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UNIVERSITY OF GHANA, LEGON

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SCHOOL OF INFORMATION AND COMMUNICATION STUDIES

DEPARTMENT OF INFORMATION STUDIES

AWARENESS OF ACADEMIC RESEARCH ETHICS AMONG SENIOR POLYTECHNIC LIBRARIANS IN GHANA

BY

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DECLARATION

I Faustina Kyerewaa Barfi, the author of this thesis do hereby declare that, except for the references made to others scholar, which references are duly acknowledged, this is my original work produced under the supervision of Prof. A.A. Alemna and Dr Emmanuel Adjei.

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DEDICATION

This thesis is dedicated to my parents, Mr and Mrs Barfi for investing in my education and encouraging me to move higher. May God bless them.

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LIST OF ABBREVIATIONS

ACIE – African Centre for Information Ethics

ANIE -African Network for Information Ethics

B-TECH - Bachelor of Technology

HND - Higher National Diploma

ICIE - International Centre for Information Ethics

ICT –Information Communication Technology

IE - Information Ethics

IR -Institutional Repository

OP -Open Access

OPAC - Online Public Access Catalogue

PIM - Personal Information Management

RCR - Responsible Conduct of Research

RDM - Research Data Management

VRE -Virtual Research Environment

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ABSTRACT

The Polytechnics in Ghana are currently in transition of upgrading to Technical University status. In view of this, academic research and for that matter compliance to research ethics has become key. The study explored the awareness of academic research ethics among Senior Polytechnic Librarians across the ten regions of Ghana by looking at the librarians' role in support to academic research, impact of Information and Communication Technology on research ethics, components of ethical dilemmas, importance of ethical compliance in scholarship, control of the menace of misconducts, and some of the tools and applications for assessing compliance with research ethics. As behavioural attitudes, the adoption of the ''duty-based theory which complements the need for compliance to academic research policies, rules, code of conducts and committees was adopted.

This was an exploratory study that adopted the quantitative method. Thirty-seven (37) Senior Polytechnic librarians were the population surveyed. Questionnaire was the instrument used for the data collection. The questions were emailed to majority of the respondents, whilst the researcher personally distributed that of Accra, Cape Coast and Koforidua Polytechnics. The Statistical Package for Social Science (SPSS) was used to analyse the data.

The study revealed research author aid services, development of institutional repositories, information literacy and digitisation as roles undertaken to support research in the Polytechnic. The study discovered plagiarism, copyright abuse, fabrication, encroachment on privacy, poor record keeping and abuse of fair use policy as some of the common ethical misconducts. Dilemmas such as honorary authorship, conflict of interest, ghost authorship and salami publications received minimal awareness among the respondents. Other delinquencies which came to light were data insecurity, social network abuse and e-waste.

Academic integrity, reputation building, institutions' ranking, competition for grants, standardisation in research, transparency, accountability and openness leading to continuity of research were indicated as some of the benefits. Ethical awareness and compliance additionally served as sources of funding in meeting sponsors and funders criteria.

Recommendations identified included the use of innovative applications such as plagiarism detectors, reference managers, learning and content management systems. Interactive approaches such as practice of Personal Information Management (PIM), establishment of academic writing centres, information literacy, establishment of ethical committees coupled with vigorous accreditation standards were indicated. Teaching of ethics in Library and Information Science (LIS) schools was also recommended.

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CHAPTER ONE

INTRODUCTION TO STUDY

1.1 BACKGROUND OF THE STUDY

The awareness and consideration for academic research ethics among scholars have become imperative as a result of open scholarship, proliferation of electronic resources, institution ranking and reputation building, research funding and for networking and collaboration purposes. Academic ethics encompass human conducts, attitudes and responsibility of compliance to lay down academic policies, rules and code of ethics. The study explored the level of awareness of issues of academic research ethics among Senior Polytechnic Librarians in Ghana and their roles in navigating and addressing it.

Tertiary institutions have three main pillars which are teaching, research and services (Exner, Horsman and Reed (2017:2). Faculty, students and scholars lives are organise based on these core values and are evaluated thereof. That notwithstanding, in this age of information overload, dynamics and demands, it is critical to assist academic scholars to distinguish quality information, be it in print format or electronic, especially for scholarly research purpose. Contemporary developments and free academic environments such as ‘‘open access, open scholarship, collaborative research and social networks platforms have subjected knowledge, teaching, speaking and publishing to the norms and standards of scholarly inquiry. Honesty, objectivity, trust, legality, integrity, accountability and responsibility in conducting academic research have become the cornerstone of many academic enterprise which includes the Polytechnics (European University Institute, 2013:7).

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Academic research, whether funded or unfunded, requires clearance from an ethics and integrity committee, especially funded research. Publications are subject to ethical clearance and audit conditions to ensure integrity. This is because academic researchers are obliged to the public, funders, community and colleagues. Recent paradigms in research actualised through networked and collaborative approaches would shape future knowledge production and advancement. Non - compliance to ethical standards are considered as serious academic misconduct and violation of laid down rules in the entire academic scope (European University Institute, 2013:7). In pursuance to this, most academic and publication institutions have instituted research ethics policies and committees to provide advice and guidance on academic research ethics. They also act as liaisons to external partners on ethical issues. A number of universities currently boast of ethics committees, the polytechnic in Ghana however have not initiated such.

Ethics has been explained to connote the moral standard that guides one's action. They are rules which distinguish between right and wrong. The paradigm shift in research has necessitated the need to educate researchers on ethical standards, thus the ''dos and don'ts'' of academic research. Undertaking academic research has become mandatory among scholars in Ghana and this includes the Polytechnics. Considering Ghana's education policy of accrediting the award of degrees to the Polytechnics, there is the need to revisit and be alerted on some ethical issues in academic research. According to the Palgrave Macmillan report (2012:1), ethical misconducts have become an emergent concern in academic and professional publications. Plagiarism, dishonesty, negligence and copyright abuse amongst others may occur as a result of lack of or inadequate awareness but not necessarily fraudulent intent. The need for policies to maintain scholarly integrity according to the report is laudable.

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Bothma, Cosijn, Fourie and Penzhorn (2014,137) defines ethics as a branch of philosophy that deals with human conduct and character in distinguishing right from wrong. Gbadamosi (2004:1145) also defines academic ethics as ‘‘rules and principles of right and wrong conduct within the academic sphere’’. The University of Oxford (2014) refers to academic ethics as ‘‘standards of research integrity that encompass research compliance, professional conduct, personal responsibility, intellectual honesty, accuracy in representing contributions and fairness’’. Again ‘’transparency, conflicts of interest and protection of human participants’’ in the conduct of research raised by University of Oxford: (2014, el) is vital. The Brown University (2015:1) also defines ethics as ‘‘set of standards for behaviour that helps one to decide how one ought to act’’. Ethical components applicable to academic research require researchers to abide by certain principles and standards in order to make research outputs acceptable both locally and internationally.

1.2 POLYTECHNICS' EDUCATION IN GHANA

Polytechnics are found in each of the ten administrative regions of Ghana. They operate under the guide of the Act of Parliament, Act 745 to provide tertiary education in Ghana (Nyako, 2011: 1). The Polytechnics are enshrined to train middle level managers in the areas of Science, Technology, Applied Science and Applied Art to serve the middle level -manpower needs of the country according to Kutsanedzie, Achio & Mensah (2013:311). Ghanaian Polytechnics of today, according to Kutsanedzie, Achio and Mensah (2013:311), Agyefi-Mensah and Edu-Buandoh, (2014:63) and Armah and Anti (2016:4) are said to have however skewed their mission to the arts and humanities. There is therefore a shift from the practical-skills to theoretical knowledge. Further, the upgrading of the Polytechnics to autonomous degree-awarding institutions have brought about paradigm shift in the curriculum and research focus, hence the call for conformity

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to research ethics (Agyefi-Mensah1 & Edu-Buandoh, 2014:63).The review of the curriculum and current research focus have creates gap in research thus ethical skepticism and enquiry.

Ghana's polytechnics have a new roadmap that was enshrined in the 2013 ''State of the Nation Address'' to convert them into Technical Universities. It is expected that students in the Technical Universities will be trained to acquire high level technical skills to drive the country's economic and national development agenda. The Technical Universities, according to the Ministry of Education (2014:1), have the terms to:

i. Contribute to raising the quality and competitiveness of the Ghanaian workforce by providing opportunities for working employees to upgrade their skills and acquire new skills.
ii. The technical Universities are envisaged to reduce the admission pressures on the traditional universities,
iii. Provide progressional avenues for technical and vocational students.
iv. Advance in research to inform policies

The elevation of the polytechnics to the status of public tertiary institutions has therefore subjected Polytechnics' to vigorous academic scrutiny. There is therefore the need to be mindful of academic and research ethics. Polytechnics are mandated to produce publications that meet both local and international standards; hence, there is the need for librarians to create the needed awareness to faculty and students on academic ethics. Development such as inventions and innovation, which fall within their domain are subject to some level of ethical compliance called intellectual property and patent rights. According to the Ministry of Education (2014:5) both the theoretical and practical knowledge are necessary for the proper understanding of the tasks at hand, hence the

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need for ethical compliance. Polytechnic Librarians who facility in the teaching, learning and research are to navigate the various ethical dilemmas with its associated implications in order to address them.

1.3 STATEMENT OF PROBLEM

Academic research ethics has become a contemporary issue of concern in tertiary institutions worldwide. This is because of its implications on ranking, funding, visibility, reputation and integrity of research on such institutions. Research has revealed the rise in ethical misconduct among scholars. Such misconduct, according to Totolo (2015:3) includes plagiarism, conflict of interest, duplication, fabrication amongst others. Scholars and librarians among tertiary establishment which include the polytechnics are not exceptional. Though some university libraries have rolled out information literacy programmes in order to create the needed awareness about ethics, the least is said about the polytechnic librarians and this has resulted in an increase of such menace.

With regards to the conversion of the polytechnics in Ghana to technical universities, thus ‘‘Bachelor of Technology (B-TECH)’’degrees instead of Higher National Diploma (HND), it is envisaged to trigger research gap, inversely, limited attention has been given in addressing ethical issues on research. The current roadmap which has called for the introduction of new and additional discipline requires greater oversight of academic and research ethical enquiry. Advancement on the above raises ethical concerns, intellectual property protection, awareness and additional roles for librarians.

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Citing Coyle and Hillmann (2007:2) researchers and librarians of both now and future are subject to significant different challenges as a result of radical changes in computer technology, information revolution, data mining and electronic document production. Information Communication Technology (ICT) as an enabling tool in the academic library is developing at a faster rate. The changes in technology with it consequences on creators poses ethical implications such as cyber ethics and plagiarism (Schomberg, 2011:19). Furtherance to this is Dadzie (2011:63) who identified cyber-crime, social network abuse and data insecurity as some of the ethical dilemmas. Additionally phenomena such as "open access, mobile application repositories, open education, publish or perish and digitization" have necessitated the need for sensitization, advocacy and education in academic research ethics. These, the Polytechnic librarians ought to consider as a critical component in academic research of which the absence of it leaves much to be desired.

Again, the challenge of funding academic research currently experienced by the institutions requires compliance and adherence to ethics (Mandal, Parija and Parija, 2012:89) and (Resnik, 2015:2). Research proposals may be declined due to lack of credibility and academic integrity. Polytechnics' librarians have the mandate to create the needed advocacy on academic research ethics to faculty and students in order to satisfy funding partners.

Recent patterns in carrying out academic research involve relationships between universities, faculty, students and the wider community. Doyle and Buckley (2014:157) articulated community engagement with external stakeholders as essential in developing research output. This current

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paradigm in academics and research such as joint or collaborative research, virtual and electronic research with its associated policies require some level of ethical consideration and inclusions.

1.4 AIM AND SIGNIFICANCE OF THE STUDY

The study aim to examine and explore academic research ethics among Senior Polytechnic librarians on the extent of awareness on ethical issues, its importance, various research ethics dilemmas and challenges of managing the menace of research ethics: conformity and violation. This study is expected to serve as a guide to those who already practice it and motivate those who are yet to do so. Awareness, training and integration of ethics would impact positively on the quality of research produce. The findings of the study will help librarians to understand the various ethical dilemmas and ways to control or eliminate them. It will serve as a policy guide to decision makers in making appropriate decisions, policies and codes concerning ethical compliance in order to build the reputation of polytechnics .It will also serve as a future reference for researchers on the subject of academic research ethics.

1.5 STUDY OBJECTIVES

i. To explore the awareness of academic research ethics among Polytechnics' Senior Librarians.
ii. Explore the librarians' role in academic research
iii. Highlight the importance of academic research ethics on scholarship
iv. To assess the impact of Information Communication Technology (ICT) on research ethics.
v. Identify some components of ethical misconduct and dilemmas.

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vi. To ascertain some of the control measures that could manage and curb the menace of violations of research ethics.

vii. Provide recommendations base on the findings to manage the menace of violation of research ethics.

1.6 RESEARCH QUESTIONS

i. Are Senior Librarians across the Polytechnics aware of ethical responsibilities towards scholarship?

ii. What are the librarians' roles in academic research?

iii. What is the importance of academic research ethics compliance?

iv. To what extent has ICT impacted on research ethics?

v. What are some of the components of ethical misconduct?

vi. What is the librarian's role in academic and research ethics?

vii. Are there measures in place to reduce/ detect ethical misconduct?

1.7 THEORETICAL FRAMEWORK

According to Brown University (2015:2), three types of theories, namely: the consequentialist theory, the non-consequentialist theory and the virtue theory are primarily concerned with ethics. Considering the context of the study, which is academic research ethics, the non-consequentialist theory, also referred to as a 'Duty-based theory is adopted (Fallies, 2007:28). The duty based approach hypothesises that human behaviour is regulated by laid down rules. This framework considers ethical action as one perpetuated from duty, that is, ''it is done precisely because it is our obligation to perform the action''. Ethical obligations are the same for all rational creatures, thus universal, and knowledge of what these obligations entail are derived by discovering rules of

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behaviour that are not contradicted by reason. (Brown University, 2015: 7). The application of this framework makes it obligatory for scholars to abide by academic research ethics. ‘‘Thus it is not only right to do it, but that it is wrong not to do it irrespective of the environment.’’ This is the basis for academic research policies, rules, code of conducts, ethics committees, informed consent of parties involved in research, respect for confidentiality and anonymity, amongst others. The duty –based approach envisages ethics to be a conduct that will always involve the perpetuation of right actions in relations to one’s duty.

The Consequentialist framework focuses on the effect or consequences of an outcome, being it positive or negative that contracts with the duty approach which considers the ethical implications before arriving at an outcome. The Virtue framework looks at character and personal traits (Lorenzetti: 2010:1).

