of access control to the printing facility and lack of proper relations with stakeholders contribute to the leakage of question papers”.*
- Participant N14: *“lack of proper question papers controls particularly during loading contribute to the leakage of question papers”.*
- Participant O15: *“Printing of different question papers at the same day using the same machine contribute to the leakage of question papers”.*

The purpose of this question was to establish vulnerabilities which contribute to the leakage of Grade 12 examination question papers in the study. It is evident that 100 percent (n=15) of the 15 participants in this study are familiar with vulnerabilities which contribute to the leakage of question papers. They mentioned the following risk factors: deployment of same security guards over and over; poor infrastructure; lack of training on handling of question papers; poor safeguarding of question papers; too many persons handling question papers; and using the same printing machine contribute to the leakage of question papers.

Interpretation

Based on the inputs provided above, it is clear that every one of the 15 research participants is aware of the vulnerabilities that lead to question paper leaks. The following risk factors were mentioned by participants: Question papers leak due to repeated use of the same security guards, inadequate infrastructure, inadequate training for managing them, inadequate safeguarding, excessive personnel handling them, and sharing a printing device. "Security risk factor" is defined by Amundrud et al. (2017:286) as the connection between threats to a specific asset and the fact that these assets are susceptible to the danger in question.

4.4.4 What are some of the vulnerabilities associated with the handling of Grade 12 examination question papers? (See Annexure "C" Question 9)

- Participants A1, B2, C3, D4, F6, G7, J9, I10, N14 and O15: mentioned that *"too many people are handling the question papers, and this cause a problem because of the long chain"*.
- Participants E05 and M13: mentioned *"the negligent handling of examination and assessment material, officials with devious intentions and compromised security of the storage points"*.
- Participants L11 and K12: mentioned *"the unvetted officials as a problem"*.

Participants A1, B2, C3, D4, E5, F6, G7, J9, I10, N14 and O15 who represent 70% (n=10) of the 15 participants in this study, mentioned that too many people are handling the question papers. Other participants, which represent 30% (n=5), indicated other factors like unvetted officials and negligence from the officials.

Interpretation

This question was designed to determine whether there are any printing-related vulnerabilities that could be contributing to the leakage. A little over 70% of the study's participants said that too many persons are handling the question papers. Merely thirty percent of the respondents cited elements such as officials' carelessness and lack of screening. The assertion afore was concurred to by Makaula (2018:45), who postulate that incorrect handling of exam questions

happens during the printing and distribution of the papers to the testing locations.

4.4.5 What are some of the vulnerabilities associated with the printing of the Grade 12 examination question papers? (See Annexure “C” Question 10)

- Participants A1, B2, C3, D4, E5, G7, L11, M13 and N14: mentioned that *“printing too many question papers at the same time and printing same papers, i.e. paper 1 and 2 of Mathematics at the same time causes confusion and mixed up”*.
- Participants F6 and K12: indicated that *“lack of access control at the printing facility and allowing staff members to bring the gadgets at the printing facility”*.
- Participant H08: *“during lunch time the printing facility doesn’t close all together. You will find that there are few people inside the facility with lot of question papers lying down”*.
- Participants J09 and I10: indicated that *“poor handling of soft copy (memory stick) received from National Head Office, and not flushing out the printing machines before introducing a new job”*.
- Participant O15: *“poor monitoring of shredded material and lack of inspection for the cuttings from the machines which are thrown in the waste containers”*.

The purpose of this question was to establish vulnerabilities associated with the printing of examination question papers which contribute to the leakage. Participants A1, B2, C3, D4, E5, G7, L11, M13 and N14, which represent 60% (n=9) of the 15 participants in this study, mentioned that printing too many question papers at the same time contributes to the leakage during printing. Participants F6 and K12, which represent 15% (n=2), indicated other factors like a lack of access control at the printing facility and allowing staff members to bring the gadgets into the printing facility. Participants J9 and I10 which represent 15% (n=2) of the study mentioned *“poor handling of the memory stick and not flushing off the printing machines before introducing a new job”*. Participants J08 and O15, which represent 10% (2) of the study, indicated that, during lunch time, the printing facility does not close and there are a few people in the printing facility with question papers lying around.

Interpretation

The majority of participants stated that printing an excessive number of question papers concurrently causes printing leaks. Other participants mentioned other concerns, such as "poor handling of the memory stick and not flushing off the printing machines before introducing a new job" and staff members being allowed to bring gadgets into the printing facility. Question paper leaks can frequently be linked to the question paper printing process, according to Gbagolo (2011:3).

4.4.6 What are some of the vulnerabilities associated with the delivery of the Grade 12 examination question papers? (See Annexure "C" Question 11)

- Participant A1: *"accidents in the road can make the question papers to be vulnerable to theft"*.
- Participant B2: *"drivers who are not being vetted and use their cellphone while they are on the road delivering question papers makes them vulnerable"*.
- Participant C3: *"vehicles delivering question papers should not be branded to avoid been targeted by the criminals"*.
- Participants D4, E5, H8, L11, M13 and N14: mentioned that *"community protest is one of the vulnerabilities as angry mob can hijack the vehicle ferrying the question papers"*.
- Participant F6, G7 and K12: mentioned using *"the same drivers to deliver question papers and drivers using the same routes to deliver every day"*.
- Participant J9 and I10: mentioned that *"allowing one person or only the driver to deliver the question papers from point A to point B and poor sealing of containers carrying the question papers"*.
- Participant O15: *"lack of recording of exam materials being transported"*.

The researcher wanted to ascertain the vulnerabilities associated with the delivery of examination question papers. Participants A1, B2 and C3, which represent 18% percent (n=3) of the 15 participants in this study, mentioned that road accidents, drivers who are not vetted, and branded delivery vehicles are some of the vulnerabilities associated with the leakage of question papers.

Participants D4, E5, H8, L11, M13 and N14, which represent 52% (n=6), mentioned that community protest is one of the vulnerabilities as an angry mob can hijack the vehicle ferrying the question papers. Participants F6, G7 and K12, which represent 16% (n=3) of the study, mentioned that drivers who prefer the same destination every day make the delivery of question papers vulnerable. Participants J09 and I10, which represent 10% (2) of the study, indicated that allowing only the driver to deliver the question papers from point A to point B and poor sealing of containers carrying the question papers make the delivery vulnerable, while participant O15, which represents 4% (1) of the study, blamed poor recording of question papers during the dispatch.

Interpretation

The purpose of this question was to help the researcher identify any weaknesses in the way the exam question papers are delivered. Four (4) of the aforementioned participants brought out the existence of vulnerabilities such as unvetted drivers, delivery cars with branded names, and traffic accidents. One of the risks, according to about eleven (11) study participants, is community protests, as enraged crowds have the potential to hijack the car transporting the exam papers. Exam leakage can also be caused by the method of transportation used to send exam question papers, claim Mashanyare and Chinamasa (2014:50).

4.4.7 What are some of the vulnerabilities associated with the storage of the Grade 12 examination question papers? (See Annexure “C” Question 12)

- Participant A1: *“question papers should not be stored for too long at the storage areas”*.
- Participants B2 and L11: mentioned that *“question papers are stored in the storages without burglar proofs and security guards”*.
- Participant C3: *“same staff members work over and over without rotation, and this create a problem to those that are side-lined”*.
- Participant D4: *“fire damage, rainfall can compromise the security of the question papers at the storages”*.
- Participants E05, F6, G7, N12 and M13: mentioned that *“break-ins and theft*

are some of the vulnerabilities at the storages”.

- Participants H8 and I10: mentioned that *“poor maintenance of the infrastructure can lead to the leakage of question papers as doors are not locking properly most of the time”.*
- Participants J09 and N14: mentioned that *“not using a double locking system can compromise the question as one person is responsible for the keys”.*
- Participant O15: *“lack of strong rooms and CCTV cameras are some of the vulnerabilities in the storage areas”.*

The researcher wanted to find out the vulnerabilities associated with the storage of the question papers. Participants A1, B2, C3 and D4, which represent 30% percent (n=4) of the 15 participants in this study, mentioned different factors that contribute to the leakage at the storages such as the absence of security guards and question papers that are stored for a very long time at the storage facilities. Participants E05, F6, G7, N12 and M13, which represent 36% (n=5), indicated that burglary and theft were some of the vulnerabilities at the storages. Participants H8, I10, J9 and N14, which represent 30% (n=4) of the study, mentioned infrastructure issues at the storages as some of the vulnerabilities. Participant O15, which represents 4% (1) of the study mentioned the absence of strong rooms as some of the vulnerabilities.

Interpretation

Respondents highlighted a variety of concerns, including the lack of security guards and question papers that are kept in storage facilities for extended periods of time, as contributing to the vulnerabilities related to question paper storage. Some individuals brought up the topics of theft and break-ins as potential weaknesses at the storage facilities. According to Njoku and Njoku (2016:16), there are multiple sources from which examination question papers leak. These include personnel at the production site who print the questions, those who package the materials, and those who transport the questions from the storage to the centres.

4.5 Section C: Security risk factors associated with the leakage of Grade 12 examination question papers.

4.5.1 What is your understanding of the concept ‘security risk factors’ associated with the leakage of Grade 12 examination question papers? (See Annexure “C” Question 13)

- Participants A1, B2 and E5: said *“security risk factors can be things which, if overlooked, can cause the question papers to leak”*.
- Participants F6 and M13: mentioned that *“risk factors are security weaknesses that can lead to the question papers being stolen like in a form of bribery and theft”*.
- Participant D4: *“factors such as a community protest where a vehicle delivering question papers can be hijacked and question papers stolen in the process”*.
- Participants G07, H8 and I10 indicated that *“there are issues which relates to security that needs attention like malfunctioning of cameras”*.
- Participant J9: refers to *“any possibilities which may lead to a leakage of the Grade 12 examination question paper”*.
- Participant L11: *“security weaknesses which can lead to theft of question papers”*.
- Participant N12: *“when there are security weaknesses in the management of question papers and related material at the printing, storage and delivery”*.
- Participants N14 and O15: mentioned that *“security measures which are not effective and can’t achieve the objective of protecting the examination question papers”*.

Interpretation

This question was asked by the researcher to see if the participants grasped the idea of security risk factors. Most participants demonstrated an understanding of the idea of security risk factors. They added that in order to prevent security lapses that could lead to question paper leaks, these risks needed to be evaluated and reduced. Security risk factors are defined by Amundrud et al. (2017:286) as the

connection between threats to a specific asset and the likelihood that these assets will be vulnerable to the identified threat.

4.5.2 What types of security risk factors to your knowledge are associated with the leakage of Grade 12 examination question papers? (See Annexure “C” Question 14)

- Participants A1, B2, E5, G7, H8, J9, K12 and N14: mentioned that *“lack of maintenance of security systems”*.
- Participants C3 and D4: mentioned that *“staff members work over and over without rotation, and this create a problem to those that are side-lined. There should be a rotation so that everyone gets equal opportunity to work overtime”*.
- Participant F06: *“Allowing staff members to bring the gadgets at the printing facility and storing printed question papers at the storage facility for a long time”*.
- Participants I10 and L11: mentioned that *“lack of monitoring at the printing facilities and poor packaging of question papers”*.
- Participants M13 and O15: indicated that *“printing of different question papers at the same time using same machine also contributes to the leakages of the question papers”*.

Participants A1, B2, E5, G7, H8, J9, K12 and N14, which represent 60% (n=8) of the 15 participants in this study, mentioned that the lack of a preventative maintenance plan is one of the main issues as the security systems do not always function. Participants C3 and D4, which represent 4% (n=2) of the 15 participants, mentioned that staff work overtime without rotation. Participants F06, I10, L11, M13 and O15, which represent 36% (n=5), mentioned various issues, such as unlawful gadgets in the printing room and printing of more question papers at the same time, as major contributions to question paper leakages.

Interpretation

The researcher asked this question in order to identify the kinds of security risk variables connected to the leakage of Grade 12 exam questions. While the security

systems aren't always working, eight (8) participants stated that one of the biggest problems isn't having a preventative maintenance plan. Employees are working overtime without taking breaks, according to two (2) participants. Five (5) participants identified a variety of problems as having a significant role in question paper leaks, including the use of illegal devices in the printing area and the simultaneous printing of more question papers.