1.8 APPLICATION OF THEORY TO POLYTECHNIC LIBRARIANS

Doing the right thing to achieve the needed results is mandatory for researchers. Polytechnic librarians, considered as scholarly mediators, have a role to play in improving academic research and ethical standards by creating the needed awareness to faculty, students and researchers. Polytechnics’ researchers often conduct academic research to add to knowledge. Hence, it is expected from them to know, adopt and apply ethical standards, irrespective of the environment. The Duty theory considers ethical implications and standards before arriving at an outcome. Researchers, before conducting any study, ought to know and consider the ethical implication of their activities be it on humans, animals and or objects. Researchers, according to Pimple (2002:193), are to ensure the credibility of the research results by asking questions such as the “trustworthiness, authenticity, relationships between the research results and impact on physical

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world". Do the data and conclusions really correspond to reality? Dilemmas, such as fabrication and falsification of results, must be avoided. Citing Pimple (2002:193), can the research be considered fair?' This concerns social relationships within the world of research by looking at issues such as copyright, authorship, objectivity and plagiarism. Also can the research be considered wise? This concerns the relationship between the research agenda and the broader social and physical world. Issues like how the research will improve the human condition, its present and future implications and its application to further advanced research ought to be assessed. Considering the current role of polytechnic librarians in ensuring credibility and integrity in research, an assessment on the level of awareness of the requirements of research ethics among the librarians is important, which this study seeks to explore.

1.9 SCOPE AND LIMITATION OF STUDY

This study was limited to Senior Polytechnic librarians in Ghana. It was also limited to the chosen phenomenon of research that polytechnics are considered tertiary institutions, where research output is subject to public scrutiny, both locally and internationally. The researcher had wanted to employ interviews, but considering the dispersed nature of the Polytechnics, a questionnaire survey was used.

1.10 ORGANISATION OF CHAPTERS

The study is organized into six chapters:

Chapter One-Chapter one presents the introduction and the background of the study, the problem statement**,** the objectives, and the theoretical framework adopted for the study, application of theory to polytechnic librarians, the scope and limitations and the organisation of chapters.

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Chapter Two -Reviews literature on academic research ethics. The following thematic areas were considered: The concept of academic research was discussed, the roles of librarians in academic research were highlighted, developments in academic research ethics in Africa were looked at. Again the importance of ethics to academic scholarship was discussed; the impact of ICT on academic research ethics was reviewed. The components of ethical misconduct and dilemmas were outlined. Finally the librarian's role in dealing with ethics was looked at.

Chapter Three -Discusses the methodology used to answer the research questions. It described the empirical data collection process and how data was analysed. The research design adopted for the study was outlined; the selection of case was identified, the study population with a table which described statistics of the respondents across the region was presented, the data collection instrument was discussed. Again the approach in analysing and presenting the data was indicated and consideration for ethical concerns was raised.

Chapter Four -Presents the data analysis and interpretations. It highlighted the findings discovered by looking at the following themes: The biographical data of respondents, the role of librarians in academic research, the extent of awareness among librarians, the impact of ICT on academic research ethics, Importance of ethics to academic scholarship. Further it highlighted on the components of ethical misconduct, control of the menace by librarians and the awareness on some of the ethical tools and applications.

Chapter Five-This chapter presents the discussion of the findings of the study, including references to the findings of related literature by triangulating the empirical findings against the literature.

Chapter Six-This chapter presented the summary of findings, conclusion and recommendations of the study.

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CHAPTER TWO

REVIEW OF LITERATURE

2.1 INTRODUCTION

This chapter explores available literature on academic research ethics, it developments, components and the role of librarians amongst others. Academic research ethics subsumed under Information Ethics (IE) encompass the ‘‘moral dilemmas and ethical conflicts” that arise in interactions between human beings and information (Carbo and Smith, 2008: 1111).Thus the ‘‘creation, organization, dissemination, and use’’. Literature is reviewed in line with the objectives of the study under the following themes: components of academic research, importance of ethical compliance, the role of librarians in support to academic research, developments in African academic research, components of ethical dilemmas and ways to control them.

2.2 CONCEPT OF ACADEMIC RESEARCH

Unlike any other research, academic research is carried out according to laid down rules, standards and codes of conducts. Academic research and writing has been defined as ‘‘investigative writing based upon ideas of scientific inquiry’’. It is a multi-step process that seeks to ‘‘inquire and ask questions in order to develop answers through serious critical thinking and thoughtful reflection’’ (University of Louisville, Kentucky). Academic research findings are of importance to society, hence both the researcher and research output go through laid down standards that ought to meet local and internationally recognized standards. In this regard, it becomes the prerogative of both the researcher and society to ensure that research outputs meet certain ethical standards and obligations. Pimple (2002:191) proposes six domains that according to him form the basis of “Responsible Conduct of Research’’ (RCR). The six domain, are ‘‘scientific integrity, collegiality,

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protection of human subjects, animal welfare, institutional integrity, and social responsibility''. Pimple's six domains have been corroborated by other authors considering the current advancement in technology. According to Mutula and Majinge (2015; 66), Totolo (2015:3) and Ocholla (2013:26) information communication technology (ICT) has influenced the management and application of information and current inventions such as openness in scholarship has called for vigorous ethical attention and consideration.

Like any other endeavour, academic research is guided by rules and regulations. Pimple (2002:192) further identifies nine principles that define ''responsible conduct of research'', and these are ''Data acquisition, management, sharing, ownership, mentorship and trainee responsibilities ,publication practices and responsible authorship, peer review, collaborative science, human subjects and animals, research misconduct and conflict of interest and commitment''.

2.3 IMPORTANCE OF ETHICS TO ACADEMIC SCHOLARSHIP

Academic research ethics has currently become one of the building blocks within the academic sphere. Faculty, librarians and students are supposed to adhere to such guidelines being it for internal or external purposes. A number of tertiary institutions worldwide have deduced ethical norms to constrain the impact on academic research abuse and negligence. Therefore the polytechnics which have been upgraded to the status of the university ought to be mindful of ethical standards which are the cornerstone of any academic institution. Violations of such widely-recognized academic and research standards represent a serious offence to the entire academic community.

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Hoecht (2011:253) in his article identifies some of the general rules of research ethics that are generally accepted among researchers. These include 'not to conduct research that is likely to harm researchers and/or research subjects; seeking for the consent of participants; anonymity of research ,damage free research, unbiased findings , privacy, dissemination of research results, among others'. The under listed are the values that are attributed to academic research ethics compliance.

Funding - research funding challenge confronted by tertiary institutions which include Polytechnics in Ghana could be addressed through ethical compliance. Researchers are obligated to the community thus ''public responsibility'' in addition to the research output in addressing societal needs. The society reciprocally supports and fund academic research as a part of social responsibility mandate, provided the research conforms to ethical standards and codes of conduct (Resnik, 2015:2).

Reputation and ranking of institution- non-conforming to academic ethics can tarnish the reputation which may affect the ranking of an academic institution (Asia Pacific international College, 2017:2). The transition of the polytechnics to degree awarding entity is open to competition which will be ranked among others academic and research institutions. Among the checklist for the rankings include adherence to research ethics and compliance, openness in research, originality, objectivity and integrity.

Transparency - ethics is a form of academic enquiry that is subject to a disclosure of sources of truth. Adherence to ethical standards brings about openness in research. According to the Palgrave Macmillan report (2012:1) the application of ethical policies openly discloses any conflict of interest. It openly discloses the source of all data and third party materials. To advance academic and research transparency, the European University Institute (2013:5) advocates for high standards

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of integrity and accountability in the conduct of academic research. Academic and research transparency is a double-edged sword that is dependent on both behaviours and ethical regulations. Academic transparency ensures continuity of research work. The processes involved in carrying out experiments, fieldwork, data collection, research methods, and findings are made available. Research process, research cycle, Research Data Management (RDM) strategies and scholars' publishing workflow processes are spelt out for future advancement and decision making.

Integrity– Ethics fosters justice, dignity and worth of the human person in scholarship (Capurro, 2008:1162). There is the assurance of authenticity of the publication produced. There is always reliability and validity in the publications produced. Macfarlane's (2009:1) publication with the title 'researching with integrity' attributes integrity to individual character rather than rule-based codes of practice. On the other hand, individuals with varying characters might have certain limitation considering the current changes in technology and intelligence. A code of ethics has rather become the new ground that ensures that people universally adhere to certain principles. In analysing the new paradigm and perspective in academic research, both collaborative and multidisciplinary, there should be a unified code of ethics in place.

Accountability- being held accountable for the authenticity of the work produced, be it errors or goodwill, amongst others. The sources of the research are usually disclosed and accounted for. Authors are held answerable and responsible for their actions. Developments in Africa concerning information ethics are the establishment of the African Centre for Information Ethics (ACIE) to serve as the coordinating agency of the African Network for Information Ethics (ANIE). The Centre aims to act as a platform for the exchange of information about African teaching and research in the field of information ethics and also to be accountable for academic actions (Capurro, 2008:1168).

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Academic research ethics, according to Schomberg (2011:9), promote 'responsible research and innovations in a transparent and interactive process. Actors become mutually responsive to each other in an "ethically acceptable, sustainable and societal desirable" manner. Researchers need to be responsible in terms of economic, social quality, equality and environmental dimensions'". (Schomberg,2011:9). Researchers ought to mandatorily comply with the fundamental values of ethics in an acceptable and accountable manner.

Legality– unlike the consequentialist theory, the deontological theory, which the study has adopted, places emphasis on 'rules'. Thus ethics are based on formally specified guidelines that assist the researcher in the conduct of research behaviour' (Berry, 2004:325).This ensures credibility in academic research. Researchers according to O'Leary (2013:45) have the obligations to ensure that the study design does not breach the law, they are to report illegal activities that will serve as informed policies. It is the duty of all scholars to take the challenge in order to ensure high standards of ethical conduct (Gbadamosi,2004:1159).The academic community must endeavour to abide by all legal norms that are related to the conduct and publication of research. Such obligations include 'copyright, intellectual property rights, privacy, data protection, ownership', among others. This means emphasis on the Universal Declaration of Human Rights, which entreat people everywhere to 'create, access, utilize and share information and knowledge', in order to attain the internationally agreed development goals and objectives, such as the Sustainable Development Goals (SDGs) (Capurro, 2008:1162). Mutula and Majinge (2015:63), among others, mention some of the ethical dimensions of the emerging African information society. This includes 'privacy, confidentiality, trust, integrity, intellectual ownership, access, and accessibility'. These are expected to encapsulate any scholarly work from an academic community.

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Academic ethics policies clearly identify and define the creators of the knowledge. Considering the current research trends which is more collaborative and cross disciplinary, application of ethics enables the identification of creators. Issues concerning the authors and contributors, authorship order, criteria and authorship conflict (Mandal, Bagchi & Basu (2015). Copyright and patent are some of the legal backings given to creators. There is also the 'fair use' policy that defines the extent under which one can utilize knowledge. All these are legal policies that guide the ethical use of information.

Privacy- Collecting, processing, distributing, and use of information through the various channels have triggered concerns about privacy, though research findings are supposed to be shared and distributed, caution needs to be taken in order to deliver the right information to the right populace Smith, Dinev and Xu, (2011:990). The right information delivered to the wrong populace infringe on their privacy and vice -versa. The issue of privacy has become phenomenal due to information technology (IT) applications. Violation of one's privacy is considered unethical. According to Smith, Dinev, and Xu, (2011:994), privacy is considered as a right and this right ought to be accorded to research work. Citing Berry, (2004:326), online research requires mutual respect and trust among academics, ethical norms of confidentiality and respect for privacy ought to be observed.

Dissemination and communication- of research finding are supposed to be disseminated. Research partners, as part of their policy, entreat the academic community to make available its results widely and freely. Citing Mutula and Majinge (2015; 55) freedom of expression and censorship are some of the principles that undermine ethics access. Sharing researchers' data without their consent is unethical and a violation of privacy. The idea of open access has in a way promoted wider coverage of research output. The use of the social media platforms has also

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facilitated the dissemination of scholarship. There is a violation of ethical norm when research findings are not freely made available to the taxpayers whose monies were used to sponsor such research.

Disseminating and communicating research findings ensure continuity of the research and its processes as well as a guide to future research plan. Researcher are to disseminate research findings widely to scholars, policy-makers, opinion leaders and the public at large. It is therefore unethical to hoard data.

Trust– In this era of information over-load and data mining, students, researchers and faculties are vigorously looking for authentic and genuine sources of information. Much is left to be desired when scholars cannot trust scholarship in order to advance research. The application of ethical principles subject scholarship to vigorous scrutiny and enquiry. Researchers across the globe must be able to trust research findings and the creators in the creation of knowledge. Further, the application of academic ethics among academic communities such as the Polytechnics stimulates the trust needed to encourage the free exchange of ideas (European University Institute, 2013:8). It facilitates collaboration and knowledge since somebody's ideas may be recognise as someone else's copyright and property. The possibility of keeping one's knowledge to oneself s must be minimal. Adherence to ethics promotes credibility in research.

Ownership- Data ownership refers to both the possession of and responsibility for information. Considering the enormous amount of information available both in print and electronically, there is always the question of who owns such information. Academic institutions and partners usually sponsor people to conduct research and publish the findings. , In such cases the funding organisation becomes the creator or the owner of such publication. The ethical and authorship

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policies define creators' status cope and contribution made which reflect in the order of names of authors and also the funding bodies involve. If an institution sponsors a research, the paper automatically becomes the property of the organization. Loshin (2002:2) alludes to the complexities of data owners to encompass the roles as "creators, consumers, compilers, enterprise, funders, decoder, packager, licenser as owner', amongst others.

Trust, transparency, accountability, integrity, amongst others, is some of the merits derived from the application of academic ethics to scholars. The integrity of scholarship is upheld as a result of the vigorous scrutiny that is in line with ethical principles. It promotes standardization in scholarship, both locally and internationally. There is continuity of research since research processes and procedures are documented.

2.4 LIBRARIANS' ROLE IN ACADEMIC RESEARCH

Garcia-Feboet et al. (2012:1),citing IFLA code of Ethics for Librarians and other information workers define librarianship as an ''ethical activity embodying a value- rich approach to professional work with information''. The following roles are carried by librarians in their quest to promote academic research: ''Increased access to information, author aid services, information literacy, marketing of resources, digital curation and preservation, Research Data Management (RDM), digitisation, development of institutional repositories, Creators of Virtual Research Environments (VRE), copyright compliance, amongst others. The question is how many of these roles are undertaken by the Polytechnics Librarians, this the study seeks to investigated.

Increased access to information

Providing information to serve diverse interests is recognized as a social responsibility. Individuals have the right to access information to satisfy their ''social, cultural and economic well-being''.

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The ‘‘rights to information’’ expressed in the United Nations Universal Declaration of Human Rights 1948; article 19 (Garcia-Febo et al., 2012:2), implicitly states the ‘‘rights of freedom of opinion, express freedom of opinion, expression and access to information for all human beings’’. Librarians therefore play a role in fulfilling this right. The emphasis on information rights and their significance for the profession and for society as a whole obligates librarians to deliver in accordance with principles, rules and regulations.

There should be equitable access to services and information irrespective of one’s ‘‘age, citizenship, political belief, physical or mental ability and gender identity’’. Information is needed for one’s personal development, education, cultural enrichment, leisure, economic activity and informed participation in and enhancement of democracy. Librarians have the core mission to ensure access to information for all. Denial and restriction of access through censorship must be liberated.

Information literacy

Lloyn (2007: 2) defines Information literacy as ‘‘skills-based’’ literacy to empower individuals. The Association of College and Research Libraries (2000) defines Information literacy is a set of abilities requiring individuals to ‘recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information’. Information literate people are engaged, enabled, enriched and embodied by social, procedural and physical information that constitutes an information environment Lloyn (2007:3) . Librarians have the responsibility to guide patrons to be able to ‘identify, locate, evaluate, organize, create, use and communicate information. They ensure the promotion and ethical use of information in order to eliminate plagiarism and other forms of misuse of information (Garcia-Febo et al., 2012:3). Assisting patrons with

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information searching, evaluation, organisation and presentation is key. Information professionals, as part of their responsibility, nurture patrons in how to use information ethically.

The emergence of electronic resources has propelled the need for students and researchers to be information literate. According to Gross Latham (2007:333) it enables scholars to find, assess, and use information in the academic environment, workplace, and their personal lives in a broader perspective for lifelong learning and social responsibility. An information literate person is able to 'access information effectively and efficiently, evaluate information critically and competently', and ''use information accurately and creatively''. According to Elmborg (2006:192), librarians have assumed new roles as educators. They assist in the development of curriculums and instructional designs as well as being specialists in coaching intellectual growth and research, hence the need for librarians to develop critical thinking skills.

The University of Texas in Austin (2016) defines information literacy as 'the ability to think critically about information'. Critical inquiry into information has become necessary due to the numerous formats in which information is represented. Librarians are now described as embedded librarians who steer research affairs by giving information in literacy sessions to researchers. An information literate person is able to 'determine the extent of information he or she needs, access the needed information effectively and efficiently evaluate information and its sources critically, incorporate selected information into his or her knowledge base, use information effectively to accomplish a specific purpose and understand the economic, legal, and social issues surrounding the use of information and be able to access and use information ethically and legally to advance research (University of Texas ,2016:el).

Author Aid Services

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Citing Gastel (2015:103), author aid provides guidance in accessing literature, analysing data, interpreting results, crafting papers, and responding to reviewers' comments. It is a project to help researchers in developing countries write about and publish their work. According to Freeman and Robbins (2006:27) researchers in developing countries want to publish in recognised journals, but find it difficult to write and publish their work. The reasons that their research papers usually fail is because they lack access to editors who can assist and mentor them refine their writing before submission, hence the need for such mentoring through author aid.

Author aid encompasses research communication and a guide on how to publish one's work. It equips creators to create profiles and promote awareness of their publications. Collaboration between creators and publishers as well as mentorship has become possible through author aid platforms. Librarians can assist in translating materials or identifying journals for publication by faculty. Editing services and identification of new areas of research can be recommended by librarians. The International Network for the Availability of Scientific Publications (INASP)in putting research knowledge at the heart of development has its core mandate to provide publishing support for researchers and librarians thus Author AID (Murugesan,2016:2). Mentoring and ensuring publication of research access and availability through empowerment, development, and evidence-informed policy''. Librarians through training, mentoring and development of knowledge support researchers to increase publications.

Academic identity management

Citing Adeagbo, Van Deventer, Asubiojo and Pienaar (2016: 3) academic identity management improves the visibility of the researcher and tracks of record of their publications. It includes having knowledge on how to manage research tools like 'Open Researcher and Contributor ID'

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(ORCID), Web of Science, Google Scholar account and Scopus Author Management. Librarians, as part of their responsibility, share and disseminate research knowledge platforms and links such as Research gate, Academia.edu, LinkedIn among others. Academic identity management takes into account librarians' ability to understand an author's agreement, citations, and data management issues. Furthermore, librarians usually are familiar with the research collaboration tools such as wikis and online forums, hosting of documents (dedicated websites), discipline-specific tools, like data analysis, data visualisation, computational tools, management of publications, and self-teaching tools such as presentations and slides.

Marketing and promotion of resources

Librarians, as part of their responsibility are to create the needed awareness about their collection. They must showcase the research out of their institutions to both users and potential users. Marketing research output increases access and availability for ready use. Marketing of research output ensures wider coverage and collaboration between creators and readers. Librarians have adopted Web 2.0 technologies and innovative online tools designed to enhance communication and collaboration (Tenopir, Volentine & King, and 2013:194). Librarians have adopted mobile devices and applications to promote and facilitate access to research outputs as corroborated by Akeriwa, Penzhorn and Holmner (2014:2).

Marketing, according to Islam and Hossain (2014:743) increases user satisfaction by promoting maximum value. Librarians use surveys, websites, Online Public Access Catalogue (OPACs,) flyers, emails, amongst others, to promote their resources. This, according to Kennedy (2011:144), is not enough. Libraries ought to have budget and marketing plans to do vigorous marketing. They must have interactive websites in order to create the needed collaboration and networking.

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Branding of research output, alerts services, training, application of social networks are all marketing tools librarians could use to intensify marketing. To market is to create awareness to both present users and potential users, both local and international. Marketing improves the acceptance of new services such as institutional repositories, research commons,, OPACs, electronic resources, amongst others.

Research Data Management (RDM) Managers

'Research Data Management (RDM)' according to the University of Leicester (2016), 'concerns the organisation of data from its entry to the research through to the dissemination and achieving of valuable result. It focusses on the creation of data, its organisation, storage, retrieval and dissemination'. Librarians are reckoned to be good data managers and coordinators of research outputs and outcomes. According to Horton, Eynden, Corti and Bishop (2011:1), good data management is fundamental for high quality research and excellence. RDM enables one to share data and increased access for 'use, re-use and for the future'. Endorsement from the Joint Information Systems Committee (JISC) revealed that good data management practice allows reliable verification of results and permits new and innovative research to be built on existing information. The majority of research and higher education institutions have policies on research data management (RDM) plans since it has become one of the requirements for funding organizations, funded research projects and sponsors. RDM propels creators to deposit research data in recognized centres in order to 'maximize transparency and accountability, scrutiny of research findings, improvement and validation of research methods and reduction in cost resulting from duplication of data collection' (Horton, Eynden, Corti and Bishop. 2011:3).

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Roles and responsibilities of RDM are not usually the sole responsibility of the researcher but encompass project directors, research staff, IT services staff and librarians that will ensure access to good quality data and sharing (Horton, Eynden, Corti and Bishop 2011:7). The responsibilities of librarians encompass the elements of the RDM which includes among others data storage, organisation, retrieval, promotion, dissemination and quality assurance. The Council on Library and Information Resources (2013:25) identified thirty –two universities where librarians provide some level of data management plans to support for researchers. Librarians at the University of Minnesota, for example, provide a range of data management support functions to researchers (University of Minnesota 2011). Specialist librarians also assist in drafting data management plans, by consulting on funding agencies' requirements, confer on subject-specific data repositories, and give access to both on and off-campus access to resources.

Further, librarians in collaboration with the university office of research offer data management Workshops to graduate students, faculty, and researchers (The Council on Library and Information Resources 2013:26). Librarians such as 'Deb Morley, head of specialized content and services at the Massachusetts Institute of Technology (MIT) Libraries, Sarah C. Williams, life sciences data services librarian at the University of Illinois at Urbana-Champaign, and Ardys Kozbial, chair of the Data Curation Working Group at the University of California–San Diego Libraries, have championed in the support of RDM. Provision of web links, access to information from funding agencies, information about data repositories, assisting in branding research output, development of RDM checklists, advice on metadata, file formats, data security and data curation practices are some examples of the activities carried out by librarians.

Digital Curation and Preservation Managers

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Harris-Pierce, Yan Quan and Liu's, (2012: 598) survey reveals that there is an increase in the number of Library and Information Science (LIS) schools offering courses in data curation in order to respond to research data produced. The Digital Curation Centre (2010) defines digital curation as the act of 'maintaining and adding value to a trusted body of digital information for current and future use'. Librarians have placed a premium on digital curation due to the digital revolution and the need to transform print data into electronic data. The majority of research outputs is produced electronically, especially scientific data, and this librarians have the responsibility to ensure access to in order to advance research. Digital information can be lost if not properly curated and preserved. The phenomenon where research is done collaboratively and in multidisciplinary areas in separate locations has become the trend. Librarians therefore require multidisciplinary skills in curating such information. Strategies such as 'data management, computing, economics, and institutional governance are needed (Yan Quan Liu, 2012: 599)

Citing Harris-Pierce Liu, (2012: 600) researchers rarely have the skills or resources necessary to prepare their data for sharing; expertise such as classification and description of information, cataloguing, marketing, and technical and public services, collection management with numerous access points, references and instructions to assist in finding and using information in the appropriate context are embedded in librarians. Heidorn (2011:670) also corroborates that librarians have a duty to society to 'collect, preserve, and disseminate the intellectual output of the society'. Libraries have the skill sets, experience, and most of the infrastructure needed to curate the numerous types of data. Functions of academic librarians according to Nielsen and Hjorland (2014:237) evolve, assuming the role of data, information and knowledge specialists around research trends. They are important in creating digital data and data collection. Librarians are

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involved in indexing data in order to improve access; the data citation index enables the description of data in repositories and subject specific databases for easy identification. There is also the citation index that enables researchers to assess their bibliometric and impact of research thus 'H-index'. Examples are the 'Web of science and ORCID.

Digitization

According to the Online Dictionary of Library and Information Science (ODLIS), digitization is the process of converting data to a digital format for processing by a computer. In information systems, digitization usually refers to the conversion of printed text or images (photographs, illustrations, maps, etc.) into binary signals using some kind of scanning device that enables the result to be displayed on a computer screen. In telecommunication, digitization refers to the conversion of continuous analogue signals into pulsating digital signals. The Association of Research Libraries (ARL) has/have endorsed digitization as an accepted preservation reformatting option for a range of materials. Examples of materials that are considered by librarians for digitisation are 'past questions, theses and dissertation, articles, valuable and rare books, cultural heritage, fragile scholarly documents, books containing handwritten notes on scientific observations and sketches', amongst others.

Library collections are usually digitized to prolong their live spans, facilitate multiple and remote access to enhance teaching, research and learning. Selecting materials to be digitised are the responsibility of the librarians. Ubogu al et (2010:5) corroborate the benefits of digitization, that it enables work to be 'searched, browsed, amended, shared and accessed by a number of users at the same time. The physical touch to the material is avoided and this goes a long way to prolong the life span of the collection, it promote access both on- site and off -site, enhances searchability, discoverability and visibility, enables the integration of different media (audio, video, pictures),

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saves space and users' time. Further sharing of resources become possible, enhances research, teaching and learning.

Institutional Repository (IR) Managers

An institutional repository is defined as a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members (Jants & Wilson, 2008). IR has become one of the fastest growing elements of the digital library genre, because of their potential to reform the current system of scholarly communication and the role in advancing the open access movement. The majority of academic librarians have invested skills, and technological resources to build a robust technical infrastructure that will foster access to the research and intellectual output of the institution. This is with the hope to enhanced access to faculty's research and the increased visibility of research generated within the university that is relevant to society (Jants & Wilson, 2008).

Lercher, (2008) describes IR as a collection of published or unpublished materials collected by any academic institution across a variety of disciplines that is freely accessible on the web. Examples of such materials include dissertations, theses, articles, research recipes, historical and cultural heritage, amongst others. A repository has the mission to provide reliable, long-term access to the managed digital resources of its designated community, now and into the future CRL (2007). Librarians have adopted the Metadata, Dublin Core and the MARC (Machine Readable Catalogue) standards. The development of repositories has strengthened the partnership between researchers and librarians and the spread of a knowledge base for students and scholars, both locally and internationally.

Creators of Virtual Research Environment (VRE)/Learning Technology Specialist

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According to Fraser (2005), a Virtual Research Environment or VRE is an online tool used by researchers to facilitate the sharing and collaboration which takes place in a secure environment. Such include 'research commons, writing and language translation services, referencing and citation tools, social interaction platforms, web technologies and ICT centres'. The Joint Information Systems Committee (JISC ,2011:7) defines VRE as the support given to researchers from all disciplines to work collaboratively by managing the increasingly complex range of tasks involved in carrying out research'. A VRE is both the access interface and the infrastructure that allow the researchers to conduct research online, it also enables researchers to easily collaborate with peers and team members remotely (Van Deventer 2015).

VRE has got an integrated online environment which helps in accessing shared documents and resources during the course of a research project. Documents shared within a VRE can be edited by multiple collaborators in different institutions and locations. VREs make online communication and the sharing of sources of information easy. Integrated tools like wikis, blogs, shared calendars and discussion forums are employed. In addition to the above, VRE is accessible anytime and anyplace and is fully integrated with Microsoft and reference tools such as Endnote, cyber infrastructure, digital infrastructure, and e-infrastructure (Fraser, 2005).

According to Pienaar and Van Deventer (2009) VRE provides a framework of resources to support research processes. Pienaar and Van Deventer (2009:3) have identified features which include the promotion of collaborations among research teams, facilitation of data collection, knowledge creation and sharing among scholars. Increased access to research data across regions and borders, enable social interaction such as wiki, blogs, instant access and feedback to research findings (OCLC,el, Leiden University) . It enables exploration of different research expertise etc. Pienaar

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and van Deventer (2009:5) identify ten developmental activities on the virtual research environment (VRE) in which librarians play a role. These are: identification of research area, literature review and indexing, identification of collaborators, proposal writing, identification of funding sources, project management, scientific workflow, training and monitoring, real time communication and dissemination of artefacts.

Promote Personal Information management (PIM)

Practicing PIM enables one to "create, organize, retrieve, use, reuse and distribute information to fulfil various responsibilities (Jones,2007:453)". PIM according to Fourie (2012:187) supports cognitive processes such as ''thinking, problem-solving, idea generation, categorization, representation, vocabulary exploration, and visualisation'' .One will be able to use, track and reuse information thereby enabling the possibility to have the right information in the right place and in the right form. Librarians have the responsibility to equip researchers to practice this in order to support research. PIM enables one to create synergy between literature and the various stages of research.

Promote Open Access (OA)

Open Access has been defined by the Open Access Academy (2017:1) as ''publications that are free to all interested readers, where the publishers place no financial or copyright barriers between the readers and the research output. According to the Academy open access increased access to relevant literature, increase visibility readership and impact of authors' work, improve discovery in the digital environments, enhances interdisciplinary research and accelerates the pace of research discovery and innovation (Open Access Academy 2017:1)

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The rapid rising in prices of academic journals, have compelled librarians to sort for other avenues for information, Open Access has therefore become a viable option that resolves the serials pricing crisis. Librarians have the role to promote openness in research output. It is encourages that research finding ought to be use without any restriction. Advancing research requires free flow of information among scholars and researchers. Librarians have the role to advocates for open access. It is the duty of librarians to translate research findings into formats which will be more readily accessible to researchers. In response to the rapidly rising prices of academic journals, librarians need to advocate for publication in open access journals to increase access and visibility. There is the Green and Gold publishing. According to the Sage Publishing (2013) Open access "sustain scholarly communication, promote research growth, control cost reduction and accelerate research". Open access repositories, books, journals and magazines are available for use by researchers.