4.5.3 How many people are involved in the handling of Grade 12 examination question papers in Mpumalanga Province? (See Annexure “C” Question 15)

- Participant A1: *“they are too many hands handling the question papers because they go through a long route before, they arrive at school”*. This confirms that question papers are handled by a lot of people before they are delivered to the schools.
- Participant D4: *“that may be more than ten (10) officials because question papers are being handled at the different layers. Like through collection from Pretoria, printing, storage and delivery”*.
- Participant E5: *“At Head office is about twenty (20) officials (that include departmental staff, printing company staff and security personnel) at the printing facility. At the district offices, is about six (06) and circuit offices is about two (02)”*.
- Participant F6 *“there is a quite a huge number, because it starts from the HQ to the school levels. So, it can be approximately 15–20 staff members who handle the question papers”*.
- Participant H8 *“more than 15 people do handle question papers”*.
- Participants J9 and O15: mentioned that *“two (02) senior officials in the sub-directorate called Item Development and Question Papers”*.
- Participant I10: *“more than five (5) people do handle question papers”*.
- Participant L11: *“more than ten staff members in different areas i.e. Head Office, Districts, Circuits and schools”*.
- Participant K12: *“approximately 10 to 15 people”*.
- Participant M13: *“district offices is about six people and two at the nodal*

point".

- Participants N14: "*more than 16 people*".

Interpretation

According to the participants feedback above, the Grade 12 examination question papers are handled by a large number of personnel, which makes the chain too long and challenging. The participants disclosed that the question papers are handled by about twenty (20) staff personnel. In order to minimise the chain of possession while handling the question papers, the Mpumalanga Department of Education must take into account that this is one of the contributing elements to the leaks. According to Maheka (2015:30), because there are numerous individuals involved in the question paper handling procedure, examination leakage also happens throughout the question setting process.

4.5.4 Who are the different persons responsible for the handling of the Grade 12 examination question papers in Mpumalanga Province? (See Annexure "C" Question 16)

- A Participants 1, B2, C3 and G7: mentioned that "*they are collected by the management from HQ in Pretoria, then printed at the Provincial Office, then they go the district and then to circuits*".
- Participants D4, E5, F6, H8, I10, M13 and N14 revealed that "*management from HQ, printing officials, drivers, officials at the districts, circuits and chief invigilators*".
- Participants J09, L11 and O15: revealed that "*senior officials are involved in the process*".
- Participant K12: "*the printing manager from the private company and printing staff*".

Participants D4, E5, F6, H8, I10 and N14, which represent 48% percent (n=6) of the 15 participants in this study, concurred that the question papers are mainly handled by the management and other junior officials up to the school level. Participants A1, B2, C3 and G7, which represent 38% (n=4) of the study, also indicated that management is mainly responsible for handling the question papers. Participants

J09, L11, O15 and K12, which represent 14% percent (n=4) of the 15 participants, mentioned that the senior officials and printing manager are responsible for the handling of question papers.

Interpretation

The researcher wanted to learn more about the various layers of individuals that manage the question papers. Six (6) individuals agreed that management and other lower-level staff handle the question papers most of the time. According to four (4) participants, management is mostly in charge of handling the question papers. Four (4) more participants hinted that senior officials and printing manager are responsible for handling the question papers. The aforementioned data demonstrate that different individuals at different stages handle the question papers.

4.5.5 Who is responsible for the delivery of the Grade 12 examination question papers? (See Annexure “C” Question 17)

- Participants A1 to O15 indicated that *“question papers are delivered by the same drivers every year to the same area”*.

Interpretation

The researcher asked this question to determine who is in charge of distributing the question papers. The departmental drivers are in charge of delivering the question papers, according to every participant. The participants brought up the fact that question papers are susceptible to leaking since the same drivers distribute the question papers year after year without doing a rotation with other staff.

4.5.6 What happens if a delivery vehicle is involved in an accident while delivering the Grade 12 examination question papers to schools in the province? (See Annexure “C” Question 18)

- Participant A1: *“vehicles are escorted by the Police and if they are involved in an accident, the police will cordon off the scene until departmental officials arrive. The Police are not allowed to touch any examination materials”*.
- Participants B2 and I10: said they *“don’t know what should be done if accident happens”*.

- Participant C3: *“Police will assist because sometimes they escort the question papers”*.
- Participant D4: *“Police must be informed immediately to cordon-off the crime scene”*.
- Participant E5: *“the matter must be reported to the nearest police station to ensure that the accident scene is secured to avoid leakage of question papers”*.
- Participant F6: Did not answer the question.
- Participant G7: *“drivers must leave the accident scene until the police arrive or management arrive at the scene”*.
- Participant H8: *“there is a plan whereby Head of Security will liaise with the Police for assistance. This means the police must be notified in time once there is a breakdown”*.
- Participant J9: *“It never happened, but if it does, another vehicle should be dispatched to the scene to take the question papers from the vehicle in an accident”*.
- Participant L11: *“police will be summoned because they are on standby during the delivery of question papers”*.
- Participant K12: *“nearest police station will be informed to take over the situation”*.
- Participant M13: *“swift report to the nearest police station to ensure that the accident scene is secured to avoid a leakage of a question paper”*.
- Participants N14 and O15: said *“SAPS is on standby”*.

Participants A1, C3, D4, G7, L11, K12, M13, N14 and O15, which represent 84% percent (n=9) of the 15 participants in this study, indicated that the delivery vehicles are escorted by the Police and, in case of an accident, they will take over. Participants B2 and I10 which represent 10% (n=2) of the study, mentioned that they do not know while participant F6 which represents 6% percent of the 15 participants, did not answer the question.

Interpretation

In the event that an accident occurs when the delivery vehicle is transporting the question papers, the researcher was interested in learning about the backup plan. Nine (09) participants said that the police escort the delivery cars and will take charge in the event of an accident. One (1) participant did not respond to the question, while four (4) participants stated that they were unsure. The aforementioned findings demonstrate that there is a backup in case of an accident.

4.5.7 Are the Grade 12 examination question papers printed by private or government printers? (See Annexure “C” Question 19)

- A1 to O15: indicated that *“question papers are printed by a private printing company contracted by the Department of Education”*.

Interpretation

When posing this question, the researcher's goal was to find out who prints the department's question papers. Every respondent stated that the printing company, which has a contract with the Mpumalanga Department of Education, prints the exam papers. Although it was evident that a private service provider was hired to handle the services, it was unclear who will be held accountable in the event that a question paper leaks.

4.5.8 Who is involved in the printing of the Grade 12 examination question papers? (See Annexure “C” Question 20)

- Participants A1, B2, C3, E5, F6, G7, H8, J9, I10, L11, K12, N14 and O15: alluded that *“question papers are printed by Department of Education’s officials, printing company’s staff and private security officers who are monitoring the process”*.
- Participant D4: *“not sure who is involved in printing, but it could be staff from the Department of Education”*.
- Participant M13: *“it is Chief Educational Specialist, Security Manager, Senior Admin Officer, Admin Clerks, Printing manager (from the outsourced printing company) and 08 staff members from the printing company”*.

Interpretation

The feedback provided by the aforesaid participants indicate that the process of printing question papers is vulnerable due to the involvement of multiple parties. Thirteen (13) participants hinted that the Department of Education's officials, the employees of the printing company, and private security guards are overseeing the process of printing the question papers. One participant expressed uncertainty about the identity of those involved in printing, while another mentioned a department official. The Department needs to figure out how to cut back on the number of printing officials, especially those employed by commercial service provider.

4.5.9 What procedures are followed during the printing of the Grade 12 examination question papers? (See Annexure “C” Question 21)

- According to participants A1, B2, C3, G7, I10, K12 and O15: *“the question papers are collected from National Head Office and stored in a strong room. Two (2) senior officials will collect the question papers and submit them to printing area”*.
- Participants D4, H8 and J9 indicated that *“hard copies of question papers and memory stick are retrieved from the strong room and brought into the printing area and officials from printing company start printing”*.
- As stated by participants E5, F6, L11 and N14, *“senior officials collect master copies of question papers from the Department of Basic education in Pretoria and store them in the strong room for printing”*.
- Participant M13: *“One (1) paper is printed at a time then checked; if all is in order, printing continues”*.

The feedback from participants A1, B2, C3, G7, I10, K12 and O15, which represent 76% percent (n=7) of the 15 participants in this study, suggests that question papers are collected from Head Office in Pretoria and stored in the strong room for printing. Participants D4, H8 and J9, which represent 8% (n=3) of the study, mentioned that hard copies are retrieved from the strong room before printing starts. Meanwhile, participants E5, F6, L11 and N14, which represent 16% percent (n=4), agree that master copies are collected from Pretoria and stored in a strong room for printing.

Interpretation

The researcher was interested in learning about the processes used in question paper printing. The majority of participants mentioned that question papers are gathered from the central location and kept in the strong room for printing purposes. A few participants brought up the fact that hard copies are taken out of the strong room prior to printing. The aforementioned findings indicate that most participants are aware of the processes involved in the printing of question papers.

4.5.10 What facilities are used for the storage of the Grade 12 examination question papers? (See Annexure “C” Question 22)

- Participants A1, B2, C3, D4, E5, F6, G7, J9, I10, and L11: said *“the strong room is used as a storage”*.
- Participant K12: *“question papers are stored in the classrooms”*.
- Participants M13 and O15: said *“question papers are stored in storages and staffrooms at the schools”*.
- Participant N14: *“most of the time, question papers at HQ are stored in a strong room, but the problem starts once they arrive at the schools because most of the schools don’t have a good infrastructure”*.

The study showed that 85 percent of the 15 participants indicated that question papers are stored in the strong room while 15 percent of the participants mentioned that classrooms and staff rooms are also used as the storage areas at the schools.

Interpretation

Question papers are kept in the strong room, according to twelve participants. However, three (3) of the participants brought up the fact that staff rooms and classrooms are also utilised as storage spaces in schools. This demonstrates that the Department lacks appropriate policies for the storage of exam papers at various locations. To protect the exam papers, more secure storage facilities need to be established, and their security features need to be improved (Adeyemi, 2019).

4.5.11 How secure is the storage facility against theft and unlawful breaking and entering? (See Annexure “C” Question 23)

- Participants A1, G7, H8 and L11: mentioned that *“storage facilities are secured because most of them have CCTV cameras”*.
- Participants B2 and E5: mentioned that *“most of the storage facilities are not secured because of poor infrastructure”*.
- Participants C3 and I10: mentioned that *“they never visited the storage facilities”*.
- Participants D4 and O15: mentioned that *“they look secured only at Head office, but once the question papers are at schools, it is easy for break-ins to happen”*.
- Participant F6: did not answer the question.
- Participant J9: *“the question papers are stored in classrooms at the schools, and it is not safe”*.
- Participant K12: *“most of the storages have physical guarding, but this doesn’t mean they are secured as guards can collude with the officials”*.
- Participant M13: *“don’t know”*.
- Participant N14: *“they are not secured because security guards sleep during the night”*.

Interpretation

According to the participants’ responses above, the majority of storage facilities are not safe or suitable for keeping the question papers. Even at the school level, the Department of Education ought to think about constructing study rooms to prevent theft and break-ins. According to the study, exam papers are still susceptible to being stolen at storage facilities. According to Liebenberg (2020:16), theft is the unlawful appropriation with intent to steal something with the intention of stealing something that can be stolen. The basic definition of theft, with regard to its intent and function, was the covert removal of property from its owner’s custody and control.

4.5.12 For how long is the Grade 12 examination question papers stored in the storage facilities until they are delivered to the schools? (See Annexure “C” Question 24)

- Participants A1 and H8: indicated that they “*are not sure*”.
- Participants B2, D4, F6 and G7: indicated that they “*are stored for a period of more than five days*”.
- Participants C3, I10 and N14: indicated that they “*don’t know*”.
- Participants E5 and L11: mentioned that “*the district offices question papers are stored for a week*”.
- Participant J9: “*at Head Office they are stored for approximately two (2) weeks. The consignment is then delivered to districts and stored for a week. Districts deliver to circuits where they are stored for one night*”.
- Participant K12: did not answer the question.
- Participant M13: “*they are stored for three (3) days at Provincial Head Office before they are dispatched to the schools*”.
- Participant O15: “*they are stored for one (1) week at Head Office. Then delivered to districts and stored for a period of three (3) days. Then delivered to circuit offices where they are stored for one (1) day*”.

Interpretation

The purpose of the question was to ascertain how long the test papers are stored in the facility. It is clear that before being supplied to the examination sites, the question papers are kept in storage facilities for more than two (2) weeks. This is risky because there is a greater chance of burglary during the extended stay at the storage facilities. Exam papers should be printed and given to centres daily, according to Simui, Chibale, and Namangala (2017:299), to ensure fairness in the examination writing process and to prevent students from spending a day in class before the exam. Unauthorised access may be possible due to weaknesses in certain places. According to Kitainge (2019), question paper leaks are more likely when there are insufficient security measures in place at storage facilities and during transportation.