Alert and tagging Services (articles and grants)

Tagging has been defined by Mendes, Quiñonez-Skinner,and Skaggs (2009:32) as the "act of associating terms with an information objects to further identify and describe the item which enables keyword-based classification and retrieval" A tag is generated metadata from communities of users that enables the aggregating and analysis of information. Tagging and alert according to Eckert, Hänger,and Niemann, (2009:557) enhances anotation of literature, improves precision and recall..Lbrarians traditionally considered the creation of subject headings to identify key concepts. The increasing volumes of information produced requires that librarians and researchers tag and asign to alert services to be able to keep track of relevant literature. Tagging has led to improvement in controlled vocabulary that has resulted in resource discovery , it has led to the advancement in subject interoperability,tagging enhances the

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organisation of knowledge enabled the creation of corporate taxonomies among others(Macgregor & McCulloch,2006:293).

Researchers can tag their identity and publication to related literature and creeators in their field since it mproves searchability and discoverability of research. Ulike the content creators who create metadata users ivolve in tagging create the metadata vocabularies naturally Mendes,Quiñonez-Skinner, J and Skaggs, 2009:35).

Data visualization

Data visualization, dating back from the 1990 has seen progressional advancement. Kruse al et (1993:145) posited the availability of ‘’Spectral Image Processing System’’ (SIPS) that visualizes data and analysis spectrometer data in an interactive manner for scientist. The use of SIPS, data visualisation application streamlined and analysed data, enabling scientist to interact, explore and quantify data. Development of Images, maps and graphics become easier as a result of this. The exponential growth of information in varying formats called for the need to simplify data for easy interpretation and application .Publication by Shneiderman (1996) postulated that visualizing information in a graphical presentation gives a better understanding. The integration of data visualisation application in research enables on to internalise, contextualized and assimilate data.

Lately data visualization has become one of the embedded roles perfumed by librarians to support research. Data visualization has become a key research components as a result of innovative way of delivery research output and blended way of learning. Citing Czuhajewski (2015) librarians at the University of Michigan Library system undertake this activity in order to present research findings in an analytical manner that facilitated understanding, evaluation and interpretation. According Voliva *(*2015) the phenomenon of big data has propelled the integration of visualizing data in order to make meaning from them easily.

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Literature gap analysis

A library may have varied collection across numerous disciplines but may be difficult to identify those that support research. Turcios, Agawal and Watkins.(2014: 476) studies on Library & Information Science Literature and how much of it is research at the Simmons College Research Library , posed these questions ‘’What percentage of periodical literature is available? 2) How many of the titles are suitable for research purpose? 3) What is the subject distribution in both the research articles and non-research articles? 4) What methodologies are used in the research?’’ Librarians need to develop a checklist that would guide them from time to time to assess the gaps that exist in the collection in relation to research support.

The demand for evidence-based practice across disciplines especially the biological sciences requires a step -by-step guide to literature. Researchers need to be guided on some of the patterns that guide in identifying the gaps that exist in literature by doing content analysis and the ‘’Search, Appraisal, Synthesis and Analysis (SALSA) which is usually applied in identifying gaps in biomedical science publication.(Grant,2009:96) .

Grant (2009:91) identified some of the methods researcher could use to review data ’’systematic review, review of evidence, comprehensive review, thematic, descriptive and narrative reviews which will go a long way to identify trends. Identifying gaps in literature will enable librarians and researchers to know ‘’how much research already exists and the subject coverage? According to Turcios, Agawal and Watkins (2014:475) prior information about the nature of literature existing in a particular field will enhance the researcher’s approach to initial inquiry.

2.5 ETHICS AND THE ROLE OF LIBRARIANS

Librarianship has become increasingly complex for several reasons. Curricula are increasingly turning to enquiry based pedagogical approaches (Doyle & Buckley, 2014:156). There is virtual

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increased collaboration, increased electronic resources and digital content coupled with mobile applications, open scholarship, social media and networking, information overload, availability of online resources, remote access, amongst others. Henceforth these will pose new ethical problems for academic librarians. Academic librarians over the years have been concerned generally with information ethics. According to Fallis (2007:24), questions such as 'who should have access to what information, intellectual freedom, equitable access to information, information privacy, and intellectual property' are primary concerns. Whilst academic and research ethics are recognized as information ethics, it is precipitated by behaviours that portray irresponsibility.

Librarians are tasked to provide research support in all endeavours to faculty, students and researchers at large, hence the consideration of ethics (Rothstein J.1993:254). Information professionals have been challenged to take responsibility and action for information policy in professional and public settings on ethics (Carbo & Smith, 2008:1111). Further, Iyer and Eastman (2006:102) predict reasons why students cheat, among them are 'lack of understanding of what plagiarism is, peer pressure and the consequences or effects of cheating on the others. Findings reveal further that, variables that facilitate cheating include: ignorance and poor surveillance (Iyer & Eastman, 2006:102).What is the librarian's role in ensuring ethical compliance.

Fallis (2007:24) is of the view that library professionals need to have a good working knowledge of information ethics. Doyle and Buckley (2014:156) corroborate this by emphasizing the need to integrate ethics into the curriculum in order to develop ethical awareness into future generations. There are a number of Research Ethics Committees (RECs) established in the universities with the mandate to ensure academic integrity, protection of participants, facilitating in securing informed consent and the promotion of a research ethics culture, according to Doyle and Buckley (2014:156), Hoecht (2011:253). On the other hand, Polytechnics in Ghana can least boast of these

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committees hence, there is the need for librarians to intervene to ensure academic and research ethics compliance. Librarians ought to promote a research ethics culture by prompting researchers, faculty, students and staff. Polytechnic librarians ought to advocate research and academic ethics.

Ethics usually encompass the processes involved in data collection. Citing Oliver and Eales, (2008:344). Librarians have a role to play by educating researchers on ethics. Further to this, issues of informed consent, rights and consequences of research processes need to be spelt out. According to Hoecht (2011:255) a number of universities have established Research Ethics Committee (RECs) that protect the public, researchers and vulnerable subjects from potentially unethical research and research fraud. That notwithstanding, the Committees also protect the researcher's and the university's reputation. Trust and self-regulation are recognized as important elements for the research process, but these alone might not safeguard the ethical dimension of research according to Hoecht (2011:256). There is therefore the need for librarians to advocate these through literacy programmes. The RECs has the aim to ensure legitimacy and accountability of research Vis-a`-Vis the public, the taxpayer, researchers at large and the government. It is in this respect that Polytechnic librarians need to assume the role of the RECs and be concerned about ethics. Training and creating awareness on academic research ethics is key.

Warnken (2004:237), points out that librarians have assumed multiple roles as defenders of intellectual and academic freedom, as facilitators of information, as teachers and as librarians, they therefore can actively promote academic integrity by 'guiding students on the appropriate use of information, assisting faculty in redesigning coursework and also on how to use the plagiarism detection software' (Warnken,2004:239). .Proactively Librarians can teach students, and faculty how to navigate and assess legitimate information on the web, by so doing, librarians shall be promoting the intelligent use of information and authorship. Librarians can fulfil their roles as

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members of academic communities when they consciously integrate academic integrity into the discourse among students and faculty. This will promote vibrant and transformed scholarship for the future.

Librarians' role cannot be neglected in the promotion and sustenance of academic integrity. Librarians ought to promote research ethics by embedding academic ethics and integrity into the information literacy programmes. The Students and faculty need to be assisted and prompted on the legitimate use of information, since it can impact on the reputation of the institutions. Librarians can assist in the legitimate and ethical way to locating, selecting, organize, presenting and assess scholarship.

2.6 DEVELOPMENTS IN ACADEMIC RESEARCH ETHICS IN AFRICA

Academic research ethics subsumed under Information Ethics (IE) has gained international recognition. Several deliberations and conferences have been held on this subject matter. Among them were UNESCO's first Conference of Info Ethics in 1997 entitled ''First International Congress on Ethical, Legal and Societal Aspects of Digital Information''. The World Summit on the Information Society (WSIS, 2003) also developed the "Declaration of Principles: Building the Information Society: A Global Challenge in the New Millennium'', and in February 2007, the ''First African Conference on Information Ethics'' was held in South Africa (Carbo & Smith, 2008:1112). These developments postulated the extent under which ethics have been embraced by all within the academic sphere.

The "Africa Network for Information Ethics" (ANIE) and the "Africa Centre of Excellence for Information Ethics" (ACEIE) have championed and advanced information ethics within the African context. The February 2007 first African Conference on Information Ethics served as a

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wakeup call on “Government agencies, numerous Academic Institutions, Departments and Private Sector stakeholders’’ to cushion the objectives. The two aforementioned African Bodies supported UNESCO and WSIS activities and structures to advocate and accelerate awareness about Information Ethics in Africa. Another objective was to explore and produce research publications on the topic. Further curriculum development to teach this knowledge as formal programmes in African universities was considered (Ocholla, Britz, Capurro and Bester: 2013).

The outcome of these initiatives has led to the development of curricula in the teaching of information ethics. Also majority of African Universities have established Ethics Committees and the introduction of informed consent to ensure academic research compliance. There is an enhanced collaboration between Research Units and the Ethics Committee to verify and ensure ethical compliance, as well as address ethical issues associated with grants, scholarship and reputation building.

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2.7 THE IMPACT OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) ON ACADEMIC ETHICS

Information Communication Technology citing Perera and Chandra (2010:1) has become the gateway to the scholarly world. This has catapult a dynamic way of researching teaching and learning. It has facilitated global transfer of information through its networks. There has been increased access to information to researchers and scholars. This has impacted positively on research publication and impact. (Mutula and Majinge, 2015; 66 and Perera and Chandra, 2010:4). Totolo (2015:3), alluded to the fact the web, is full of information, hence the possibility of plagiarizing is always on the increase. The Internet has provided the researcher with new forms of social life that are remarkable in their 'diversity, accessibility and persistence ties' among others. Academic dishonesty, according to Lyer & Eastman (2006:101) is on the increase since technology makes it easier for students to cheat by cutting and pasting.

Capurro, (2008:1163) a participants at the International Centre for Information Ethics (ICIE) symposia acknowledged that the introduction of information and communication has posed ethical challenges for the African continent, specifically in 'the protection and promotion of indigenous knowledge, the achieving of African Web sites and particularly the right to communicate and the right of access to knowledge in a digital environment' therefore it is incumbent on Africans to commit, attain and abide by ethical policies.

Virtual research, data mining, online and E-research has increased significantly aiming to ensure traceability and contiguity (Beaulieu & Estalella, 2012:23). Further, advanced technology and new techniques have made it easier than ever before to process, store and disseminate large amounts of research data as well as personal and sensitive information. The new infrastructure of

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communication such as social media, advanced and virtual technologies, the information revolution among others have exacerbated the way research is packaged and delivered (Beaulieu & Estalella, 2012:23; Schomberg,2011:8; Madge, 2007:654). According to Beaulieu & Estalella (2012:23) these have called for research ethics principles aiming to guide the research process. According to Madge (2007:654) 'informed consent, confidentiality, privacy, debriefing and netiquette' are key issues that pertain to online research ethics.

The Emerging ICTs justify for vigorous ethical principles that will impact on recent research agendas and shape future research. In addressing the ethical implication on the emerging ICTs Schomberg, (2011:30) recommended the 'establishment of an "ICT ethics observatory", platforms to disseminate past and current research ethics opinions, ethical impact assessment, early warning mechanism for issues that may require ethical legislation, openness about the description of the project and its ethical issues, and to encourage broader stakeholder engagement in the identification and resolution of ethical questions'.

2.8 COMPONENTS OF ETHICAL MISCONDUCT/DILEMMAS

Academic misconduct has been defined as the various forms of cheating and plagiarism. Currently there is a growing concern to address ethical problems since this unacceptable behaviour carried out in the classroom an in writing theses affects the various professions. The under listed are some of the forms of the misconduct:

Academic Dishonesty– It has been defined as the forms of disruptive behaviour that affect the academic setting (Sabloff & Yeager, 1989:2). Academic dishonesty in research, according to Sabloff and Yeager (1989:3), encompass the following: 'fabricating data in support of laboratory or field work, falsification of data in support of laboratory or field work, sabotaging another

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student's research, stealing another student's research ideas, taking credit for work not done by oneself, hoarding materials/equipment to advance one's research at the expense of others, deliberate destruction, theft, or unauthorized use of laboratory data, research materials' . In moving forward Iyer and Eastman (2006:102) identified fraud, intellectual theft, copying without proper citation and cheating as forms of dishonesty. Findings revealed that, undergraduate possibility of cheating is higher compared to the postgraduate, this is as a result of lack of understanding of what dishonesty encompass.

Academic Negligence- this is an intent to mislead, deceive or defraud. Negligence is not equated with ignorance. This is because rules and regulations are mostly made available (Sabloff &Yeager, 1989:1). The Library, according to Sabloff and Yeager (1989:3), experiences misconduct such as 'stealing materials from the library, not returning materials promptly when asked to do so, hoarding scarce copies of materials needed by others, deliberately damaging library materials, helping other students to steal, hoard, or damage library materials, duplicating copyrighted material unlawfully. Recent findings by the European University Institute (2013:15) deliberated on the deliberate actions such as 'stealing or cutting pages out of library books, mutilation, wilfully disrupting the experiments of the laboratory, endangering institutional access to licensed research resources by wilfully failing to observe their terms and conditions' affect good academic practice. The European University Institute (2013:14) further identified exploitation of ideas from others without proper acknowledgement and the fact that some scholars act to prevent others from completing their work deliberately as unethical.

Plagiarism- this has been defined as the insufficient or improper acknowledgement of someone else's written work in ones' writing (Sabloff & Yeager, 1989:2).It can take the form of: 'Word-for-word plagiarism, section-by-section plagiarism, select-term or key phrase plagiarism'.

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Plagiarism has further been defined by Totolo (2015:3) as the manners that are associated with stealing other people's ideas and pretending that they are your own. The Oxford Online Dictionary also defines it as 'the practice of taking someone else's work or ideas and passing them off as one's own'. Incidences of Plagiarism are on the increase as a result of the proliferation of information on the World Wide Web (Mclafferty & Foust, 2004:186).

Iyer and Eastman (2006:102) identify plagiarism as a form of 'fraud, intellectual theft, and a transgression against common intellectual values'. According to Warnken (2004:238), students plagiarize from both conventional and internet sources. The ratio then was thirty eight percent (38%) for conventional sources and forty percent (40%) for internet sources as at the time of the study. This is expected to have worsened as students do not accept plagiarism as a form of offence. The discovery of plagiarism creates a breach of faith between the student and the lecturer of which the eventuality can be mistrust between them (Warnken, 2004:239). It is therefore appropriate for faculty and librarians to emphasise the prevalent rate of dishonesty, its consequences as violation of the institution's norm and punishments as such. It is expedient for academic institutions to develop policies and communicate it to the community. It is more effective to prevent plagiarism than to spend time detecting it after it happens (Warnken, 2004:240).