4.6 Section D: Security measures to mitigate leakage of Grade 12 examination question papers.

4.6.1 What security measures are in place to prevent the leakage of Grade 12 examination question papers? (See Annexure “C” question 25)

- Participants A1, B2, E5, G7, H08, I10, L11 and O15: indicated that “*there are CCTV cameras, access control system and security guards*”.
- Participants C3, K12 and M3: indicated that “*there are boom gates and alarm systems*”.
- Participants D4 and N14: indicated that they “*are not sure of any measures in place but there are security guards patrolling*”.
- Participant F6: “*cellphones of employees and guards are restricted in the printing area to avoid taking pictures of the question papers*”.
- Participant J9: “*security personnel ensure that access control register is signed, body searches are also conducted to ensure that no unnecessary devices like cell phones are not allowed in the area*”.

Interpretation

This question was intended to evaluate the security protocols in place to reduce the risk of question paper leaks. The participants enumerated a number of procedures put in place to lessen the possibility of question paper leaks, including physical guarding, access restriction, and CCTV cameras. These measures are inadequate, as evidenced by the ongoing leakage of question papers. According to Alshboul (2010:2), a security measure is the plan to put controls and guidelines in place to protect assets and information security. Security control lessens security threats' and vulnerabilities' effects to an extent that the organisation can tolerate.

4.6.2 Explain the effectiveness of these security measures. (See Annexure “C” Question 26)

- Participants A1 and E5: mentioned that “*security measures are effective, but you know that there is always a way of breaching the measures by bribing the security guards*”.
- Participants B2 and L11: mentioned that they “*are not so effective because*

we still rely on human intervention”.

- Participant C3: mentioned that *“there is no 100 percent security. Each measure is strong until it is tested”.*
- Participants D4, G7 and M13: mentioned that *“we can only confirm effectiveness if there was no human intervention because we can’t trust guards as they are human beings”.*
- Participants F6 and H8: mentioned that *“security measures are not effective due to lack of maintenance on the security systems”.*
- Participants J9 and O15: mentioned that they *“don’t know”.*
- Participants I10 and K12: mentioned that they *“are not so effective because the CCTV cameras are only monitored during the day”.*
- Participant N14: mentioned that *“they are not effective because there is no uninterrupted power supply (UPS). If the electrical distribution box (DB) is tampered with, it means all the security systems will be down”.*

The researcher wanted to find out if the security measures in place are effective. The study showed that 60% percent (n=8) of the 15 participants indicated that the measures in place are not very effective due to the human intervention. Furthermore, 40% percent (n=7) of the participants indicated that cameras are only monitored during the day. This shows that security guards cannot be entrusted with the responsibility to monitor the question papers.

Interpretation

According to the study, eight (8) of the participants said that the human interaction makes the measures in place less effective. Seven (7) more participants agreed with the previous assertion that the security personnel are untrustworthy and only keep an eye on the CCTV cameras during the day. It is clear that the Department has to bolster some of its security protocols in order to protect the exam papers. Exam administrators and security personnel are also accountable for exam question paper leaks, according to Furo (2015:6). There are times when certain law enforcement officers stationed at schools are bribed (Akintunde & Musa, 2016:112).

4.6.3 Do all personnel handling the Grade 12 examination question papers (officials, printing, delivering, storing guarding) undergo background checks and screening? (See Annexure “C” Question 27)

- Participants A1, B2, D4, E5, F6, G7, H8, J9, L11, K12, N14 and O15: said *“no, not everyone handling the question papers underwent background checks and screening”*.
- Participants B3 and M13: said they *“are not sure if all personnel have done a background check as they didn’t do it themselves”*.

Participants’ responses to the question show that most of the departmental staff were not vetted or screened. The study further revealed that the majority of the participants, which is 88 percent (n=12) of the 15 participants, indicated that not everyone had gone through the process of background check, while 12 percent (n=3) of the 15 participants indicated that they were *“not sure*

Interpretation

Most participants admitted that not all of the staff had gone through the screening and background checks. Of the fifteen participants, three (3) said they were "not sure." To preserve the integrity of the exam papers in this instance, the staff handling the question papers had to go through a screening procedure. According to Mdluli (2011:3), vetting is the practice of carefully or critically examining a candidate before hiring them or conducting an examination and evaluation. In general, vetting refers to running a background check on a candidate before hiring them or bestowing an honour upon them. To preserve the integrity of the examination paper in this situation, staff handling exam question sheets must go through a screening procedure. It is imperative, according to (Nyaga, 2017), that all staff members participating in the examination process receive training regarding the significance of upholding the integrity of examination papers.

4.6.4 What are the measures that are put in place during the delivery of examination question papers? (See Annexure “C” Question 28)

- Participants A1, D4, I10 and O15: said they *“are not sure as this information is treated as confidential”*.
- Participants B2, H8, L11 and N14: said *“drivers are not allowed to use their*

cellphones while on the way to deliver question papers”.

- Participants C3 and K12: said *“drivers are not allowed to drive at a speed of more than 100km per hour to reduce the chances of accidents”.*
- Participants E5, F6 and M13: *“All the delivery vehicles are escorted by the police and security guards”.*
- Participants G7 and J9: said *“question papers are packaged inside the bins with seal numbers. If one (1) bin is opened, it will be difficult to seal the bins again”.*

The researcher was interested in learning about the safety precautions taken when distributing the questions papers. Participants A1, D4, I10 and O15 which represent 16 percent (n=4) of the 15 participants, mentioned they were not sure as the information is confidential. The majority of participants, which represent 84% percent (n=11) of the 15 participants, mentioned that various measures are in place, such as a police escort, drivers not allowed to use their cellphones en route and the use of bins to load the question papers.

Interpretation

Concerning the safety precautions taken in question paper distribution, the researcher was interested in learning more. Four (4) individuals indicated in the comments above that they were unsure since the Department keeps the information private. A police escort, the prohibition on drivers using cellphones while driving, and the usage of bins to load question papers are only few of the measures that most participants cited. Exam leakage is also influenced by the method of transportation used to carry question papers, according to Mashanyare and Chinamasa (2014:50).

4.6.5 What is the contingency plan if vehicles delivering Grade 12 question papers are hijacked? (See Annexure “C” Question 29)

- Participants A1, D4, I10, L11 and O15: said that they *“are not sure as the information is confidential and not divulged to anyone”.*
- Participants B2, C3, G7, H8 and J9: said that *“the drivers should call police”.*

- Participants E5, F6 and M13: said *“it is unlikely that the vehicles can be hijacked because they are being escorted by the police”*.
- Participants K12 and N14: said they *“see the possibility of hijacking as they delivery is done during quiet times”*.

Interpretation

The researcher was interested in learning what would happen in the event that a car carrying exam papers was hijacked. A total of four participants mentioned that they are not sure as the information is kept confidential, while five participants indicated that the drivers should call the police. Five of the fifteen participants stated that it is improbable that someone would hijack a delivery vehicle because the police would be escorting them. The inputs above show that not all the participants knew the contingency plan in the event of vehicle hijacking while delivering question papers.

4.6.6 Is the strong room register in place to record the movement of the Grade 12 examination question papers when in the storage area? (See Annexure “C” Question 30)

- Participants A1, B2, C3, D4, F6, H8, J9, I10, K12, M13, N14 and O15: said *“yes, there is a strongroom register”*.
- Participants E5 and G7: said *“yes, there are strong room register, officials who access the strong room fill in the strong register”*.
- Participant L11: *“not sure because he never accessed the strongroom”*.

Interpretation

If a strongroom register is in place to monitor the movement of the question papers and the staff, that is what the researcher needed to know. Most of the attendees attested to the fact that question paper movement is tracked by strongroom registers. The only participant who expressed uncertainty about the register's existence was one (1).

4.6.7 Does the strong room have a locking door mechanism? (See Annexure “C” Question 31)

- Participants A1, B2, C3, D4, E5, F6, G7 H8, J9, I10, K12, M13, N14 and O15 said *“yes, the strong room has a locking door mechanism”*.
- Participant L11: *“not sure because he never accessed the strongroom”*.

Interpretation

In response to the question above which asked participants to indicate if the strong room has a locking mechanism. Fourteen (14) participants mentioned yes, while only one (1) participant said he is not sure. The deduction above confirms that the strong room has the locking mechanism and this augment other security measures in place.

4.6.8 What security measures are taken to prevent cell phones and laptops from being brought into a printing facility, where the Grade 12 examination question papers are printed? (See Annexure “C” Question 32)

- Participants A1, B2, C3, E5 and H8: said *“officials are being subjected to the body searches”*.
- Participants D4 and K12: said *“everyone who goes into the printing facility is being searched, but sometimes you find only males security guards and can’t search female staff”*.
- Participants F6 and M13: said *“access into the printing facility is controlled, searches are conducted by the security guards”*.
- Participants G7 and I10: said *“there is a register where everybody should declare their phones”*.
- J Participants 9: *“security personnel have a designated area at the entrance where all unnecessary equipment is registered and stored for the individual entering the printing area”*.
- Participants L11: *“not sure because he never accessed the printing area”*.
- Participants N14: *“searches are conducted at the door and but sometimes you find that there is no security at the door”*.
- Participants O15: *“not sure as this information is confidential and the print room is at the basement”*.

Interpretation

The researcher intended to find out if any procedures were in place to keep electronics out of the printing area. The preponderance of respondents indicated that protocols are in place to guarantee that mobile phones and laptops are not introduced into the printing establishment. A small percentage of participants said that they were unsure of the existence of the measures. This suggests that security mechanisms are in place to prevent cellphones from accessing the printing area. But given that a few individuals expressed uncertainty, it raises some questions. This demonstrates that, despite the existence of certain safeguards, their complete implementation is hindered because some personnel are unaware of them. Technology can spread exam question leaks through emails, cell phones, and other electronic devices, according to Mashanyare and Chinamasa (2014:50).

4.6.9 Are officials being subjected to body searches upon entering the printing facility? (See Annexure “C” Question 33)

- Participants A1, B2, C3, E5, F6, G7, H8, J9, I10, M13, N14 and O15: said *“yes searches are conducted”*.
- Participant L11: *“not sure because he never accessed the printing area”*.
- Participants D4 and K12: said *“everyone who goes into the printing facility is being searched, but sometimes you find only males security guards and can’t search female staff”*.
- Participant O15: said he is *“not sure as this information is confidential and the print room is at the basement”*.

Interpretation

The researcher was interested in learning whether searches take place before authorities in the printing room are given access. Since the information is mostly kept confidential, most participants stated that searches are done before entering the printing facility, and only a small number stated that they have never visited the location. The researcher can infer that, despite searches being done, there are instances where there is just a male or female guard at the door, making it challenging to search the other gender. This gives rise to certain concerns because

it could be a time for opportunist crime.

4.6.10 What are the ideal security systems that can be put in place to prevent examination paper leakage? (See Annexure “C” Question 34)

- Participants A1, D4, J9 and N14: said *“the Department of Education must install CCTV cameras and fingerprint biometric readers”*.
- Participant B2: *“security awareness workshops should be conducted every time there is an exam”*.
- Participants C3, I10 and O15: said *“bins carrying question papers should be installed with a tracker monitoring”*.
- Participant E5: *“the department should rotate security guards who are deployed to monitor the printing and storage facilities”*.
- Participant F6: *“the department must not print and package different subjects at the same time”*.
- Participant G7: *“the department should not print and package different subjects at the same time”*.
- Participant H8: *“the department should vet all examination staff during recruitment stage and after five (5) years”*.
- Participant L11: *“printing machines must be inspected or flushed off after each print work”*.
- Participant K12: *“drivers must not deliver the question papers to the same destination every day”*.
- Participant M13: *“the Department should build and install double locking strong rooms at the schools”*.

Interpretation

In order to find out what participants believed should be done to strengthen security measures that can stop question papers from leaking, the researcher posed this question. The vast majority of participants recommended that the department should build strong rooms at the schools and install CCTV cameras. The participants also made it apparent that there are numerous security measures that may be put in place to secure the exam papers, thus the Department of Education will need to take these suggestions into consideration. According to Udim et al. (2018:206), another reason for examination leakage is the inadequate infrastructure in storage locations.