Examination/Assignment Malpractice– contemporary problems affecting the education system today, according to Akaranga and Ongong (2013:87), involve examination misconduct and irregularity are considered (as) ethical issue. It is defined as a 'deliberate wrong doing contrary to official examination rules designed to place a candidate at an unfair advantage or disadvantage' (Wilayat2009:2). This has been corroborated by Fasasi (2006) as 'a misconduct or improper practice, whether it is before, during or after any examination by examinees or others with a view to obtaining good results by fraudulent means'. Such includes cheating, colluding with invigilators

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and examiners, impersonation and writing synoptic notes (Akaranga & Ongong, 2013:88). It is a moral issue which academic institutions recognise as an unethical act.

Examination malpractice falls within these ethical dimensions of morality, thus conduct of good or bad. The majority of academic institutions have examination codes of conduct expected to be adhered to, hence a violation justifies persecution. Though these normative guides are available, there are still records of malpractice. There are moral principles, rules and regulations for conducting examinations and violations of such by either the teacher or the learner. Ethical principles, according to Nweze (2009:99), must be employed in the conduct of examinations.

Honorary Authorship/Author Inflation - Publishing is reckoned as a criterion for academic career enhancement. The phenomenon 'publish or perish' has pressurizes faculty to produce more publications, hence, the probability for scientific misconducts and authorship conflicts. Mandal, Bagchi and Basu (2015: 401) define author inflation as the phenomenon where similar authors owe duplicate publications and inclusion of non‐contributing persons as authors (honorary authorship). Recent findings have revealed its prevalence in the physical medicine and rehabilitation research articles: 18.0% and 55.2% respectively (Mandal, Bagchi & Basu, 2015: 402). The following have been identified as some of the ethical violations:' plagiarism, publishing in predatory journals, fabrication of data to get papers published in renowned journals amongst others (Mandal, Bagchi & Basu, 2015: 402). Further situations where more information is revealed by an author to a third party for commercial purposes is considered as a breach of ethical policy.

Ghost authorship – this is where writers who substantially contribute to research have concealed themselves from being acknowledge. Wislar, Flanagin, Fontanarosa,DeAngelis (2011:1) define these as individuals who have made substantial contributions to works reported in articles but

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have their names withheld or not mentioned as authors. It is the failure to name authors, individual and creators who have made substantial contributions to an article, this hinders public accountability and integrity in research (Gøtzsche, Hróbjartsson, Johansen, Haahr, Altman, & Chan, 2007:1)

In order to ensure transparency in authorship Baskin and Gross (2011:2) recommended to journal editors to validate and investigate authors' contribution to a study. Strengthening the authorship of International Committee of Medical Journal Editors (ICMJE) , *Neurology* developed a policy that compelled authors to ''define an intellectual contribution made, identify author and creators for a work, authors acknowledge all versions of the manuscript and sign statements about their specific contributions using manuscript tracking system''. This ensured that authors assume public responsibility for contributions made'' (Baskin & Gross,2011:2).

Salami publication - this is where one research finding for a project is separately reported thus duplication. Šupak Smolčić, V. (2013:1) defines it as segmented publication and redundant publication that is mostly characterized by similarity of hypothesis, methodology or results. This is unethical in research. Publication of two or more articles derived from a single study is likely to be described as such. Producing two or more articles from a single study according to Rezaeian, (2014:43) might be permitted for epidemiological studies, publishing for different audience or language.

Censorship- Tertiary institutions, which include the Polytechnics, are mandated to create and disseminate research output to the populace. Research works that have been funded with taxes ought to be made available for public use. How often are these information made available to facilitate decision- making and knowledge sharing? The absence of such impedes one's ability to

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think. The withdrawal of research articles affect knowledge sharing. The majority of journal publications are mostly online and their withdrawal makes it difficult to trace the paper for reference purposes.

Censorship contradicts WSIS vision of an information society as one 'where everyone can create, access, utilize and share information and knowledge, enabling individuals and communities to achieve their full potential' (Capurro, 2008:1163). Citing Carbo and Smith (2008:1111), freedom of expression and access to academic information ought to be made available for all. Information and communication technology, which is the major driving force, ought to be streamlined in order to ensure privacy but not necessarily to deny access.

Encroachment on privacy

This is the degree of confidentiality and anonymity accorded to the research. It is the right of the participants to be accorded privacy. The researcher needs to have his/her privacy, thus limited interference both internal and external. The subjects used as instruments ought to be accorded privacy. Disclosing of research findings to third parties without subjects' consent is unethical.

2.9 SUMMARY OF CHAPTER

This chapter reviewed related literature on the following thematic areas. It defined the concept of academic research with it distinguished features. It was discovered that academic research is an investigative writing which is based upon scientific inquiry. It is guided by laid down rules, policies and code of conduct unlike other research. As a result of this librarians play a role to ensure that research output conforms to ethical standards. Benefits of ethical compliance include transparency in research, integrity, accountability to research, privacy, trust, ownership and increase dissemination. It was discovered that librarians paly numerous roles to promote research

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among which include: increased access to information, author aid services, information literacy, digital curation, manage research data, alerts and tagging services and creates virtual research environments. The chapter further reviewed developments in academic research ethics in Africa. A highlight on the impact of Information Communication Technology (ICT) on academic ethics was given.

Findings from this chapter identified various forms of misconduct such as cheating and plagiarism, academic dishonest, falsification, examination malpractice, ghost authorship, honorary authorship, encroachment on privacy, conflict of interest and fabrication. Further the roles performed by librarians in navigating and addressing the issues was discussed. Phenomenon such as open access, information overload, social media, virtual and increased collaboration, remote access, increased electronic resources and digital content coupled with mobile applications have pose new ethical challenges to librarians. It was discovered that academic research ethics compliance is important because of it implication on institution visibility and reputation, ranking, funding and integrity.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research design and method adopted for the study. It is an exploratory study which aims to investigate the awareness of academic research ethics among senior polytechnic librarians in Ghana. The chapter presents the methodology used for the study. It

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discusses the research design, the study population, sample size and sampling procedure, data collection approach, data presentation and ethical considerations.

3.2 STUDY METHODOLOGY

A method, according to Flick (2014:54) and Leedy (2005:15) refers to the scientific way of accomplishing an objective by adhering to vigorous research and ethical standards. A method therefore is the standardised way of solving a problem or reaching an objective. Various methods are used to carry out social science research. This study primarily was an exploratory research, the researcher wanted to investigate the roles, opinions on academic research ethics, awareness and the preparedness of the polytechnic librarians in support of the transition. It adopted the quantitative method to analyse and presented the study findings. Quantitative data unlike the qualitative describe phenomenon using figures.

A combination of primary and secondary sources of data was utilized to accomplish the study objectives. The primary source utilised a questionnaire as its data collection instrument. The primary data provided first-hand information on the role of the polytechnic librarians in promoting academic ethics and integrity. Merriam and Tisdell (2015) described primary data as a record that contain first-hand information or original data on a topic, which is also empirical evidence. The researcher directly engaged the respondents in primary data collection. Primary data collection instruments include: ‘‘questionnaire, interview, surveys, and focus group’’, amongst others (Baglione, 2012:113). The study utilised secondary sources. This can be considered as any published or unpublished work that has been modified from the original source. Both primary and secondary data were triangulated to arrive at the study findings.

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Due to the study objectives, the researcher employed a case study approach. A case study is an intensive analysis of a person, group or event stressing developmental factors in relation to the context. The Senior Polytechnic Librarians being used for the study provided a descriptive and explanatory analysis on academic research ethics.

3.3 RESEARCH DESIGN

Research design according to Babbie (2010:112) refers to the steps regarding the topic to be explored and the population involve. It refers to the way variables are organised and measured in order to evaluate and triangulate the changes which might have occurred (Flick, 2014: 55). The study was a field research which adopted the descriptive design using the case study method. Collection of data, analysis, triangulation and discussion were carried out in order to present findings appropriately. The design served as a blue print that specified the manner in which data relating to the study were collected, analysed and presented. It provided to the researcher a procedural outline that enabled investigations to be carried out. (Creswell; 2009). According to Baglione: 2012:99), it explicitly defend ones choices on how to translate concepts into knowable entities.

3.4 SELECTION OF CASE

The selection of the Senior Polytechnic Librarians was appropriate considering the transition of the Polytechnics to University status. Dynamics and demands in technological advancement, research funding challenges, as well as reputation building motivated the researcher's interest to explore the awareness of academic research ethics among polytechnic librarians in Ghana. Additionally, limited research has been carried out on that. Preliminary investigations carried out by the researcher revealed that though there were research departments, where research ethics need

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to be practiced by researchers, the onus of training researchers on ethics sits well with librarians. This is because librarians are usually trained to identify quality research that met both national and international standards.

3.5 STUDY POPULATION

Considering the knowledge scope of the study and the willingness of respondents' participation, senior polytechnic librarians across the ten regions became the resultant population. This was because exploring the awareness of academic research ethics among Senior Polytechnic librarians in Ghana required librarians who are considered as forth runners and with homogenous characteristics. Research population according to Descombe (2014:23) refers to all the items in the category of things that are being researched. Concentrating on the unit with such particular characteristics, senior librarians across the regions were selected to assess their awareness in support to the technical universities. Findings cannot, thus, be generalized but are rather indicative of the issues that the Ghanaian Senior Polytechnic librarians might have or are likely to have to deal with and explored. In order to select a population that can provide suitable data in terms of relevance and in-depth, senior polytechnic librarians were considered. They are those classified to be senior members, managers, supervisors and heads. The envisaged qualification was at least the Masters degrees in librarianship with a number of years' experience. The majority of the libraries could boast of at least two or three master's degree holders for the position of Head librarianship and deputy (Field Survey: 2017).

3.6 SAMPLING

Purposive sampling approach was used to select the respondents. According to Oliver (2006) from the Sage Dictionary of Social Research Method (2006) purposive sampling ‘‘is a type of non-

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probability sampling where the researcher decides on the units to be used based on the study's objective(s)''. The size comprised of all the senior librarians from each of the ten polytechnics as respondents for the study. Thirty-eight (38) senior librarians were at post at the time of the study. Considering the knowledge scope of the study and the willingness of respondents' participation, opinions of thirty-eight (38) senior Polytechnic librarians were expected but due to unavailability of a respondent thirty-seven (37) became the resultant respondents. This made it possible to specifically apply the homogenous sampling technique. Concentrating on the unit with such peculiar characteristics. Though one of the challenges identified for purposive sampling was researcher bias, the study scope, objectives and characteristics made it impossible.

Table 1: respondents across the regions

RESPONDENTS	**TOTAL NUMBER OF LIBRARY STAFF (PROFESSIONALS AND PARA-PROFESSIONALS**	**TOTAL PROFESSIONALS**
Accra Polytechnic	11	5
Kumasi Polytechnic	11	5
Wa Polytechnic	8	2
Tamale Polytechnic	12	3
Sunyani Polytechnic	20	3
Takoradi Polytechnic	25	5
Cape Coast Polytechnic	20	5
Ho Polytechnic	9	3

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Koforidua Polytechnic	10	5
Bolgatanga Polytechnic	8	2
Total	**134**	**37**

Source: (Field Survey: 2017)

3.7 DATA COLLECTION

Questionnaire was the main instrument used for the collection of data. Both structured and non-structured questions, also known as open -ended questions were used. The open-ended questions enabled respondents to express their own views and suggestions. The questions were emailed to some respondents, affording them the opportunity to access them remotely and at convenient times. The researcher personally distributed that of ‘‘Accra, Cape Coast and Koforidua’’ thereby providing the researcher a direct engagement with respondents. Data was collected from Senior Polytechnic librarians across the ten regions of Ghana.

The questionnaire was structured into six parts which reflected the objected of the study. It consisted of a total of fourteen questions both open and closed ended questions. The first section contained ‘‘demographic characteristics of the respondents. The second section highlighted on the role of librarians’ in academic research, the third section outlined the level of awareness, the fourth solicited views on the importance of academic research ethics and its impact on research, the fifth section assessed the impact of ICT on research ethics. This was followed by the components of ethical misconduct, control of ethical dilemmas by librarians and finally awareness on some of the ethical tools and applications’’. Information was also gathered from annual reports of the polytechnics and websites .Secondary sources which included books, journals, and online databases were also utilised. Data collection was limited to the views from Senior Polytechnic

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librarians in Ghana. Opinions, facts and recommendations were solicited to personally and via email to respondents to accomplish the study objectives.

3.8 DATA ANALYSIS AND PRESENTATION

The data collected from the respondents was coded using the Statistical Package for Social Sciences (SPSS). The software was also used to analyse the data descriptively through frequency and tables from which findings were obtained.

3.9 ETHICAL CONSIDERATIONS

An informed consent was sought from the respondents in order to facilitate the collection of data. An informed consent, according to Bell (2010: 46), reduces the legal liability of the researcher and protects its reputation. A letter of introduction from the Department of Information Studies (DIS) was attached to the questionnaire that were emailed to the respondents. This enabled the researcher to win the confidence of the respondents by revealing the rationale and procedure of the study to the respondents. It enabled participants to be fully aware of the purpose of the study. Respondents were assured of anonymity thus a guarantee that any information provided to the researcher would be held in confidence. Jamison (2007) defines confidentiality as an explicit or implicit guarantee by a researcher to a respondent whereby the respondent is confident that the information provided to the researcher cannot be divulged (Jamison; 2007).

3.10 LIMITATIONS OF THE STUDY

The researcher wanted to utilise ‘‘self-administered questionnaire’’ approach to directly engage respondents across the ten regions to collect the primary data, but due the dispersed nature of the respondents, an email system was utilised for some of them. Another major constraint on the

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researcher was time, the researcher had to work within a specific short time-frame to collect and analyse data to meet the objectives of the study.

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CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 INTRODUCTION

This chapter presents the findings of the primary data for the study. Questionnaires were used to solicit views from senior polytechnic librarians .There was a ninety –seven (97%) response rate, signifying the level of willingness and enthusiasm accorded the study.

4.2 BIOGRAPHICAL DATA OF RESPONDENTS

The respondents for the study were senior professional librarians across the ten Polytechnics. The study identified the names and addresses of all the Polytechnics. This enabled the researcher to track, reconcile and verify the sources of data from the respondents. It also provided the platform for further clarifications from respondents.

4.3 LIBRARIANS' ROLE IN ACADEMIC RESEARCH

Respondents' views were explored on the roles they perform in support of academic research. The table below highlights the under listed roles played by the librarians. Librarians, according to the study, play a multitasking role throughout the research lifecycle process. Ensuring increased access to information was strongly agreed by (89%) of the librarians as the major role. The librarians consented to the provision of information as a primary responsibility to support ''teaching, learning, research and training''.

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The Embedded Librarian according to Drewes & Hoffman (2010:76) carry out number of engagements to support research, among them are creation of Virtual Research Environment (VRE), Academic identity management and promotion of open access. Provision of information goes beyond the confines of the library building, remote access to electronic databases, "Ask the Librarians" web base catalogue, lib guides, subject librarians services amongst others aim to increase access to information to support research.

Marketing of the library resources to both users and potential users was discovered to be one of the major roles. Greater percentage, (81.4%) of the librarians market the library resources and facilities to promote usage. Marketing and advocacy through orientations, notice board, application of social media tools such as web 2.0 tools, web page ,Facebook, twitter amongst others are applications employed by the 21st librarians to promote awareness. The establishment of an Institutional Repository (IR) to preserve and disseminate copies of the intellectual output of the institutions was strongly agreed by (74%) of the librarians.

Electronic Theses and Dissertations (ETDs), journal articles, conference proceeding and monographs are preserved for use, both onsite and remotely. The Polytechnic librarians were consciously embedding these roles in order to support research.

The role of networking and collaboration was strongly agreed by 70.3% of the respondents. Librarians in the Polytechnics collaborate and network in order to share resources, seek for funds and donations, sharing of network devices and software, amongst others. This role has become critical as no library can boast of all the resources needed. Networking and collaboration have therefore become inevitable. Librarians have assumed the role of educating patrons by giving information literacy lessons in order to promote life-long learning. Sixty –seven (67%) strongly

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agreed on the provision of Information Literacy sessions among users and potential users to facilitate the effective use of library resources. Curating the digital content to ensure continuous access remotely recorded (59.2%). Ensuring that patrons adhere to copyright laws to discourage abuse and indiscriminate use of intellectual property recorded (55.5%).Licensing agreements which govern the use and subscription of online databases are regulated and complied by researchers.

Also delivery of Author Aid services and Research Data Management recorded (51.8%) respectively. Forty-eight (48.6%) strongly supported Digitisation as a role that compliment research. Open Access which is regarded as the future of the libraries was strongly agreed by (44.4%). According to the Sage (2013) open access ‘‘sustains scholarly communication, control cost and accelerate research’’. Academic identity management recorded and Literature gap analysis recorded (37%) respectively, whilst Creation of Virtual Research Environment (VRE) and Alert and tagging recorded (33.3%). Data Visualisation which enable to present data in a graphical and visualised manner for easy interpretation and practice of Personal Information Management (PIM) recorded (22.2). The emerging and contemporary roles recorded the least roles undertaken by the librarians. These roles were discovered to be unpopular among the Polytechnic librarians.

Options were given to respondents to indicate other activities undertaken to support academic research in their institutions: the following were some of the activities mentioned: knowledge sharing, teaching, serve as role models, raising funds and proposals, counselling, amongst others. It became obvious that knowledge management and sharing has become part of the embedded activity of librarians in their support to research.

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Roles played by librarians to support academic research	**Rating%**				
List of roles	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Increased access to information	89%	11%			
Marketing and publicity of scholarly materials	81.4%	14.8%	3.7%		
Institutional repository (IR) managers	74%	22.2%	3.7%		
Networking and collaboration	70.3%	26%		3.7%	
Promote Information Literacy	67%	26%	3.7%	3.7%	
Digital Curation and preservation managers	59.2%	22%	18.5%		
Ensure copyright compliance	55.5%	22%	18.5%	3.7%	
Author Aid Services	51.8%	33.3%	14.8%		
Research Data Management (RDM) managers	51.8%	26%	22.2%		
Digitization	48.6%	22%	22%	7.4%	
Promote Open Access Scholarship	44.4%	37%	14.8%	3.7%	
Academic identity management	37%	33.3%	26%		3.7%
Literature gap analysis	37%	14.8%	44.4%	3.7%	
Virtual Research Environment (VRE) Managers	33.3%	37.3%	22%	7.4%	

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Alert /tagging Services (articles and grants)	33.3%	14.8%	51.8%		
Data visualisation	22.2%	22.2%	44.4%	7.4%	
Promote Personal Information Management (PIM)	22.2%	3.7%	74%		
Other (specify)					

Table 2: Roles in academic research*: Source: (Field Survey: 2017)*

4.4 AWARENESS OF ACADEMIC RESEARCH ETHICS

All the respondents indicated that they were aware of the academic research ethics. This recorded a 100% response rate. Further questions were asked about some of the Codes of Ethics they were familiar with. The following codes were mentioned: copyright compliance, informed consent, integrity, privacy, plagiarism, fabrication, fair use, originality, objectivity, anonymity, respect and confidentiality. Plagiarism tops the list, as the majority of the librarians confirmed it. It was the most alarming dilemma experienced in the polytechnics.

4.5 IMPACT OF ICT ON ACADEMIC RESEARCH ETHICS

Majority of the respondents (95%) were positive that information communication technology (ICT) has impacted on academic research ethics. The following were mentioned as some of the impacts:

- Efficient data analysis
- increased access to information

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- Increased availability of software to detect plagiarism,
- Ensured accuracy and integrity in research
- Facilitated sharing of research output
- Enabled the creation of virtual environments
- Increased searchability and discoverability
- Promoted collaborative and network in research
- Created applications that project author identity

On the other hand, it was discovered that ICT has encouraged copying and pasting, promoted plagiarism, data insecurity, social media abuse, cyber ethics and information explosion. The explosion of information on the World Wide Web (www) makes it difficult to assess the authenticity and originality of information for academic purposes. It is for this reason that the roles of the librarians have become indispensable in the academic landscape.

4.6 IMPORTANCE OF ACADEMIC RESEARCH ETHICS ON SCHOLARSHIP

The under listed themes were explored under the importance of academic research and why the polytechnics, now Technical Universities, need to comply with research ethics. Views from respondents were explored on the importance of ethical compliance to academic research. The table below presents some of the benefits derived .Complying with the codes of academic ethics eliminates or controls plagiarism. This was strongly agreed by the majority of the respondents, thus (81.4%). Enhancement on institutional reputation was popular among the respondents thus (70.3%). Reputation building has come necessary, this mostly pave way for research grants and sponsorship. Promotion of integrity was strongly agreed by (66.6%) of the librarians. Ensure standardization and transparency were strongly agreed by (62.9%) of the respondents respectively.

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This enables research publication to meet both local and international standards. A number of the respondents, (55.5%), agreed that it promotes openness in research. There was also the assurance of ownership by (51.8 %), as genuine creators' of information are easily traced. Further, Rights to confidentiality and anonymity was assured by (48.1%). Privacy and trust were the least, these recorded, (29.9%) and (33.3%) respectively. Complying with ethical standards enables research publications to meet international, regional and local standards.

Table 3 Benefits of academic research ethics

Benefit on scholarship	**Rating%**				
Benefits	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Eliminate plagiarism	81.4%	18.5%			
Enhances institution reputation	70.3%	26%	3.7%		
Ensures Integrity	66.6%	29.6%	3.7%		
Promote Transparency	62.9%	33.3%	3.7%		
Promote standardization	62.9%	25.9%	11.1%		
Openness in research	55.5%	33.3%	11.1%		
Ensures Ownership	51.8%	40.7%	7.4%		
Rights to anonymity	48.1%	40.7%	11.1%		
Continuity of research	44.4%	48.1%	3.7%		

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Increased Dissemination and communication	44.4%	40.7%	14.8%		
Enhances Accountability	40.7%	51.8%	7.4%		
Improve Trust	33.3%	51.8%	14.8%		
Improves Privacy	29.6%	44.4%	22.2%	3.7%	
Other (specify)					

Source: (Field Survey: 2017)

4.7 THE NEED FOR POLYTECHNICS TO COMPLY WITH RESEARCH ETHICS

An open ended question was asked concerning the need for the polytechnics to practise and comply with ethical standards. The following were mentioned**:** promotion of intellectual discipline, promotion of integrity, to raise the quality of research work, enhance good research, control ethical dilemmas, promote honesty, ensure originality of research work, to meet international standards Again it serves as source grants and funding, promote reputation and institution ranking. Polytechnics becoming Technical Universities need to employ measures to instil academic discipline in students. This is because they will be competing with all other institutions and graduates elsewhere in the world. Research publications, dissertations and assignments ought to meet all forms of ethical standards. There is also competition among tertiary institutions, hence the need to position oneself for better rankings.

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4.8 COMPONENTS OF ETHICAL MISCONDUCTS /DILEMMAS

The researcher explored some of the ethical dilemmas known by the respondents. The table below gives the rating. Plagiarism recorded the highest form of academic misconduct, this was strongly agreed by (88.8%) of the librarians. Plagiarism, according to Le Ha, (2006), connotes copying another person's ideas to reproduce them as one's own. Academic Dishonesty rated (66.6%). This happens when people use wrong respondents or become disloyal to fellow researchers. Data manipulation was strongly agreed by (59.2%). This happens when research data is manipulated or tampered with. This presents false and unreliable information that poses a risk for the continuity of research. Fabrication was popular among the respondents. It recorded (51.8). This encompassed misrepresentation of research results in order to serve one's interests. Encroachment on privacy recorded (48.1%). This is on the increase, as people invade other's privacy.

Again, examination malpractice was also known to the librarians .Forty (40.7%) attested to this menace of misconduct. It comprised of cheating, impersonation, copying ones work, amongst others. Further Conflict of interest recorded (40.7%).This comprises of diversifying fund meant for research on other things. Over-estimating research budgets and grants. It also occurs when research objectives differ from that of the sponsor of parent organisation, especially funded research projects. There is conflict when researchers, reviewers and editors have a relationship either financial and/or non-financial which might infringe upon or produce unwanted impacts on the findings (Asia Pacific International College:2017) . Researchers are advised to disclose their interest before embarking on a study. Also poor record keeping recorded (33.3%), destruction of records makes it difficult to detect wrong facts which affect continuity of research. Poor record

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keeping also occurs when improper records are kept in order to hinder continuity of work .This usually affects the engineering and biological research and investigations.

Additionally, Author inflation recorded (33.3%). This is where non- contributing authors' names are added to the research, thus inflating the authors for a particular publication. According to Kretschmer and Rousseau (2001) there is a growing concern in number of people receiving authorship credit on published works. Ghost authorship (29.6%), Academic Negligence recorded (29.6%) respectively. Censorship recorded (22.2%). This happens when one denies access and privileges to access information. Salami publication recorded (11.1%) indicating the minimal awareness of ethical dilemma among respondents.

Table 4: Ethical dilemmas

	Rating%				
Misconduct/Dilemmas	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Plagiarism	88.8%	7.4%			3.7%
Academic Dishonesty	66.6%	22.2%	7.4%		3.7%
Data manipulation	59.2%	25.9%	11.1%	3.7%	
Fabrication	51.8%	29.6%	11.1%	3.7%	3.7%
Encroachment on privacy	48.1%	29.6%	11.1%	11.1%	
Conflict of interest	40.7%	40.7%	11.1%	3.7%	3.7%

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Examination/Assignment Malpractice	40.7%	40.7%	14.8%		3.7%
Poor record keeping	33.3%	44.4%	11.1%	7.4%	3.7%
Author Inflation /honorary authorship	33.3%	22%	37.3%	7.4%	
Academic Negligence	29.6%	48.1%	22.2%		3.7%
Ghost Authorship	29.6%	25.9%	33.3%	7.4%	
Censorship	22.2%	51.8%	11.1%	11.1%	3.7%
Salami Publication	11.1%	22.2%	55.5%	11.1%	
Other (specify)					

Source: (Field Survey: 2017)

4.8 CONTROL OF ETHICAL DILEMMAS BY LIBRARIANS

In order to control the menace, the following measures were considered: Use of referencing tools and plagiarism detectors. Use of plagiarism detectors has become one of the ways to check for plagiarised content. Majority of the respondents (84.2%) indicated that the tool enables one to count and identify areas that have been plagiarised. This confirmed to the increasing rate of this delinquency. Such tools included ‘‘TurnItIn, Plagiarism Checker, Plagiascan’’ amongst others. Plagiarism detection tools can either be proprietary software such as ‘‘TurnItIn’’, or open source such as ‘‘Plagscan and Plagiarism Checker’’ They all help to detect the level /percentage of content plagiarised and the count. It also generates reports and highlight on areas that need to be corrected.

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Information literacy sessions recorded (81.4%). This is an advanced tutorial given to equip patrons to become life-long learners. Information Literacy (IL) as defined by Catts and Lau (2008) is ‘‘the ability of people to recognise their information needs, locate and evaluate the quality of information, store and retrieve information, make effective and ethical use of information, and apply information to create and communicate knowledge’’. A number of academic institutions have instituted information literacy as part of the curriculum in order to create the awareness on the ethical use of information and for patrons to become life-long learners. Seventy seven percent (77.7%) of the respondents strongly agreed on the enforcement of a Fair Use Policy.

The policy streamlined on the content of scholarship to be used .An effective way on how to locate information and to increase access to information were strongly mentioned by (62.9%) of the respondents. Increasing access to authentic information enrich the quality of research work with a number of reference sources used. Access in various formats ensure limitless increase both onsite and offsite. Protection of copyright recorded (59.2%), whilst authentication of information was popular among (55.5%). Practice and promotion of Personal Information Management (PIM) enables one to use and reuse scholarship. PIM encompass book marking, tagging, assigning to favourites amongst others. Organization of information was endorsed by (33.3%). Use of referencing tools according to the librarians has become one of remedies used to curb the dilemma. Greater number of the librarians, (33.3%) strongly agreed on the use of referencing tools, Refman Refworks and Mendeley amongst others. According to the librarians these assist researchers to cite and reference literature easily.

There is the saying that ‘‘prevention is always better than cure’’ .It is better to educate researchers not to indulge in such delinquencies than to prevent them. The use of plagiarism detectors attracts

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cost whiles the use of referencing tools equips patron to collaborate and learn. Practical ways such as practice of personal information management, information retrieval skills and identification of authentic sources enable researchers to produce good papers. Scholars ought to assess the sources and authenticity of information used for academic research. Academic misconduct is considered as behavioural attitudes hence policies, rules and codes of ethics such as copyright and fair use policy, promotion of intellectual property rights, ethics committees ensures compliance.

Table 5. Control of ethical dilemmas by librarians

Control Measures	**Rating%**				
	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Use of plagiarism detectors	84.2%	15.8%			
Information literacy	81.4%	18.5%	3.7%		
Fair use	77.7%	14.8%	7.4%		
Increased access to information	62.9%	37%			
How to locate information	62.9%	29.6%	3.7%		3.7%
Protect copyright works	59.2%	33.3%	7.4%		
Organization of information	55.5%	40.7%	3.7%		
Authentication of information	55.5%	25.9%	7.4%	7.4%	
Evaluation of information	48.1%	40.7%	7.4%	3.7%	
Promoting of Personal Information Management (PIM)	48.1%	33.3%	14.8%	3.7%	

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Use and communicate information	44.4%	40.7%	7.4%	7.4%	
Use of referencing tools	33.3%	18.5%	48.1%		
Others(Specify)					

Source: (Field Survey: 2017)

An open ended question was asked about practical measures that could further control the ethical breaches in their institutions. The majority of the librarians indicated adherence to ethical codes and norms. Teaching of academic ethics as part of the curriculum in Library and Information Science (LIS) Schools and establishment of ethics committees were recommended. Also education and awareness on the use of predatory journals was mentioned .Further, the establishment of academic writing centres were recommended. A number of Universities have instituted ethics committees to probe, approve and legitimize research processes (University of Sanford:2017). Finally, the use of disciplinary measures such as payments of fines, suspension, sanctions and demotion were recommended.