4.6.11 Are the norms and standard of handling Grade 12 examination question papers adhered to? (See Annexure “C” Question 35)

- Participants A1 and G7: said *“the norms and standards indicate that all question papers should be stored in a strong room. But in other areas, they are stored in classes and staff rooms”*.
- Participants B2 and E5: said they *“are not being followed because of lack of awareness workshops”*.
- Participants C3, D4 and F6: said not, *“because sometimes more than one question papers are printed at the same time”*.
- Participants H8 and O15: said they *“are not sure if they are followed”*.
- Participants J9 and N14: said *“yes, although when there is a pressure, it is difficult to comply with them”*.
- Participants I10 and K12: said *“yes, but printing question papers is a very strenuous job as there is too much pressure”*.
- Participants L11 and M13: said they are *“not sure”*.

Interpretation

The researcher aimed to ascertain whether the norms and standards for managing question papers are followed when asking this question. According to the study, two (2) of the 15 participants stated that norms and standards are observed, while the

other participants claimed that they are not followed. This indicates that the guidelines established by the Norms and Standards are not followed when handling the question papers. According to (Zungu, 2020), the policies and regulations that regulate the examinations are crucial and include Norms and Standards.

4.7 Section E: General

4.7.1 Is there anything further you would like to add?

The study indicated that the majority, 76% percent (n=9), of the participants answered this question and 24 percent (n=6) of the 15 participants did not answer this question. Therefore, in terms of anything that participants wanted to add to assist further with this study, 76 percent (n=9) of the participants mentioned that the Mpumalanga Department of Education should install the advance security systems and avoid printing bulk question papers at the same time. (Smith, 2021) indicate that utilizing advanced encryption techniques for digital examination papers and secure distribution channels will protect against hacking and unauthorized access of the question papers.

By examining the supplementary data above, which was supplied by the nine (09) participants, it is evident that the department needs to improve the infrastructure in exam premises by building strongrooms, installing CCTV cameras, biometrics systems, alarm systems, deploying physical guarding in all exam centres and printing one question paper at the time.

4.8 Observation (See Annexure “B”)

The researcher visited two examination centres where the question papers were distributed and stored from 22 to 25 April 2019 (refer to Annexure B). The researcher visited the examination centres during office hours on the designated days to examine the security measures that were in place to secure the distribution and storage of question papers. The researcher's observation checklist was divided into four categories: physical guarding, delivery trucks, perimeter fence and CCTV cameras. Most of the security procedures were not followed during these visits and, according to the researcher, this compromised the confidentiality of the question papers.

The most common security measures which were used to ensure the safety and security of the question papers were CCTV cameras, boom gates, perimeter fences and deployment of security guards. Furthermore, the researcher discovered that the exam centres had the following security measures in place during the observations the researcher made from April 22 to 25, 2019:

- Security personnel: All main entrances of the exam centres had guards who were conducting access control.
- CCTV cameras: Cameras were installed in strategic areas such as the front, back and side elevations of the premises but the cameras were not monitored for 24 hours.
- Perimeter fence: One exam centre perimeter was surrounded by a Clearview fence, and the other centre (exam centre B) had a cracked security wall. It was not clear as to why exam centres were using different types of fences as opposed to a specific fence as a standard measure.
- Delivery trucks: The trucks were not escorted by the Police but only the armed security guards who were using the Department of Education's vehicles. The trucks were not recorded and searched at the main gate and the guards mentioned that they knew the drivers as they come often to the centres for the delivery.

4.9 Summary

Exam question papers leakages for Grade 12 students were one of the study's objectives, which included evaluating vulnerabilities. A literature study, in-person interviews with 15 staff members, and observation were all carried out by the researcher using a qualitative technique. Participants from both sexes participated in the study. The data was reviewed by the researcher once data collection was complete. Analysis, interpretation, and conclusion were drawn with respect to the study's goals based on data from the semi-structured interviews and observation checklist. The researcher's conclusions - which will be discussed in the next chapter along with findings and recommendations were influenced by the study's results.

CHAPTER 5: FINDINGS AND RECOMMENDATIONS

5.1 Introduction

The research findings and recommendations are shown in this chapter. The researcher's analysis and interpretation of the data the researcher gathered for the study led to the conclusions. Recommendations were developed in light of the findings. In Mbombela Municipality in Mpumalanga Province, South Africa, Grade 12 examination question papers are known to leak. The purpose of this study was to assess the current vulnerabilities and pinpoint specific risk factors to reduce this leakage. Additionally, where necessary, appropriate security measures were established to ensure that Grade 12 examination question papers are adequately protected from leakage. A literature review, one-on-one interviews, and observations were used in this study's data collection process. After that, Chapter 4's analysis and interpretation of the data led to the conclusions and recommendations that were given in this chapter.

5.2 A summary of the research

The Mpumalanga Department of Education gave the researcher permission (see attached Annexure B) to do research in its district offices as the case study for this study. Fifteen (15) officials in total, out of 30 officials, made up the study's sample. The officials included Chief Education Specialists, Deputy Education Specialists and Senior Administration Officers in charge of item development and question paper printing, examiners responsible for setting question papers, the examination security manager responsible for security services of question papers, circuit managers responsible for receiving and dispatching of question papers, drivers responsible for delivering question papers to the circuit offices, print room managers and printing machine operators responsible for printing question papers and physical guarding at the print room. The researcher then conducted a qualitative analysis and interpretation of the data.

To mitigate the leakage of Grade 12 examination question papers in Mbombela Municipality in Mpumalanga Province, South Africa, the goal of this study was to conduct an assessment on the current vulnerabilities and identify specific risk factors by interviewing 15 officials in the Mbombela Municipality in Mpumalanga

Department of Education, South Africa who are in charge of administering examination question papers. This allowed for the improvement of security measures to ensure that Grade 12 examination paper leakage will be prevented and managed at all costs. The recommendations for the education departments in Mbombela Municipality in the province of Mpumalanga, South Africa were derived from the study's findings. With the intention of assembling findings and recommendations, the study's justification, research problem, research questions, aim, and research objectives were assessed.

5.3 Findings related to the research questions

From the data the researcher collected through one-on-one interviews, the following inferences were made. Biographical details about the participants are covered in Section A; security risk factors associated with the leakage of Grade 12 exam question papers in Mbombela Municipality in Mpumalanga Province, South Africa, are covered in Section C; vulnerabilities related to the Grade 12 exam question papers in Mbombela Municipality in Mpumalanga Province, South Africa, are covered in Section B; and general additional information from the participants is covered in Section E.

Ten males and five females made up the study's fifteen participants. The majority of the participants were in the age range of 25 to 29. The majority of participants, according to the report, were single in terms of marital status. The majority of participants, according to the study, held certificate credentials as their greatest educational achievement.

5.3.1 Findings of research question 1

The following research question was posed in order to identify the vulnerabilities connected to the question paper leakage:

Research question 1: *Which vulnerabilities are presently associated with the leakage of Grade 12 examination question papers in Mbombela Municipality in Mpumalanga Province, South Africa?*

Based on this question, the data showed that printing and packaging are the main

causes of examination question paper leaks. The simultaneous production and packaging of multiple question papers, as well as a lack of personnel supervision, are the causes of this. A portion of the leaks occur when the question papers are being transferred to the districts, where two question papers - one to be written in the morning and one in the afternoon - are transported simultaneously. This implies that since the question papers are delivered by the same drivers each year, the afternoon paper could be jeopardized. Another reason for question paper leaks is the usage of the same security guards year after year without any rotation or security clearances performed on staff members. Due to inadequate infrastructure, particularly in remote areas where it is challenging to keep question papers safe, some leaks happen at schools. A few participants have hinted that the examination question paper leaks may have been caused by unmonitored staff movement in and out of the strongroom. Employees eat lunch at the same time every day without any set schedule, leaving the printing firm officials alone.

According to the researcher, these vulnerabilities might be used by people or organizations looking to obtain unauthorized access to test questions. The effects of these leaks may be dire, since they may jeopardize the integrity of the testing process and inflict much anxiety on students hoping to graduate from college with a pass from a fair examination rather than one linked to cheating. Organizing the printing, packaging, and delivery of examination questions is a laborious process that many examination bodies find challenging when it comes to administering exams. This includes scheduling the exam, keeping an eye on candidates while they write it, administering it in several sites, making sure the question papers aren't tampered with, and managing the entire process from beginning to end to maintain the exam's integrity. To combat this threat and preserve the integrity of the examination process, a high level of security is required; if attained, this could be expensive but advantageous.

Nnam and Out (2015:65) claim that a wide range of people are closely connected to the misbehaviour, including parents, teachers, exam authorities, and even security officers. Lack of shelving, lack of awareness among officials, and lack of quality inspections are the causes of the mixed-up question papers. Exam paper leaks can originate from the distribution point in some cases. The disclosure of exam

question papers is the fault of both security personnel and exam officials (Furo, 2015:6). According to Suleman, Gul, Ambrin, and Kamran (2015:168), there is also another reason for examination leakage when there is no security guard present. According to Leonard, Alhaji, and Linus (2019:49), changing out the supervisors of examination centres and installing CCTV cameras in every exam hall to monitor malpractices were all suggested as creative ways to reduce exam insecurity.

Biometrics, according to Sabhanayangam et al. (2018:2276), is the term used to describe particular physiological or behavioural traits that are specifically linked to an individual. By giving their children money to buy leaked exam papers, parents can help their children play a part (Dada, 2014: 22). Exam leakage at the printing site occurs frequently (Raji & Okunlola, 2017:6). According to Kobiowu and Alao (2005:44), the question paper printer is usually the source of leaks. Certain leaks happen when question papers are printed and packaged (James et al., 2015:22). Exam paper storage and transportation are major areas of vulnerability. Unauthorized access may be possible due to weaknesses in certain places. Research shows that insufficient security precautions taken at storage facilities and during transit raise the possibility of leaks (Kitaing, 2019).

It is acknowledged by Gbagolo (2011:3) that question paper leaks happen when the papers are printed by individuals who are in charge of them. The majority of leaks happen during the production and packaging of question papers, according to Kobiowu and Alao (2005:44). Ifeakor and Anekwe (2010:361) state that one factor contributing to question paper leakage is incorrect management of examination question papers during printing.

5.3.2 Findings of research question 2

In order to establish the security risk factors associated with the leakage of question papers, the following research question was asked:

Research question 2: *What security risk factors are associated with the leakage of Grade 12 examination question papers Mbombela Municipality in Mpumalanga Province, South Africa?*

According to the study, an unscreened and unvetted workforce - including security

guards and staff that handles question papers is a major contributor to leaks. In an effort to raise their pass rates, several schools experience leaks. Working with examination question papers exposes some staff members to the temptation of question paper theft for financial gain. Some students bring devices into the test room that the monitors and invigilators fail to notice, which is another risk concern.

After considering the aforementioned discussion, the researcher believes that everybody who handles sensitive material should undergo screening, including security guards who handle examination papers. It is required that anyone handling exam materials go through screening, complete a declaration of secrecy form, and disclose if they have family members who are writing the exam they are reviewing. It is recommended that only officials with the necessary security clearance be permitted to handle examination papers in order to enhance their security.

Some parents even purchase question papers for their children, according to Permenus (2015:21), which gives the idea that the goal always justifies the means. When exams are administered by unreliable individuals, it encourages parents or students to bribe those individuals in order to give a student the chance to cheat on the examination. Most parents want their children to be thought of as geniuses who should be able to attend prestigious universities and succeed there. According to Thompson and Ansoglenang (2019:10), there is evidence indicating that students, parents, and school authorities have collaborated to commit malpractices.

Because examination papers can leak, Phiri and Nakamba (2015:327) suggest that all officials who work with question papers utilize and complete a statement of confidentiality.

5.3.3 Findings of research question 3

Research question 3: *How should the vulnerabilities be eliminated to mitigate the leakage of the Grade 12 examination question papers in Mbombela in Mpumalanga Province, South Africa?*

Based on the research question, the findings showed that before being delivered, question papers are put in bins and sealed with plastic cable ties. The study also revealed that it is simple to tamper with these cable ties by cutting them off and

replacing them with fresh ones that are the same colour. The study also discovered that several examination question papers are inadvertently packed with examination question papers from other subjects when they are printed simultaneously. Because they work in the question papers section permanently, the staff members who handle the papers are also susceptible to bribery because of their familiar surroundings. It was also discovered that while they are accustomed to exam procedures, they do not receive any training on managing exam papers.

Additionally, the research found that exam centre monitors can be local residents. They could feel conflicted if they know people who are taking examinations at those locations. The security of the question papers is compromised by employees who are not allocated to the examination question papers division having easy access to the printing area facility. Simui et al. (2017:299) state that in order to maintain exam fairness and prevent exam papers from being in schools ahead of time, exam papers should be printed and sent to centres daily.

5.4 Recommendations

Drawing from the research questions, the following recommendations are put forward:

5.4.1 Recommendations based on the findings research question 1:

Based on the research findings of research question 1, the following recommendations are made:

- The Department should avoid printing different question papers at the same time.
- Question papers should be packaged separately without mixing the question papers, for instance, Mathematics paper 1 and 2.
- All staff members printing question papers should be monitored by CCTV cameras for the entire day.
- Drivers, employees, security and police officers should be rotated every examination period. This should be preceded by the awareness workshops where the roles and responsibilities of all the stakeholders are clearly

defined.

- Question papers should be delivered twice a day just before the examinations start.
- Infrastructure at rural schools should be improved especially where examination question papers are kept overnight.

Inadequate classroom, laboratory, and test centre furnishings, including desks, seats, and working tables, might lead to cheating, claims Kagete (2008:19).

5.4.2 Recommendations based on the findings of research question 2:

Based on the research findings of question 2, the following recommendations are made:

- All the employees, security guards, teachers, principals and police officials handling the question papers should be subjected to vetting and undergo polygraph tests annually.
- Everyone, including teachers and examiners, should complete a declaration of confidentiality form every examination cycle.
- Learners should not be allowed to bring gadgets, such as cellphones and smart watches, into the examination rooms.

5.4.3 Recommendations based on the findings of research question 3:

Based on the research findings of research question 3, the following recommendations are made:

- The Department should adhere to the printing plan and refrain from printing question papers in bulk for different subjects.
- Bins should be sealed off with the unique digital seals and not cable ties. The seal numbers should then be recorded during dispatch. This will make it difficult for the drivers to tamper with the seals en route to the exam centres.
- The department should deploy exam monitors who are not from the same area where the exam is written. Their primary duties will be to monitor the exam centres during the examination.

- All the employees, security guards and the police should be trained on the management and handling of examination papers.
- Biometric fingerprints and attendance registers should be used to ensure that only authorised personnel have access to the printing area. Every checkpoint should have security personnel stationed to make sure no one enters the printing area illegally.

Exam leakage can be prevented by switching test centres and supervisors, according to Shaibu, Yakubu, and Igoche (2019:49). CCTV surveillance cameras can be installed in all exam halls to monitor for malpractices.

5.5 Recommendations for additional research

The researcher suggests conducting additional research in the following fields:

- Find out how and by whom scribbles are destroyed after Grade 12 question papers are set by the examiners.
- Examine the management and control of emergency question papers, which are provided at exam centres along with the majority of question papers.
- Determine whether students are likely to use smart watches to save information during tests in order to cheat.

5.6 Conclusion

The present security procedures implemented by the Department of Education to safeguard exam materials at printing rooms, distribution centres, and exam centres were judged to be partially effective in the study. Annually, examination question papers leaks occur in spite of these security precautions. Hence, whether they are being moved or are being stored, question papers need to be protected at all times. In order to secure examination questions papers and preserve the integrity of the examination procedures, it is the responsibility of the Department of Education to guarantee that all security measures are completely engaged. The researcher took into account participant responses, observations, and a review of the literature to ensure the validity and trustworthiness of the study's conclusions and recommendations. This chapter's recommendations could assist the Department of

Education in enhancing the security and safety of the exam question papers.

LIST OF REFERENCES

- Achio, S., Ameko, E. & Kutsanedzie, F. 2012. Concerns on issues of examination malpractices: A case study of ACCRA polytechnic. *Natural and Applied Sciences*, 3(2):145–152.
- Adeyemi, T. O. (2019). Enhancing the Security of Examination Papers. *Journal of Education and Practice**, 10(3), 45-53.
- Adler, E.S. & Clark, R. 2015. *An invitation to social research: How it's done* (5th ed.). Stamford, CT: Cengage Learning.
- Adow, I.M., Alio, A.A. & Thinguri, R. 2015. An assessment of the management KCS examination and its influence on irregularities among students: A case of secondary schools in Mandera County, Kenya. *Journal of Education and Practice*, 6(28):15–22.
- Agnew, R. 1985. A revised strain theory of delinquency. *Journal of Research in Crime and Delinquency*, 64(1):157–167.
- Agnew, R. 1992. An empirical test of general strain theory. *Criminology*, 30(4): 475–500.
- Agnew, R. 2001. Building on the foundation of General Strain Theory: Specifying the types of strain most likely to lead to crime and delinquency. *Journal of Research in Crime and Delinquency*, 38(4):319–61.
- Airmic. 2010. *A structured approach to enterprise risk management (ERM) and the requirements of ISO 31000*. The Public Risk Management Association. Available at https://www.theirm.org/media/886062/ISO31000_doc.pdf. Accessed on 15 September 2021.
- Ajelabi, P.A. 2018. About the utilisation of technologies in curbing examination misconducts in a Nigerian University. *Journal of Educational Research and Review*, 1(1):25–34.
- Akaranga, S.I. & Ongong, J.J. 2013. The phenomenon of examination malpractice: An example of Nairobi and Kenyatta Universities. *Journal of Education and*

Practice, 4(18):87–97.

Akintunde, O.O. & Musa, G.S. 2016. Pragmatic techniques of curbing examination malpractices in secondary schools in Nigeria. *Asian Pacific Journal of Education, Arts and Science*, 3(1):110–115.

Alnatheer, M. & Nelson, K. 2009. *Proposed framework for understanding information security culture and practices in the Saudi context*. Proceedings of the 7th Australian Information Security Management Conference, Perth, Western Australia, 1st to 3rd December.

Al-Nokee, S.A. 2018. *Question paper lead in public examinations: The frequent incidence of leaking out question paper is a grave concern for the nation*. Available at: <https://m.theindependentbd.com/printversion/details/137617> (accessed on: 14 September 2020).

Alshboul, A. 2010. *Information systems security measures and countermeasures: Protecting organizational assets from malicious attacks*. Available at: <https://ibimapublishing.com/articles/CIBIMA/2010/486878/> (accessed on: 14 September 2020).

Alvesson, M. & Gabriel, Y. 2013. Beyond Formulaic Research: In praise of greater diversity in organizational research and publications. *Journal of Academy in Management Learning and Education*, 13(2):245–63.

Amundrud, O., Aven, T. & Flage, R. 2017. How the definition of security risk can be made compatible with safety definitions. *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability*, 231(3):286–294.

Andafu, E.M., K’Odhiambo, A.K. & Gunga, S.O. 2019. A philosophical justification for a paradigm shift to the metaphysical approach in combating examination malpractices among teachers in Kenya. *International Journal of Education and Research*, 7(2):1–10.

Annenbaum, C., Greaves, L. & Graham, I.D. 2016. Why sex and gender matter in implementation research. *BMC Med Res Methodol*, 16:145.

- Anzene, S.J. 2014. Trends in examination malpractice in Nigerian educational system and its effects on the socio-economic and political development of Nigeria. *Asian Journal of Humanities and Social Sciences*, 2(3):1–8.
- Ashiagbot, K.K. 2019. *Examination malpractice at WASSCE in Ghana: The challenges of utilizing information and communication technology*. The 37th Annual AEEA Conference, Abuja-Nigeria from 5–9 August 2019, 1–20.
- Babbie, E.R. 2016. *The practice of social research* (15th ed.). Boston, MA: Cengage Learning. <https://au.cengage.com/c/the-practice-of-social-research-44-15th-edition-15ebabbie/9780357360767/>
- Bajinath, N. & Singh, D. 2019. Examination cheating: Risks to the quality and integrity of higher education. *S Africa J Sci.*, 115(11/12): Art. #6281. Available at: <https://doi.org/10.17159/sajs.2019/6281> (Accessed on 6 August 2021).
- Bhirangi, R. & Bhor, S. 2016. Automated question paper generation system. *International Journal of Emerging Research in Management & Technology*, 5(4):28–34.
- Braun, A. & Clarke, V. 2013. *Successful qualitative research: A practical guide for beginners*. Thousand Oaks, CA: Sage.
- Cavalcanti, E.R., Pires, C.E., Cavalcanti, E.P. & Pires, V.F. 2012. Detection and evaluation of cheating on college exams using supervised classification. *Informatics in Education Vilnius University*, 11(2):169–190.
- Chaminuka, L. & Ndudzo, D. 2014. Students and staff perceptions on examination malpractice and fraud in higher education in Zimbabwe. *Asian Journal of Humanities and Social Sciences*, 2(2):78–90.
- Champion, D.J. 2000. *Research methods for criminal justice and criminology*. Hoboken, NJ: Prentice Hall.
- Chuenyane, G. 2010. Matric farce in Mpumalanga. *City Press*. 07 Nov. Available at <http://www.news24.com/SouthAfrica/News/Matric-exam-farce-in-Mpumalanga-2010> (accessed on 29 April 2019).

- Chux, O. 2018. WAEC denies leakage of question papers. *Punch*. 04 May. Available at <https://Punchng.com/2018-Wassce-Waec-denies-leakage-of-question-papers/> (accessed on 08 April 2019).
- Clandinin, D. & Connelly, F. 1994. *Personal experience methods*. Thousand Oaks, CA: Sage.
- Coetzee, J. 2015. We had exam papers before the exams: Mpumalanga Matrics-*The Citizen*. 30 June.
- Cohen, L., Manion, L. & Morrison, K. 2011. *Research methods in education*. London: Routledge.
- Corbin, J. & Strauss, A. 2015. *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). Thousand Oaks, CA: Sage.
- Creswell, J.W. 2009. *Research design: Qualitative, quantitative and mixed methods approaches*. 3rd edition. London: Sage.
- Creswell, J.W. 2013. *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Creswell, J.W. 2014. *Research design: Qualitative, quantitative, and mixed methods approach* (4th ed.). Thousand Oaks, CA: Sage.
- Creswell, J.W. 2017. *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.
- Crime Statistics South Africa. 2019. Available at: <https://hdl.handle.net/10520/EJC-192ca0bdf2> (Accessed on: 30 July 2023)
- Crime Statistics SA. 2020/21. *SAPS Crime Stats*. Available at: <http://www.crimestatssa.com/precinct.php?id=215> (Accessed: 11 June 2023).
- Crump, D. 2018. Deterrence. *St. Mary's Law Journal*. Vol. 49, No. 2, Art. 2
- Dabone, K.T., Graham, Y.A., Fabea, I.B. & Dabone, A.S. 2015. The perception and

reasons of examination malpractice among students. *International Journal of Innovative Research and Development*, 4(4):145–148.

Dada, O.M.O. 2014. A sociological investigation of the causes, effects and solutions to the problem of examination malpractice: The opinions of the Crawford University students in Nigeria. *International Journal of Advanced Research in Management and Social Sciences*, 3(5):19–34.

Dambhare, S., Dahare, K., Namdagwali, B., Banait, M. & Wanjari, K. 2018. Paper leak security system. *International Journal of Scientific Research in Science, Engineering and Technology*, 4(1):123–126.

Delport, C.S.L. & Roestenburg, W.J.H. 2011. Qualitative data collection methods: Indexes and scales. (pp. 171–205). In A.S. de Vos, H. Strydom, C.B. Fouche & C.S.L. Delport (Eds.). *Research at grass roots: For the social sciences and human services professions* (4th ed.). Pretoria: Van Schaik.

Denzin, N.K. & Lincoln, Y.S. (Eds.). 2011. *The SAGE handbook of qualitative research* (4th ed.). Thousand Oaks, CA: Sage.

Department of Basic Education (DBE). 2014. *Regulations pertaining to the conduct, administration and management of the National Senior Certificate examination*. Pretoria: Government Printers. Available at <https://education.gov.za/Portals/0/Media/Preess%20Releases/BASIC%20EDUCATION%20DEPARTMENT%20INVESTIGATING%20THE%20LEAK%20OF%20MATRIC%20EXAM%20QUESTION%20PAPERS.pdf?ver=2020-12-02-145933-077> (accessed on 07 June 2021).

Department of Basic Education (DBE). 2020. *Basic Education Department investigating the leak of matric exam question papers*. Pretoria: Government Printers.

Driscoll, D.L. 2011. *Introduction to primary research: Observations, surveys and interviews*. Anderson, NC: Parlor Press.

E&T Editorial Staff. 2019. *Exam papers to be tracked using microchips as police probe test leaks*. 24 April. Available at

<https://eandt.theiet.org/content/articles/2019/04/school-exam-papers-to-be-tracked-using-microchips-as-police-probe-test-leaks/> (accessed on 07 June 2020).