4.10 AWARENESS OF ETHICAL TOOLS AND APPLICATIONS

Plagiarism, according to Menai and Bagais (2011), has become a serious problem in academia. Detecting it in the various formats and language has become a challenging task, particularly in languages other than English. This is because majority of the software have their programming language in English. Citing Menai and Bagais (2011) new plagiarism detection tools are being developed for languages such as Arabic. Table six (6) describes some of the tools available to detect, control, manage and curb some of these menaces of misconducts. The responses below indicate that Plagiarism Checker was one of the major tools the respondents were familiar with.

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This recorded (81.4%). This is free open software that could be used to detect the percentage of plagiarised content. TurnItIn were popular among (77.7%) of the respondents. Thought it is a proprietary software majority of the respondents were aware. Plagscan recorded (66.6%), it is free package for research purposes. Viper recorded (62.9%), whilst CopyLeaks became popular among (44.4%) of the respondents. These are all preventive applications that detect the percentage of plagiarised content. It is expected of librarians to make available some of the free source software to enable patrons to assess the level of plagiarism count. Viper and CopyLeaks were some of the free and open software.

Mendeley which are proprietary softwares recorded (60%) among respondents. Refworks was known to (26%). Zotero and Endnote were popular among (18.5%) respectively. These are reference management tools that assist researchers to compile and keep record of sources used. Some are free open software that serves as curative measures. Librarians need to be proactive in order to integrate some of these applications to facilitate citation.

Table 6: Tools to control the ethical dilemmas

Tools /applications	**Yes**	**No**
Plagiarism Checker	81.4%	18.5%
TurnItIn	77.7 %	22.3%
Plagscan	66.6%	33.3%
Viper	62.9%	37.1%
Mendeley	60%	40%
CopyLeaks	44.4%	55.5%
Refworks	26%	74%

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Zotero	18.5%	81.4%
Endnote	18.5%	81.4%

Source: (Field Survey: 2017)

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CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 INTRODUCTION

This chapter discusses the findings, analysis base on the objectives of the study. Below were areas covered; The role of librarians in academic research, awareness of ethical dilemmas among respondents, impact of information technology on academic research, benefits of ethical awareness, examples of ethical misconduct, way to control the menace and the tools used

5.2 LIBRARIANS' ROLE IN ACADEMIC RESEARCH

Librarians are recognised with the techniques, knowledge and skills in providing information that supports research activities in higher education institutions. Library professionals play crucial roles that support research in diverse ways. The study revealed numerous roles, noted among them were ‘‘increased access to information,marketing and publicity of scholarly materials,institutional repository (IR) managers, networking and collaboration,Promote information literacy tutors,digital curation and preservation managers,copyright compliance,Author Aid Services,Research Data Management (RDM) managers,Digitization, Promote Open access Scholarship,Academic identity management,Literature gap analysis,Create Virtual Research Environment (VRE),Alert /tagging Services, data visualisation and Promotion of Personal Information Management (PIM) ’’.

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5.2.1 Increased access to information

This role recorded the highest result thus (89%) of the librarians' alluded to this traditional role in support to research. The Polytechnic Librarians attested to increased access to electronic content, books, journals, online databases and report. Consideration for electronic resources such as e-books and databases were being subscribed to by some polytechnic libraries. This aims at expanding access remotely.

This finding is corroborated by Agyen-Gyasi, Lamptey and Frempong (2010:8) that library collection ought to meet research focus of the parent institution. Polytechnic Librarians and Faculty ought to collaborate in order to acquire materials that meet their interest. Developing the collection in the form of digitised content, electronic, media and print need to be considered.

Bowden (1999:4) and International Federation of Library Associations and Institutions (2015:5) acknowledged that librarianship today is synonymous with ''information transfer'' as librarians are working to increased access to information ,literacy and the skills need to improved access that support research and informed decision-making. As ICT has catapulted the fundamental laws of Library Science as indicated by Ranganathan thus ''accuracy, currency, relevance of the information, comprehensiveness, reliability, authority and authentic sources of information has impacted on research output. The Polytechnic Librarians ought to make available the needed ICT infrastructure such as internet, computers, research commons, and training to support research. Researchers need to be equipped with modern techniques to ''search, skim, retrieve and utilise'' information ethically.

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According to International Research and Exchange Board (2016) increased accesses to information for women and youth in Nigeria become effective as a result of introduction of innovative activities which included training in Information Communication Technology (ICT) and infrastructure provision. The Polytechnic librarians need to be mindful and embrace the significant role of ICT in the provision of information. The new concepts of delivering library services beyond the building offer users the opportunity to explore the collection remotely. Online Public Access Catalogues (OPAC) has improved the traditional way of cataloguing where one can export and import bibliographic records from remote sources leading to faster processing of books, circulation and searchability for research work. Boateng, Agyemang and Dzandu (2014:8) in discovering the Pros and Cons of Library Automation in KNUST indicated that automation enables easy access to library materials whereby one can search by the author, title and subject. Madhusudhan (2008:3) corroborated this at the Goa University Library where bibliographic data is available online. Not only the materials purchased or donated but also analytics of publications from Faculty and local research reports are available for use.

Selective Dissemination of Information (SDI) spectacled by Sharma and Parasar (2014:4) are current awareness services that libraries of Dehradun have adopted to expand access .It aims at closing the gaps between the user and information resources by bringing information to the door step of users. It focuses on meeting researchers' specific information needs timely. The Polytechnic Librarians indicated this role performed to support researchers. Pursuing this role makes them proactive in meeting the needs of users. Researchers can also recommend for the acquisition of materials that may not be available. Increased access to information as a traditional role undertaking by the librarians is vigorously on-going across the ten Polytechnics.

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5.2.2 Marketing and publicity of scholarly materials

Librarians as part of their roles create the needed awareness on scholarly materials through marketing and publicity, this not withstanding services and products. Majortiy of the Polytechnic librarians (81.4%) enumerated this role in support to research. Patil and Pradhan (2014:249) posited that marketing promotes awareness of library services, not only the collection but other service such as Selective Dissemination of Information, academic identity, reproduction services amongst others. Librarians through marketing bring to the notice of users ‘’materials available for reading, promotes customer satisfaction and enhance the perceived value of the services’’ offered (Patil and Pradhan, 2014:250). Marketing techniques according to Madhusudhan (2008:1) include ‘’branding, exhibition, patron segmentation, building of customer relationships, corporate identity and marketing research’’. Marketing research enables librarians to identify the anticipated desires and requirements of potential users. It enables librarians to segment the research needs of both present and future of researchers.

Citing Patil and Pradhan (2014:254) marketing of library services could be enhanced through the application and integration of Web.2.0 applications. ‘’Wikis, YouTube, blogs, and Facebook. Chan (2012:1) corroborated this by indicating that application of Social network advertising tools such as the face book promote visibility at minimal financial cost. Kaur (2009:454) postulated on the need for libraries to market their services through the web. Though the Polytechnic Librarians market the resources, findings revealed that the librarians have not fully exploited this medium. This affirms a preliminary survey where only a few of the polytechnic libraries had Facebook

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accounts. It was revealed that majority of the polytechnic libraries market the library through the webpage with limited use of social networks such as Facebook, wikis and blogs.

Investigating on the possibility of adoption of mobile technologies as a marketing tool, a study among graduate students at the University for Development Studies Library in Ghana by Akeriwa, Penzhorn and Holmner (2014:2) revealed minimal use of it. The use of Podcasts, instant messaging, social bookmarking, wikis and mobile reference services according to Makori (2012: 30) and Chua and Goh (2010) adopted as marketing tools bridged the information gap. Majority of the respondents (81.4%) market their resources but not service, such as Selective Dissemination of Information (SDI) and facilities such as Wifi. According to Akeriwa, Penzhorn and Holmner (2014:3) whilst libraries in the advanced world have integrated social media to promote and facilitate the communication of information and research outputs, the least is said about the developing countries. The study discovered minimal use of these among the respondents.

5.2.3 Institutional repository (IR) managers

Establishment of Institutional Repository (IR) is becoming a prerogative of majority of librarians notwithstanding the Polytechnics which is becoming Technical Universities. Davis (2007:2) defines institutional repository as services a tertiary institution ‘’offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. ’’It is a database of all the research works produced by members of an institution. It usually comprise of journals, monographs, thesis, dissertations, artifacts, historical materials and research findings produced for research purposes. It is recognised as a long-term preservation that the institution showcases. Ghosh& Kumar (2007:3) allude that IRs are institution’s initiative to promote open access literature for the advancement in research. The

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Polytechnic librarians knowing this, corroborated as findings indicated that majority (74%) of them undertake initiatives in the establishment and development of repositories for research advancement. though the pace of development was not ascertained, it is envisaged that the librarians liaise with research departments to establish them.

5.2.4 Networking and collaboration

The advancement in technology has propelled librarians to network and collaborate in order to provide networked information. Collaboration and networking promoted the Health Science Library of the University of Cape Town (Swingler, 2017:1) to gain insights in the global health arena that fostered proposal development between researchers and the library. Librarians deeping collaboration with academic partners such as researchers, faculty, students, IT departments, finance officers among others shall contribute immensely to research (Corrall,2014:1). A study conducted in twenty –four UK research universities revealed that librarians could greatly support research through resource mobilisation and engagement with researchers. This role was affirmed by the greater number of the respondents (70.3%) as performed to solicit support from partners.

In Ghana, there is the Consortium of Academic and research library (CARLIGH) in place. Findings revealed that majority of the libraries were members of this consortium. Dzandza & Alemna (2011) examining the Prospects of Consortia using the Consortium of Academic and Research Libraries in Ghana (CARLIGH) as a case facilitates in the negotiation for online databases, e-books, software and remote access applications among, others. The polytechnic Librarians through collaboration with the Consortium subscribe to online databases such as Taylor and Francis, Research 4 life publication, Biomed, amongst others.

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Building Strong Library Associations according to the International Federation of Library Associations and Institutions (2012:23) highlighting on goal seventeen (17) of the ‘’Sustainable Development Goal (SDGs)’’ spectacled on the need for libraries to create partnerships in order to leverage gains. Findings revealed that Polytechnic librarians are into collaboration and networking in order to share resources, expertise, technological application and talents. They have expanded collaboration among themselves and beyond. They were recognised to be members of associations such as the Ghana Library Association and the American Library Association. Being part of such associations broadens their horizon and introduces them to technical areas for support.

5.2.5 Promote Information Literacy

Information Literacy (IL) is defined by Van’t Hof, Asamoah-Hassan, Agyen-Gyasi (2010:13) and the Association of College and Research Libraries (2000) as the ‘’capability to recognize when information is needed, the ability to locate the information, evaluate the information and use the information acquired effectively to solve the problem’’. An information literate person has the ability to evaluate information and apply it ethically.

Equipping Students with this skill enables them to synthesis information and identify new areas for publication. It therefore forms the basis for lifelong learning that equips researchers to perform creditably. Information literate people are ‘‘engaged, enabled, enriched and embodied by social, procedural and physical information’’ that constitutes an information environment for lifelong learning (Lloyn 2007:3).

Sixty-Seven percent (67%) of the respondents’ responded positive to this role as it equips students to become life-long learners. The polytechnic librarians believe that library orientations alone does not address the literacy gap hence information literacy sessions are undertaken to expose students

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to the ethical way of applying information. The various ethical dilemmas with it implications, search and information retrieval skills, exposure to authentic sources of information, referencing and citation skills and academic writing abilities are covered in information literacy. This goes a long way to prepare students to conduct research ethically.

5.2.6 Digital Curation and preservation managers

The University of Leicester (2017:1) define digital curation as the processes of '' selecting, preserving, maintaining the collection and archiving of digital assets for current and future use by researchers, scientists, historians, and scholars''. Curation aids the preservation of research data for use and reuse. Curating and preserving materials in its digital formats facilitates remote access and simultaneous usage. Pennock (2006:2) postulated that digital curation encompass the activities involve in ''maintaining and adding value to scholarship for both current and future use''. The emergence of research data has compelled librarians to curate and preserve data to increased access.

Findings of the study revealed that (59.2%) of the librarians strongly agreed on this role in support to research, whilst (18.5%) indicated that they had no opinion about it. The study revealed limited awareness about digital curation among the respondents. The phenomenon of research data requires that polytechnic librarians consider and champion this role. Higgins (2011: 78) attested to the importance of digital curation to facilitate access to digital content, use and reuse of digital materials.

Considering the digital curation lifecycle which comprises of the following elements ''Creation, active use, appraisal and selection, transfer, storage and reuse'', a number of university researchers found it easier in applying data (Pennock. M. (2006:3). The University of California and University of Toronto's iSchool established curation Centers in the year 2010 to foster research continuity (Higgins, 2011:83).

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5.2.7 Ensure copyright compliance

Librarians as part of their roles put measures in place to ensure copyright compliance. They ensure that research output is utilised in an ethical manner. Berkman Centre for Internet Society and Electronic Information for Libraries (2012:1) have developed copyright laws that guide librarians on how to educate patrons to make effective use of online resources. The proliferation of electronic resources such as conference proceedings, books, articles, databases has widened the gap concerning copyright and licensing.

The Singapore Management University according to Cornish, Llewelyn, & Aplin, (2013:1) have developed the "intellectual property law, Patents, Copyright, Trade Marks and Allied Rights on research collection. The study discovered that (55.5%) of the librarians were conscious and have put in place measures that control the menace. The libraries with reproduction sections ensure that only a percentage of the items are reproduced for patrons. Though the majority, (18.5%) were neutral whilst 3.7% disagreed meaning their role does not encompass copyright awareness and compliance, this is in not encouraging.Russell (2012:2) expressed that librarians ought to assume the role to educate researchers on copyright laws, Publishers' right and licensing agreements. Creators hold the copyright to the work but usually are bound by publishers contract to transfer, the right to ''reproduce and distribute the work. Librarians also need to educate students and reprographic staff on issues that pertains to the laws.

5.2.8 Author Aid Services

This role equips researchers on the techniques needed to publish their work, it is a role that directly impact on research publication. The importance of Author Aid compelled the Terra Viva Grants Directory (2017) to organize a free online course to assist early-career researchers in developing countries

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to improve their research writing and grant proposal skills. The topics included: ‘‘literature review writing, publication and research ethics; developing a research plan; writing grant proposal; publishing in the right journals, peer reveiwing and writing and publishing a research paper for publication‘‘ , the issue of predatory journals were also discussed. Author aid has the benefit of equipping researchers to assess the impact of their publication. (Biochemical Society, 2016:39). The problem of inadequate funding for research has propagated a competition and hence the need to improve researchers' academic writing skills and grant proposal writing to secure funding for research.