- Edmonds, F. & Kennedy, T.D. 2017. *An applied guide to research designs: Quantitative, qualitative, and mixed methods* (2nd ed.). Thousand Oaks, CA: Sage.
- Ellis, P. 2016. The language of research (Part 11: Research methodologies: Interview types). *Wounds UK*, 12(1):104–106.
- Folson, D. & Awuah, F.K. 2014. Combating examination malpractices in the Basic Education Certificate Examinations (BECE) in Ghana. *International Journal of Computer Applications*, 100(7):12–23.
- Fouche, C.B. & Schurink, W. 2011. *Qualitative research design*. Pretoria: Van Schaik.
- Funso, P.S. 2016. An investigation on parental role in curbing examination malpractice in our education system. *International Journal of Social Science and Humanities Research*, 4(3):624–628.
- Furo, P.T. 2015. Student's perception of examination malpractice in Rivers State University of Education Port Harcourt. *American Journal of Scientific and Industrial Research*, 6(1):5–11.
- Gbagolo, H. 2011. Examination malpractices in Nigeria: A review of literature. *Continental Journal of Social Sciences*, 4(3):1–10.
- Gibbs, J.P. 1986. *Deterrence theory and Research*. Lincoln, NE: University of Nebraska Press.
- Gower, P. 2010. Motshekga Acts on Exam Leaks. Johannesburg: *Mail & Guardian*. 08 January 2010. Available at: <https://mg.co.za/article/2010-01-08-motshekga-acts-on-exam-leaks/> (Accessed on 22 June 2024)
- Govender, P. 2015. Matric cheats uncovered in seven out of nine provinces. *Times Live*, 4 January. Available at: <https://www.timeslive.co.za/news/south->

africa/2015-01-04-matric-cheats-uncovered-in-seven-out-of-nine-provinces/
(Accessed on 6 August 2021).

- Grinnell, R.M. & Unrau, Y.A. (Eds.). 2014. *Social work research and evaluation: Foundations of evidence-based practice* (10th ed.). New York: Oxford University Press.
- Guba, E.G. & Lincoln, Y.S. (Eds.). 2011. *The SAGE handbook of qualitative research* (4th ed.). Thousand Oaks, CA: Sage.
- Halai, A. 2006. *Ethics in qualitative research: Issues and challenges*. Plenary Address: Multi-Disciplinary Qualitative Research in Developing Countries, Aka Khan University, Karachi, November.
- Hardwick, L. & Worsley, A. 2011. *Doing social work research* (2nd edition). Thousand Oaks, CA: Sage.
- Hernandez, K. & Wambura Ngunjiri, F. 2013. Relationships and communities in autoethnography. (Pp. 262–299). In S. Holman, T. Adams & C. Ellis (Eds.). *Handbook of autoethnography*. Walnut Creek, CA: Left Coast Press.
- Ifeakor, A.C. & Anekwe, J.U. 2010. Achieving standard in secondary education through the eradication of examination malpractice: The Nigerian experience. *African Research Review*, 4(4):357–377.
- Ifijeh, G., Onuoha, O., Ilogho, J. & Osinulu, I. 2015. Emergence of hi-tech examination malpractices in Nigeria: Issues and implications. *International Journal of Education and Research*, 3(3):113–122.
- Imenda, S. 2014. Is there a Conceptual Difference between Theoretical and Conceptual Framework? *Journal of Social Sciences*, 38:185–195.
- Ituma, E., Nnandi, F.U. & Nche, G.C. 2014. The resilience of examination malpractice in Nigeria: Cultural and religious approach. *International Journal of Research in Social Science and Human Development*, 6(1):199–205.
- Jaccard, J., Jacoby, J. 2010. *Theory construction and model building skills: Practical guide for social scientists*. London: The Gilford Press.

- James, A.O., Olatona, O. & Samuel, J.O. 2015. Perceptions of polytechnic students towards examination malpractice. *Research & Reviews: Journal of Educational Studies*, 1(1):20–29.
- Jordan, N. 2019. UNISA confirms exam papers were leaked, and police know who did it. *Sowetan*. Available at: <https://www.sowetanlive.co.za/news/south-africa/2019-11-18-unisa-confirms-exam-papers-were-leaked-and-police-know-who-did-it/> (accessed on: 14 September 2020).
- Jore, S.H. 2019. The conceptual and scientific demarcation of security in contrast to safety. *International Journal of Security Research*, 4(2019):157–174. Available at: <https://link.springer.com/content/pdf/10.1007/s41125-017-0021-9.pdf> (accessed on: 14 September 2020).
- Kagete, P.M. 2008. *Examination malpractice in Kenya*. Unpublished Master's thesis of Education Dissertation, University of Nairobi, Kenya.
- Kellegan, T. & Greeney, V. 2020. *Public examinations examined*. Washington, DC: World Bank.
- Kemunto, K.Z. 2016. *Cheating in national examinations in Kenya: Aristotelian akratic analysis of causes and remedies*. Unpublished Dissertation, University of Nairobi, Kenya.
- Kennasecurity. 2021. *Risk threat, or vulnerability? How to tell the difference?* Available at: <https://www.kennasecurity.com/blog/risk-vs-threat-vs-vulnerability/#:~:text=> (Accessed on 16 September 2021).
- Kitaingi, K. 2019. Logistical Challenges in Examination Security. *East African Journal of Education*. 15(1), 23-31
- Kivunja, C. 2018. Distinguishing between theory, theoretical framework, and conceptual framework: A systematic review of lessons from the field. *International Journal of Higher Education*, 7(6):44–53.
- Kobiowu, S.V. & Alao, F. 2005. The challenges of examination management in the developing societies: The Nigerian scenario. *International Journal of African*

American Studies, IV(2):40–47.

- Kole, O.J. 2010. *An examination of security measures for the protection of petrol stations: An analysis of case studies in Gauteng*. Unpublished PhD Dissertation, University of South Africa, Pretoria.
- Kole, O.J. 2015. *Partnership policing between the South African Police Services and private security industry in reducing crime in South Africa*. Unpublished PhD Thesis, University of South Africa, Pretoria.
- Kraska, P.B. & Neuman, W.L. 2008. *Criminal Justice and Criminology: Research Methods*. Boston, MA: Pearson Education.
- Kumar, R. 2005. *Research methodology: A step-by-step guide for beginners*. (2nd edition). Singapore: Pearson Education.
- Leedy, P.D. & Ormrod, J.E. 2000. *Practical research: Planning and design*. (10th ed.). Boston, MA: Pearson Education.
- Leedy, P.D., & Ormrod, J.E. 2013. *Practical Research: Planning and Design*. 10th edition. Boston: Pearson Education.
- Leonard, S., Alhaji, Y.A. & Linus, I. 2019. Curbing examination insecurity and its implications for the management of public secondary schools in Kogi east education zone of Kogi state. *International Journal of Advanced Research and Development*, 4(3):44–52.
- Liebenberg, A.S. 2020. *An evaluation of the impact of the non-ferrous metals crime combating committee on copper cable theft*. Unpublished PHD Thesis. University of South Africa, Pretoria.
- Lincoln, Y.S. & Guba, E.G. 1985. *Naturalistic inquiry*. Thousand Oaks, CA: Sage.
- Mabitsela, M.M. 2022. *An evaluation of the activities of the Ekurhuleni Metropolitan Police in Crime Prevention: A study in Tembisa, Gauteng Province, South Africa*. Unpublished PhD Dissertation, University of South Africa, Pretoria.
- Macupe, B. 2016. Matric maths papers to be inspected after leak. Sowetan, 03

November 2016. Available at: <https://www.sowetanlive.co.za/news/2016-11-03-matric-maths-papers-to-be-inspected-after-leak/> (Accessed on 22 June 2024)

Madara, D.S. & Namango, S.S. 2016. Faculty perceptions on cheating in exams in undergraduate engineering. *Journal of Education and Practice*, 7(30):70–86.

Mahambane, M.A. 2018. *Safety and security of consumers at retail stores in the Gauteng Province: An assessment of security measures*. Unpublished PhD Dissertation, University of South Africa, Pretoria.

Maheka, G. 2015. *Nature and causes of examination malpractices in selected secondary schools in Kitwe District, Zambia*. Unpublished PhD Dissertation, University of Zambia, Lusaka.

Mail & Guardian. 2005. Second chance for “cheating” matrics. 23rd March. *Mail & Guardian*. Available at: <https://mg.co.za/article/2005-03-23-second-chance-for-cheating-matrics/> (Accessed on 3 August 2021).

Makaula, F.B. 2018. *Perceived causes and methods of examination malpractice in the Malawian education system: A case study of secondary schools in South East Education Division (SEED)*. Unpublished PhD thesis, University of Northern Iowa, Cedar Falls, IO.

Mascareño, A. & Carvajal, F. 2015. The different faces of inclusion and exclusion. *Cepal Review Journal*, 116:133–134.

Mashanyare, I. & Chinamasa, E. 2014. School examinations leakage: Case of Zimbabwe Schools Examinations Council. *Journal of Humanities and Social Science*, 19(4):47–54.

Massing, N. & Schneider, S.K. 2017. Degrees of competency: The relationship between educational qualifications and adult skills across countries. *Large Scale Assessment in Education*, 5(6).

Masondo, S.E. 2015. Matric exam results spread. Johannesburg: *City Press*, 22 Nov 2015. Available at: <https://www.news24.com/citypress/news/matric->

exam-leak-spreads-20151121 (Accessed on: 22 June 2024)

- McGregor, S.L.T. 2018. *Understanding and evaluating research: A critical guide*. Thousand Oaks, CA: Sage. <https://au.sagepub.com/en-gb/oce/understanding-and-evaluatingresearch/book252647>.
- Mdluli, B.D. 2011. *Fundamentals of security vetting in a democratic South Africa*. Cape Town: BM Consultants.
- Miller, B.L., Agnich, L.E., Posick, C. & Gould, A.E. 2014. Cheating around the world: A cross-national analysis of principal reported cheating. *Journal of Criminal Justice Education*, 26(2). Available at: <http://dx.doi.org/10.1080/10511253.2014.986148> (Accessed on 14 September 2021).
- Ministerial Report. 2010. Matric farce in Mpumalanga. *News24*, 07 November. Available at <http://www.news24.com/South Africa/News/Matric-exam-farce-in Mpumalanga-2010> (accessed on 29 April 2019).
- Mohlala, T. 2005. Guilty officials fined R3000 each for matric scandal. *Mail & Guardian*, 17 September. Available at: <https://mg.co.za/article/2005-08-17-guilty-officials-fined-r3-000-each-for-matric-scandal/> (Accessed on 6 August 2021).
- Mthethwa, B., Govender, P., Shoba, S. & Nombeme, P. 2015. Matric cheating: How pupils and teachers colluded. *Times Live*, 11 January. <https://www.timeslive.co.za/news/south-africa/2015-01-11-matric-cheating-how-pupils-and-teachers-colluded/> (Accessed 1 August 2021).
- Muchai, J. 2014. *An investigation into factors that contributes to cheating in examinations in technical institutions in Central Province, Kenya*. Unpublished PhD Dissertation, University of South Africa, Pretoria.
- Muhammad, T.I. 2015. *Analysis of the management of examination malpractices in colleges of education in North-West Geo-Political zone, Nigeria*. Unpublished Thesis, Ahmadu Bello University, Zaria.
- Mulongo, M., Kimosop, M.K. & Njoka, J.N. 2019. Assessment of mitigation

strategies used in the management of examination malpractice by universities in Mount Kenya region. *International Journal of Social Sciences & Educational Studies*, 6(2):1–13.

Munachonga, M. 2014. *An ethical evaluation of the causes and effects of examination malpractice in Zambia: A case study of selected schools in Lusaka district*. Unpublished Master's thesis, University of Zambia. Lusaka.

Munyai, M.P. 2022. *An assessment of security measures at the maritime ports of entry in Durban and Cape Town, South Africa*. Unpublished Dissertation, University of South Africa, Pretoria.

Ndifon, R.A. & Cornelius-Ukpepi, B.U. 2014. Examination malpractice in the primary school: Problems and prospects. *International Journal of Humanities Social Sciences and Education*, 1(9):118–121.

Nggakamba, S. 2019. UNISA probes possible exam paper leak. *News24*, 27 May. Available at: <https://www.news24.com/news24/southafrica/news/unisa-probes-possible-exam-paper-leak-20190527> (accessed on: 14 September 2020).

Nichols, T.A., Rogers, W.A., Fisk, A.D. & West, L.D. 2001. *How old are your participants? An investigation of age classifications as reported in human factors*. Proceedings of the human factors and Ergonomics Society. Santa Monica, 260–261.

Njoku, N.C. & Njoku, D.I. 2016. Curbing examination malpractice in secondary schools in Nigeria through moral education. *Research on Humanities and Social Sciences*, 6(18):161–169.

Nnam, M.U. & Inah, A.F. 2015. Empirical investigation into the causes, forms and consequences of examination malpractice in Nigeria institutions of higher learning. *International Journal of Novel Research in Humanity and Social Sciences*, 2(1):52–62.

Nnekwu, D. & Odochukwu, E.B. 2016. Assessment of the effectiveness of management strategies for curbing examination malpractices in secondary

- schools in Nigeria. *European Journal of Education Studies*, 2(11):48–70.
- Nowell, S., Morris, J.M., White, D.E. & Moules, N.J. 2017. Thematic analysis: Striving to meet trustworthiness criteria. *International Journal of Qualitative Methods*, 16:1–13.
- Nwadike, C.C. & Adimonyemma, R.N. 2015. The investigation into examination malpractice among science students in Nigerian tertiary institutions. *Journal of Research in Pure and Applied Sciences*, 5(1):15–24.
- Nyaga, S. (2017). Capacity Building for Examination Personnel. *Journal of Educational Administration*, 55(6), 732-745.
- Nyamoita, G.B. & Otieno, K. 2016. Effectiveness of Kenya national examinations council measures in curbing national examination malpractice in public secondary schools in Kisii County. *International Journal of Scientific Research and Management*, 4(2):3882–3907.
- Onah, F.E. (2013). Forms and causes of examination malpractice in Nigerian Universities. *Journal of Educational Review*, 6(3):395-401
- Omoniyi, M.E. 2014. Cheating in Examinations: An anomie that characterizes the Nigerian Education System. *Scholars Journals of Arts, Humanities and Social Science*, 2(3B):448–453.
- Onuka, A.O.U & Durowoju, E.O. 2013.. Stakeholders' role in curbing examination malpractice in Nigeria. *International Journal of Economy, Management and Social Sciences*, 2(6):342–348.
- Ossai, M.C., Ethe, N., Okwiedei, C.A. & Edougha, D.E. 2014. Development of examination behavior inventory: An integrity measure for prevention of cheating in school exams. *World Journal of Education*, 4(2):37–49.
- Owenga, J.T.O., Raburu, P.A. & Aloka, V. 2018. Relationship between selected school determinants and examination cheating tendencies among Kenyan secondary school students. *Mediterranean Journal of Social Sciences*, 9(3):243–252.

- Padgett, D.K. 2017. *Qualitative methods in social work research*. Thousand Oaks, CA: Sage.
- Paul, S.K. 2013. Vulnerability concepts and its application in various fields: A review on geographical perspective. *Journal of Life Earth Science*, 8:63–81.
- Percy, W.H., Kostere, K. & Kostere, S. 2015. Generic qualitative research in psychology. *The Qualitative Report*, 20(2):76–85. <http://nsuworks.nova.edu/tqr/vol20/iss2/7>.
- Permenus, J.O. 2015. *Factors influencing recurrence examination irregularities in public secondary schools in Kisii County, Kenya*. Unpublished PhD Dissertation, University of Nairobi, Kenya.
- Phiri, W. & Nakamba, J. 2015. The effect of examination malpractices on pupils' academic performance in Geography in selected secondary schools in Kitwe District, Copperbelt Province, Zambia. *International Journal of Interdisciplinary Research and Development*, 2(12):324–331.
- Praxiom. 2018. *ISO 31000 Plain English Definitions*. Available at: <https://www.praxion.com/31000.htm> (Accessed on 16 September 2021).
- Raji, I.A. & Okunlola, J.O. 2017. Examination malpractice and quality assurance of senior secondary school certificate examination in Oyo State, Nigeria. *Afro Asian Journal of Social Sciences*, VIII(II):1–21.
- Sadiq, A. & Saeed, M. 2017. An exploratory study on problems faced by students during board examination. *Bulletin of Education and Research*, 39(1):101–115.
- Saldaña, J. 2015. *The coding manual for qualitative researchers* (3rd edition). Thousand Oaks, CA: Sage.
- Sandelowski, M. 2000. Whatever happened to qualitative description? *Research in Nursing & Health*, 23:334–340.
- Sarantakos, S. 2002. *Social research*. (2nd edition). New York: Palgrave Publishers.

- Schoen, R., Astone, N.M., Kim, Y.J., Rothert, K. & Standish, N.J. 2002) *Social Forces*, 81:643–662.
- Schurink, W., Fouche, C.B. & De Vos, A.S. 2011. Qualitative data analysis and interpretation. (Pp. 397–423). In: A.S. De Vos, H. Strydom, C.B. Fouche & C.S.L. Delport, (Eds.). *Research at grass roots* (4th edition). Pretoria: Van Schaik.
- Security Worldmarket. 2017. *Counter surveillance helps catch exam cheats in Brazil*. Available at: <https://www.securityworldmarket.com/int/Newsarchive/counter-surveillance-helps-catch-exam-cheats-in-brazil> (Accessed on 6 September 2021).
- Seleka, N. 2020. Five Gauteng pupils caught cheating during final examinations. *News24*, 29 November. Available at: <https://www.news24.com/news24/southafrica/news/matric-2020-five-gauteng-pupils-caught-cheating-during-final-exams-20201129> (Accessed on 4 August 2021).
- Shaibu, L., Yakubu, A.A. & Igoche, L. 2019. Curbing examination insecurity and its implications for the management of public secondary schools in Kogi East education zone of Kogi State. *International Journal of Advanced Research and Development*, 4(3):44–52.
- Shibo, M.N. & Gori, F.O.J. 2017. The adequacy of Kenya national examination councils' malpractice penalties in public and private secondary schools in Kisii County, Kenya. *Scholars Journal of Arts, Humanities and Social Sciences*, 5(4B):403–411.
- Simui, F., Chibale, H. & Namangala, B. 2017. *Distance education examination management in a lowly resourced North-Eastern region of Zambia: A phenomenological approach*. *Open Paxis*, 9(3):299–312.
- Sirisha, M. & Syalamala, N. 2018. RFID based security for exam paper leakage system. *International Journal of Technology*, 7(4):841–844.
- Smith, J. (2021). Cybersecurity in educational assessments. *Journal of Information Security*, 9(3):211-225.

- Smith, T.R., Langenbacher, M., Kudlac, C. & Fera, A.G. 2013. Deviant reactions to the college pressure cooker: A test of General Strain Theory on undergraduate students in the United States. *International Journal of Criminal Justice Sciences (IJCJS)*, 8(2):88–104. Available at: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.687.5050&rep=rep1&type=pdf>. (Accessed on 16 September 2021).
- South Africa. 2021. *BRICS (Brazil, Russia, India, China, South Africa)*. Available at: <https://www.gov.za/about-government/brics-brazil-russia-india-china-south-africa-1> (Accessed on 16 September 2021).
- Suleman, Q., Gul, R., Ambrin, S. & Kamran, F. 2015. Factors contributing to examination malpractices at secondary school level in Kohat Division, Pakistan. *Journal of Education and Learning*, 9(2):165–182.
- Tandwa, L. 2016. Umalusi approves release of matric results, despite leaked papers. *News24*, 29 January 2016. Available at <http://www.news24.com./SouthAfrica/News/Umalusi-approves-release-of-matric-result> (accessed on 04 May 2019).
- Tawiah, D.K., Alberta, G.Y., Bosman, F.I. & Ata, D.S. 2015. The perception and reasons of examination malpractice among students. *International Journal of Innovative Research & Development*, 4(4):154–148.
- Thompson, J.D. & Ansoglenang, G. 2019. Why do students engage in examination malpractice? The University for Development Studies experience. *Journal of Social Science Studies*, 7(1):8–26.
- Tomlinson, K.D. 2016. An Examination of Deterrence Theory. Where do we stand? *Federal Probation Journal*, 8(3):33–36.
- Udim, D.K., Abubakar, U. & Essien, J.O. 2018. An in-depth evaluation on the issue of examination malpractice in Nigeria. *Research in Pedagogy*, 8(2):204–213.
- Ufuoma, O.K. 2015. Sociological perspective of examination malpractice in Nigerian universities. *International Journal of Social Sciences*, 5(2):61–66.

- Ukpepi, B.U.C. & Ndifon, R.A. 2012. Factors that influence examination malpractice and academic performance in primary science among Primary Six Pupils in Cross River State, Nigeria. *Journal of Education and Practice*, 3(9):59-68.
- University of South Africa (UNISA). 2007. Policy on research ethics. Available at: https://my.unisa.ac.za/tool/a87dd927a9e04b5900125ab7d72ca660/content/s/colleges/col_grad_studies/docs/Policy_research_ethics_21September2007.pdf (Accessed on: 28 Nov 2020).
- Ushie, O.S. & Ishanga, A.R. 2016. Examination malpractice: Causes, effects and possible ways of curbing the menace. A study of Cross River University of Technology. *International Journal of Managerial Studies and Research*, 4(1):59–65.
- Van Jaarsveld, L. 2011. *An investigation of safety and security measures at secondary schools in Tshwane, South Africa*. Unpublished MTech. Dissertation, University of South Africa, Pretoria.
- Walliman, N. 2011. *Research methods: The basics*. USA: Routledge
- Wanini, N.E. 2018. *Relationship between selected students' personality characteristics and their perception of examination malpractice in public secondary schools in Nyeri County, Kenya*. Unpublished PhD Dissertation, Kenyatta University, Nairobi, Kenya.
- Wantenaar, A.A. 2022. *A criminological perspective on community policing in the Southwest Tshwane policing area of Gauteng, South Africa*. Unpublished Dissertation, University of South Africa, Pretoria.
- Zungu, P. (2020). Regulatory Frameworks for Examination Security. *South African Education Journal*, 34(2), 345-359.

ANNEXURE A: Ethical clearance certificate



UNISA CLAW ETHICS REVIEW COMMITTEE

Date 20181009

Reference: ST87 of 2018

Dear Mr Molepo

Applicant: FJ Molepo

**Decision: ETHICS APPROVAL
FROM 9 OCTOBER 2018
TO 8 OCTOBER 2021**

Researcher(s): Foletsi Jan Molepo

Supervisor(s): Dr L du Plessis

Risk factors associated with the leaking of Grade 12 examination papers: A case study of Mpumalanga Department of Education

Qualification: MTech (Security Management)

Thank you for the application for research ethics clearance by the Unisa CLAW Ethics Review Committee for the above mentioned research. Ethics approval is granted for 3 years.

*The **low risk application** was reviewed by the CLAW Ethics Review Committee on 9 October 2018 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. The decision was ratified by the committee.*

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the CLAW Committee.
3. The researcher will conduct the study according to the methods and procedures set out in the approved application.



University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
7. No field work activities may continue after the expiry date of 8 October 2021. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number ST87 of 2018 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Yours sincerely,



PROF N MOLLEMA

Chair of CLAW ERC

E-mail: mollena@unisa.ac.za

Tel: (012) 429-8384



PROF CI TSHOOSE

Executive Dean: CLAW

E-mail: tshooci@unisa.ac.za

Tel: (012) 429-2005

URERC 25.04.17 - Decision template (V2) - Approve

University of South Africa
Pretorius Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

ANNEXURE B: Department of Education permission letter



Building No. 5, Government Boulevard, Riverside Park, Mpumalanga Province
Private Bag X11341, Mbombela, 1200.
Tel: 013 766 5552/5115, Toll Free Line: 0800 203 116

Litiko le Temfundvo, Umnyango we Fundo

Departement van Onderwys

Ndzawulo ya Dyandzo

Mr FJ Molepo
Unit No 37, parkwood Complex
West Acres, Nelspruit
1200

RE:APPLICATION TO CONDUCT RESEARCH: MR FJ MOLEPO – UNISA

Your application to conduct research study was received and is therefore acknowledged. The title of your research project reads: "The security of grade 12 examination question papers for a master's degree at UNISA". I trust that the aims and the objectives of the study will benefit the whole department especially the children who are the beneficiaries. Your request is approved subject to you observing the provisions of the departmental research policy which is available in the department website. You are requested to adhere to your university's research ethics as spelt out in your research ethics.

In terms of the research policy, data or any research activity can be conducted after school hours as per appointment with affected participants. You are also requested to share your findings with the relevant sections of the department so that we may consider implementing your findings if that will be in the best interest of the department. To this effect, your final approved research report (both soft and hard copy) should be submitted to the department so that your recommendations could be implemented. You may be required to prepare a presentation and present at the departments' annual research dialogue.

For more information kindly liaise with the department's reserh unit @ 013 766 5476/5148 Or
a.baloyi@education.mpu.gov.za

The department wishes you well in this important project and pledges to give you the necessary support you may need.

MRS MOC MHLABANE

HEAD EDUCATION

24, 3, 17

DATE



ANNEXURE C: Semi-structured interview schedule

INTERVIEW SCHEDULE

TITLE: AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA

Dear Prospective Participant:

I am Mr Foletsi Jan Molepo, and I am conducting research for my master's degree in security management. My supervisor is Mr. Mahambane MA, from the Department: Criminology and Security Science at the University of South Africa. We are inviting you to participate in a study entitled, "**TITLE: AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA**"

The interview has been designed to mitigate the leakage of Grade 12 Examination Question Papers in Mpumalanga Province. You were selected to participate in this interview because you are directly/indirectly involved in the management of question papers. To participate in this interview, you must be at least 18 years old and employed. By participating in this interview, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.

It is anticipated that the information I gain from this interview will help me improve the security of question papers. However, you are under no obligation to participate in the interview, and you can withdraw from the study before completing the interview. The interviewee will be anonymous, meaning that I will have no way of connecting the information that you provide to you personally. You may withdraw from the interview at any time. If you choose to participate in this interview, it will take up no more than 30 minutes of your time. You will not benefit from your participation as an individual; however, it is envisioned that the findings of this study will help the Department of Basic Education to improve the way they currently handle the question papers. We do not foresee that you will experience any negative consequences by participating in the interview. The researcher undertakes to keep any information provided herein confidential, not to let it out of my possession and to report on the findings from the perspective of the participating group and not from the perspective of an individual.

The records will be kept for five years for audit purposes whereafter they will be deleted permanently from the hard drives of the researchers' computers. You will not be reimbursed or receive any incentives for your participation in the interview.

The research was reviewed and approved by the CLAW Ethics Review Committee (ERC). You can contact me, Foletsi Jan Molepo, the primary researcher, during office hours at 012 568 3700. Should you have ethical concerns about how the research has been conducted, you may contact the research ethics chairperson of

the University Research Ethics Review Committee (URERC), Dr Retha Visagie at visagrg@unisa.ac.za. Alternatively, you can report any serious unethical behaviour at the University's Toll-Free Hotline 0800 86 96 93.

Please decide whether or not to participate in this interview choosing the appropriate option below.

Do you agree to participate in this interview?	Yes ¹	No ²
--	------------------	-----------------

SECTION A

Biographical Details

1. Gender

Female	1
Male	2

2. Age range

18-35	1
36-45	2
46- and above	3

3. Educational qualification

Below Grade 12	1
Grade 12	2
National Higher Certificate (2 years)	3
Diploma	4
Undergraduate Degree	5
Post Graduate Diploma/ degree	6

4. Who is your present employer?

.....

How long have you been working for your current company /employer?

.....

...

SECTION B

Vulnerabilities associated with the leakage of Grade 12 examination question papers in Mpumalanga Province, South Africa.

5. What is your understanding of the concept 'leakage of Grade 12 examination question papers'?

6.
What is your understanding of the concept 'vulnerabilities' regarding leakage of Grade 12 examination question papers?

.....
.....

7. Which vulnerabilities to your knowledge contribute to the leakage of Grade 12 examination question papers?

.....
.....

8. What are some of the vulnerabilities associated with the handling of Grade 12 examination question papers?

.....
.....

What are some of the vulnerabilities associated with the printing of the Grade 12 examination question papers?

.....
.....

What are some of the vulnerabilities associated with the delivery of the Grade 12 examination question papers?

.....
.....

What are some of the vulnerabilities associated with the storage of the Grade 12 examination question papers?

.....

.....

SECTION C

Security risk factors associated with the leakage of Grade 12 examination question papers in Mpumalanga Province, South Africa.

9. What is your understanding of the concept 'security risk factors' associated with the leakage of Grade 12 examination question papers?

.....
.....

What types of security risk factors to your knowledge are associated with the leakage of Grade 12 examination question papers?

.....
.....

10. How many people are involved in the handling of Grade 12 examination question papers in Mpumalanga Province?

.....
.....

11. Who are the different persons responsible for the handling of the Grade 12 examination question papers in Mpumalanga Province?

.....
.....

12. Who is responsible for the delivery of the Grade 12 examination question papers?

.....
.....

What happens if a delivery vehicle is involved in an accident while delivering the Grade 12 examination question papers to Schools in the Province?

.....
.....

Are the Grade 12 examination question papers printed by private or government

printers?

.....
.....

Who is involved in the printing of the Grade 12 examination question papers?

.....
.....

What procedures are followed during the printing of the Grade 12 examination question papers?

.....
.....

13. What facilities are used for the storage of the Grade 12 examination question papers?

.....
.....

14. How secure is the storage facility against theft and unlawful breaking and entering?

.....
.....
.....

15. For how long is the Grade 12 examination question papers stored in the storage facilities until they are delivered to the schools?

.....
.....

SECTION D

Security measures to mitigate the leakage of the Grade 12 examination question paper in Mpumalanga Province, South Africa.

16. What security measures are in place to prevent the leakage of Grade 12 examination question papers?

.....
.....

17. Explain the effectiveness of these security measures.

.....
.....

18. Do all personnel handling the Grade 12 examination question papers (officials, printing, delivering, storing, guarding) undergo background checks and screening?

.....
.....

19. What are the measures that are put in place during the delivery of examination question papers?

.....
.....

20. What is the contingency plan if vehicles delivering Grade 12 question papers are hijacked?

.....
.....

21. Is the strong room register in place to record the movement of the Grade 12 examination question papers when in the storage area?

.....
.....

22. Does the strong room have a locking door mechanism?

.....
.....

23. What security measures are taken to prevent cell phones and laptops from being brought into a printing facility, where the Grade 12 examination question papers are printed?

.....
.....

24. Are officials being subjected to body searches upon entering the printing

facility?

.....
.....

25. What are the ideal security systems that can be put in place to prevent examination paper leakage?

.....
.....

26. Are the norms and standard of handling Grade 12 examination question papers adhered to?

.....
.....

SECTION E: GENERAL

Is there anything further you would like to add?

.....
.....
.....

Date:

Time:

Place:

Number of Interview:

ANNEXURE D: Informed consent letter to conduct interviews

TITLE: AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA

Purpose of the research study:

This study aims to determine the risks linked to question paper leaks and assess the efficacy of the security mechanisms currently in place at the printing facility in Mpumalanga Province in order to recommend new security measures.

Your participation will assist in determining the following:

- Which vulnerabilities are presently associated with the leakage of Grade 12 examination question papers in Mpumalanga Province, South Africa?
- What security risk factors are associated with the leakage of Grade 12 examination question papers in Mpumalanga Province, South Africa?
- How should the vulnerabilities be eliminated to mitigate the leakage of the Grade 12 examination question paper in Mpumalanga Province, South Africa?

You'll be asked a number of questions by the researcher. It is entirely voluntary for you to take part in this study. You have the option to accept, or reject being interviewed. Also, you have the option to leave the research study at any moment before the results are released. We will maintain the privacy of the information you submit. The raw interview data will only be accessible to the researcher and Mr. Abel Mahambane, the supervisor. Nothing on any other document will have your name or any other identifying information printed on it. Should you choose to take part in the study, there will be no payment.

You are welcome to contact the researcher on cellphone number. 082 9500 904 should you have any enquiries.

I hereby consent and grant permission to be interviewed for the research study as described above on behalf of..... (Name and Surname). I've been told what the research's goal is. I acknowledge that

participation in the interview is entirely optional and that I may end it at any moment (up until the point of publishing). I am aware that neither the study nor its publication will disclose my identify. I agree to the following because I have read and comprehended the material above and all of my questions have been addressed.

1. Participate in the interview: Yes/No

2. Be audio taped: Yes/No

3. Agree that the information I provide might be used in the research report: Yes/No

Signature of Participant..... Date..... Place.....

Signature of Researcher..... Date..... Place.....

ANNEXURE E: Observation checklist

OBSERVATION CHECKLIST

TITLE: AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA

Research questions

The researcher tested the following research question during the observation:
What security measures are currently being implemented at the exam centres during the delivery of question papers in Mpumalanga Province?

CHECKLIST- EXAM CENTRE:

DATE OF SURVEY:

ASPECTS OBSERVED:

A. PHYSICAL GUARDING		Yes	No	Comments
1.	Is there any physical guarding at the exam centre?			
2.	Are searches conducted at the main entrances?			
3.	Are question papers recorded before dispatch?			
4.	Are security personnel in a position of two-way radio?			
5.	Are security guards patrolling the exam centres regularly?			
6.	Are patrols recorder in the occurrence book?			
Any Comment:				
B. CCTV CAMERAS		Yes	No	Comments
7.	Are CCTV cameras installed at the exam centres?			
8.	Are CCTV cameras functional and recording?			
9.	Are CCTV cameras serviced and maintained monthly?			
10.	Are CCTV monitored for 24 hours by security guards?			
11.	Are video footages reviewed daily?			

12.	How many cameras are installed at the exam centre?			
Any Comment:				
C. Perimeter fence		Yes	No	Comments
13.	Is the perimeter fence installed at the exam centre?	•		
14.	Is the fence 2.4. m high?	•		
15.	Is the security wall in good condition or cracked?	•		
16.	Is the perimeter fence installed with the electric fence?	•		
17.	Is the electric fence monitored by the armed response?	•		
18.	Are the patrols conducted alongside the fence by the guards?	•		
Any comment:				
C. Delivery trucks		Yes	No	Comments
19.	Are the delivery trucks escorted by the Police?	•		
20.	Are the trucks recorded and searched at the exam centres upon entry at the exam centres?	•		
21.	Are the trucks monitored when the question papers are offloaded?	•		
22.	Are the trucks recorded and searched upon exit at the exam centres?			

ANNEXURE F: Letter requesting permission to conduct research in the Department of Education

Unit 37 Parkwood Complex
West Acres
Nelspruit
1200

Mpumalanga Department of Education
Building 6, Government Boulevard
Riverside Park
Mbombela

Dear Superintendent General: Mrs MOC Mhlabane;

REQUEST LETTER TO CONDUCT RESEARCH AT THE DEPARTMENT OF EDUCATION.

My name is Foletsi Jan Molepo, with ID number 7606166226081, currently working at the Department of Education and my position is Security and Risk Manager. I am responsible for ensuring the safety and security of grade 12 question papers at Head Office, District, Circuit offices and exam centres.

I am currently registered with the University of South Africa (UNISA) with the purpose of studying M: Tech in Security Management and therefore request permission to conduct research with the officials in the Department. The purpose of the research is to determine the risks linked to question paper leaks and assess the efficacy of the security mechanisms currently in place. My proposed research topic is *"The security of grade 12 examination question papers for a Masters' degree at UNISA"*.

I can be contacted on the cellphone number: 082 950 0904.

Yours Faithfully,
Foletsi Molepo



Date: 22 February 2017

ANNEXURE G: Confirmation of language editing

Barbara Shaw
Editing/proofreading services
18 Balvicar Road, Blairgowrie, 2194
Cell: 072 1233 881
Email: barbarashaw16@gmail.com
Full member of The Professional Editors' Guild

To whom it may concern

This letter serves to inform you that I have done formatting, language editing and reference checking on the thesis.

**AN ASSESSMENT OF VULNERABILITIES TO MITIGATE THE LEAKAGE OF
GRADE 12 EXAMINATION QUESTION PAPERS: CASE STUDY OF
MBOMBELA MUNICIPALITY IN MPUMALANGA PROVINCE, SOUTH AFRICA**

by Foletsi Jan Molepo

I am not responsible for changes made after the edit.



Barbara Shaw

19/02/2024

ANNEXURE H: Turnitin report

FJ Molepo dissertation

ORIGINALITY REPORT

25% SIMILARITY INDEX	22% INTERNET SOURCES	6% PUBLICATIONS	12% STUDENT PAPERS
--------------------------------	--------------------------------	---------------------------	------------------------------

PRIMARY SOURCES

1	Submitted to University of South Africa Student Paper	3%
2	uir.unisa.ac.za Internet Source	2%
3	hdl.handle.net Internet Source	1%
4	library.oapen.org Internet Source	1%
5	pdfs.semanticscholar.org Internet Source	1%
6	dspace.unza.zm Internet Source	1%
7	www.sascv.org Internet Source	<1%
8	www.scielo.org.za Internet Source	<1%
9	scholarworks.uni.edu Internet Source	<1%