According to the International Network for the Availability of Scientific Publication (2016:2) Author Aid is a platform that ‘’supports researchers to gain the confidence, knowledge and skills needed for publishing and communicating their research through training, mentoring, networking and resources’’. Developing research career of researchers through mentoring is recommended by librarians which they themselves serve as good mentors. The study corroborated on this role performed by the respondents in support to research. The Librarians (51.8%) strongly attested to this role whiles 14.8% remained neutral. This does not present a good outcome considering the fact that the Polytechnics are becoming Technical Universities.

5.2.9 Research Data Management (RDM) managers

This concerns the organization of research data through to the dissemination and archiving of valuable findings (University of Leicester, 2016: el). It encompass the research life cycle which focuses on the ‘’creation of data, it organization, storage, retrieval and dissemination’’. The University of Manitoba corroborated the definition of RDM to encompass the ‘’storage, access and preservation of data that are originally produced for research project. It encompass entire lifecycle of data from ‘’creation, analysis, sharing to storage and preservation’’.

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University of Toronto libraries (2017), The Queen's University Library (2017) and University of Manitoba libraries (2017) undertake RDM activities to support the dissemination of research output ,to increased access for "use, re-use and future use and also in discovering research trends. Research data management facilitates the continuity, exploration and advancement of research according to the literature reviewed. Majority of the librarians (51.8%) strongly agreed to this phenomenon. Although a number of the librarians attested to this phenomenon, the study revealed limited awareness among the respondents. The study revealed that RDM directly impacts on research output and hence the Polytechnic librarians need to explore further on their roles in integrating the stages of the lifecycle to the guide the processes of academic research.

5.2.10 Digitization

Digitization has been defined by Amollo (2012:5) as the activities involved in ''converting print-on-paper resources to digital form by scanning''. Thus the conversion of printed text or images into binary format for computer processing. The British Library Board (2011) is involved in digitisation and currently embarking on mass digitisation aimed at ''expanding access to research content. Digitisation adds value to content, promotes innovative methods of research, improve searchability and discoverability, preserve unique rare and fragile cultural heritage amongst others. '' Verheusen (2008:2) indicated that the lifespan of digitised materials are mostly prolonged**. ''**Maps, manuscripts, photographs, drawings, paintings, sound recordings, microforms, newspapers and rare materials are mostly digitised''. The researcher anticipated a higher percentage since it directly impacts on research but less than half of the respondents (48.6%) strongly agreed to this role. Awareness of this among the librarians was minimal.

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5.2.11 Promote Open access Scholarship

Open Access has been defined by the Open Access Academy (2017:1) as ‘‘publications that are free to all interested readers, where the publishers place no financial or copyright barriers between the readers and the research output’’.

Findings from the study revealed (44.4%) limited awareness about the impact of open access on research. Considering the merits indicated by the Open Access Academy (2017:1) thus ‘’increased access to relevant literature, increase visibility of readership and impact of authors’ work, improve discovery in the digital environments, enhances interdisciplinary research and accelerates the pace of research discovery and innovation.

The rapid rising in prices of academic journals, must compel librarians especially in Africa to seek other avenues for information, Open Access has therefore become a viable option that resolves the serials pricing crisis. Librarians have the role to promote publishing in open access journals by faculty since research advancement requires free flow of scholarship.

Findings from Sage (2013) indicated that open access “sustains scholarly communication, promotes research growth, control cost reduction and accelerate research”. Librarians in the Polytechnics need to consider the impact enumerated above in order to increase advocacy.

5.2.12 Academic identity management

This is considered as one of the modern perspective that aims to promote scholarly communication, collaboration and reputation building. The large amount of literature on the web makes it difficult to track creators and authors. Therefore creating and maintaining the profile of authors has become necessary. Authors need to get the needed recognition and credit for all publications produced, and this can be done through academic identity management. The Technical University of Munich Library (2017: 2)

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identified ‘’Researcher ID, Google Scholar Citations, Scopus, Web of Science as platforms that are used to assign unique identifiers to researchers for easy tracking of works. The platforms aims to increase visibility of authors facilitate the transfer of bibliographic record, import and export of records, enables assessment of research Impact and bibliometric calculation (H-index and the G-10 index).

The underlying fact in promoting identity is to enhance interactions between individual’s researchers and community of scholars (Quigley, 2011:20). When researchers are identified, it promotes communication and collaboration. Librarians as information professionals have the skills to ensure that scholarly works are disseminated to users. Projecting the visibility of creators and authors among students, researchers, libraries and on the web has become necessary. Further library automation, indexing and social media also helps to promote visibility of creators. The analysed data revealed that thirty -Seven (37%) of the librarians strongly agreed to this role whistle **(**26%) remained neutral. This shows decline in awareness indicating that few polytechnic librarians have considered this in research publications. The findings corroborated that of Li, Thelwall and Giustin (2012:1) that majority of researchers and librarians were not aware of the use of online bibliometric tools to validate research.

5.2.13 Literature gap analysis

The study discovered the activity of literature gap analysis as one of the roles perfumed by librarians in the advanced world to assess the library’s collection in relation to research. Findings from the study revealed that majority of the librarians were not aware of this phenomenon. . Librarians need to develop a checklist that would guide them from time to time to assess the gaps that exist in the collection in relation to research support. Thirty-seven (37%) of the librarians strongly attested to this role whilst (44.4%) were neutral about this role in support to research.

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The demand for evidence-based practice across disciplines especially the biological sciences and large volumes of information produced requires a step -by-step guide in analysing literature to identify gaps.. Identifying gaps in literature will enable librarians and researchers to know ‘’how much research already exists , the subject coverage and to identify trends. Prior information about the nature of literature existing in a particular field will enhance the researcher’s approach to initial inquiry. (Turcios, Agawal and Watkins (2014:475) and (Grant,2009:96).

5.2.14 Virtual Research Environment (VRE),

This is also known as ‘’Virtual Research Community or Virtual Organisation’’ according to Carusi and Reimer (2010:12). The main benefits of VREs according to Pienaar and Van Deventer (2009) and Carusi and Reimer (2010:12) among others includes the ‘’promotion of collaborations among research teams, facilitation of data collection, knowledge creation and sharing among scholars, exchange of information, access to skills and knowledge, access to research data and computational resources in remote locations and cooperative writing of academic material”. In the light of the above positive impact on research. (33.3%) of the respondents attested to this role. Twenty two (22%) of them indicated neutral pointing to limited awareness on this among respondents.

Some of the elements of VRE components included “research commons, writing and language translation services, referencing and citation applications, blogs, wikis, project management tools and calendars, video conferencing centres, web technologies” amongst others (OCLC, el, Leiden University).

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5.2.15 Alert /tagging Services (articles and grants)

The benefitts of tagging to academic research have been identifed by Mendes, Quiñonez-Skinner,and Skaggs (.2009:32) ,Eckert, Hänger,and Niemann, (2009:557) and Macgregor and McCulloch (2006:293). to facilitate the‘‘aggregating and analysis of information, enhances anotation of literature, it leads to improvement in controlled vocabulary, results in resource discovery and discoverability , it leads to the advancement in subject interoperability,tagging enhances the organisation of knowledge and enabled the creation of corporate taxonomie‘‘. The increased volume of information generated requires that librarians undertake this activity to be able to track information.Considerig the enormous benefits of tagging and alert to acadenic research,findings of the study discovered minimal awarenss among respondents (33.3%) and their role in establisihbg such initiative to advance research was not predicted at the polytechnics.

5.2.16 Data visualization

Lately data visualization has become one of the embedded roles perfumed by librarians to support research. Data visualization has become a key research components as a result of innovative ways of delivery research output and blended ways of learning. Citing Czuhajewski (2015) librarians at the University of Michigan Library system undertake this activity in order to present research findings in an analytical manner that facilitated understanding, evaluation and interpretation. According Voliva *(*2015) the phenomenon of big data has propelled the integration of visualization in order to make meaning from data easily. The study revealed negligible awareness among the respondent, (22.2%) strongly agreed to this role in support to research.

5.2.17 Promote Personal Information Management (PIM).

Jones (2007:453) and Fourie (2012:187) postulated that PIM supports researchers to “create, organize, retrieve, use, reuse and distribute” information to fulfil various activities such as

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‘’thinking, problem-solving, idea generation, categorization, representation of data, vocabulary exploration, and visualization’’. It was discovered from the analysed data that (22.2%) of the respondents were aware of this phenomenon whilst the majority (74%) remained neutral meaning there was limited awareness of the impact of PIM on research among the librarians.

The above elaborations point to the limited consideration and integration of Information Communication Technology (ICT) among the Polytechnic librarians, hence the need to be mindful and embrace the significant role of ICT in support to research. A gap was discovered between the traditional and contemporary roles. The use of web 2.0, social media and mobile appliction in marketing the resources were minimal. Increased access to information, marketing of resources, information literacy, networking and collaboration, copyright, author aid and awareness on information repositories were on the increased. On the other hand most of the contemporary roles of research support such as data visualisation, alert and tagging service on articles and grants, academic identity management, literature gap analysis, creation of virtual research environment, research data management and practice of Personal Information Management (PIM) recorded minimal awareness. Majroty of these roles were imformation technology and inclined. This points to the that fact that awarenss and integration of ICT application in support to research was low.The Polytechnic librarians need to sharpen and explore on more innovative ways of supporting reseach since the Polytechnics are becoming Technical Universities.

5.3 AWARENESS OF ACADEMIC RESEARCH ETHICS AMONG SENIOR POLYTECHNIC LIBRARIANS

Majority of the respondents attested to the fact that they were aware of academic research ethics. This, the researchers wanted to know from the respondents some of the codes of ethics they were

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familiar with. The following codes of ethics were mentioned " Fair use, informed consent, plagiarism, citation and referencing, appropriate copying and paste, objectivity, anonymity, respect confidentiality, copyright compliance, informed consent, integrity, privacy, plagiarism, fabrication and originality. Plagiarism was identified by majority of the librarians. This was corroborated by: Burke (2005:1), Drinan& Gallant (2008:125) and Totolo (2015:3). This signifies that plagiarism has existed for the past years within the academic arena.

The level of awareness or ignorance reflect in the research work produced by students and faculty. Citng Mundava and Chaudhuri (2007:176) librarians at the University of Tennessee assumed this role by extending awareness and advocacy to students, faculty and researchers in order to practice good research ethics. Students must be educated on good citation and referencing skills, fair use and copy right policies and informed consent.

Librarians being aware ought to educate patrons on good research ethics. Information literacy and orientations sessions can be organized for the various categories of patrons. Citing Geuna and Martin (2003:277) the establishment of Academic Research Committees could be helpful to address issues that pertain to ethics and accountability in research. The University of Queensland (2017) and University of California, San Francisco (2017) have both established committees to ensure that academic research meets the requisite specifications and requirements of partners and sponsors. It also serves as sources of securing grants for research since donors' specifications could be met. In addition to the committee, writing centres could be established to verify, validate and edit research outputs. Example is the ''Carnegie Writing Centre'' of the University of Ghana that proof reads, edits and validates research works.

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Policies, rules and regulations specifying the dos and don'ts with it various penalties can be established to punish culprits and also serve as deterrent to others. This shall go a long way to control the menace and also streamline research (Mundava and Chaudhuri, 2007:179). The policy could streamline the various ways on how to ''treat subjects used in research and ethical implications. The respondents awareness on ''copyright, fair use, anonymity, informed consent, and privacy is an indication that they were familiar with the traditional forms of ethics. Social network abuses and data insecurity were also discovered.

5.4 IMPACT OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) ON ACADEMIC RESEARCH ETHICS

Evolution and growth resulting from Information Communication Technology (ICT) coupled with increased vast of data and information generated especially in academic environments has impacted on ethics. Holmner, Penzhorn and Van Wyk (2013:268 :), Mutula (2013), Vaccaro and Madsen (2009:213), Bynum (2008) and Floridi (2007:2) have acknowledged that ICT has both positive and negative impacts on academic, human, economic and social relationships. The penetration of Online Social Networks (OSN) such as Facebook in Africa has compounded the ethical implication in which Capurro (2013:163) and Mutua (2011) explored on certain ethical breaches associated with the use of Facebook in Nigeria, Kenya and South Africa.

The study affirmed Pivec's (2011:64) findings that ICT has promoted ''creativity and innovation; communication and cooperation among researchers and influence in information''. Majority of the respondents (95%) attested to the positive impact of ICT on research. The following were mentioned as some of the impacts: ''Efficient data analysis, increased access to information ,Increased availability of software to detect plagiarism, Ensured accuracy and integrity in research, Facilitated sharing of research output,Enabled the creation of virtual environments ,Increased

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searchability and discoverability,promotes collaborative and network in research,Created applications that project author identity.

Contrary information communication technology (ICT) according to Capurro (2008:1163) has posed ethical challenges within the African continent. Dadzie (2011:63) also corroborated this by indicating ‘’cyber-crime, social network abuses and data insecurity’’as some of the ethical dilemmas posed by ICT. It was discovered that ICT has encouraged copying and pasting, promoted plagiarism and information explosion (Totolo: 2015:3). The explosion of information on the World Wide Web (www) makes it difficult to assess the authenticity and originality of information for academic purposes. It is for this reason that the role of the librarians have become indispensable in the academic landscape.

5.5 IMPORTANCE OF ACADEMIC RESEARCH ETHICS AND ITS IMPACT ON SCHOLARSHIP

Ethical dilemmas postulated by the Association of Social Anthropologists of the UK and Commonwealth (2014) are encountered at all stages of research tracing it from the ‘’selection of topic, population, choice of sponsor and source of funding, access, dissemination amongst others. Ethics impact on the quality of research output in diverse ways. This has been corroborated by Kamat (2006:4) that the phenomenon about ‘’authorship, collaborative research and accountability’’ has influenced it merits on scholarship. Researchers of today are obliged to include variety of metrics in their application for grants, funding and promotion hence ethical compliance play a crucial role. Researchers have the obligation to respect the trust placed in them by their colleagues, the public and themselves.

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Ethics according to Mikesell, Bromley and Khodyakov (2013:1) protect research and scholars to certain obligations that promote quality research, it also controls abuse of usage work. Issues of accountability, ownership and originality are considered as some of the impact on research (Kamat, 2006:10).The findings of the study revealed the following as some of the impact of ethics on scholarship. 'Promotes standardization in research, eliminates plagiarism, promotes transparency, ensures integrity, enhances institution reputation, promotes continuity in research, improves trust, improves privacy, endures openness, amongst others**.**

5.5.1 Control of Plagiarism

This has become a recent phenomenon as a result of proliferation of digital information on the web (Totolo 2015:1) and (Dadzie, 2011:64). Plagiarism was heighted as one of the popular menace in academic research as it is easily committed and detected by softwares. Majority, (81.4%) of the respondents consented to the elimination and control of plagiarism if the necessary awareness is created. Mostly students' gain admission to tertiary institutions without hearing or encountering the word plagiarism, it is therefore the ethical obligations and responsibility for librarians to educate students especially first years to be able to comply with ethical principles throughout their education. Creating the awareness about it implications and remedies promote quality research. One of the uppermost benefits of academic research ethics awareness is its ability to eliminate or control plagiarism. Researchers who plagiarism according *to* Calvano (2012) and *Kamat (2006:35)* does it as a result of ignorance.

5.5.2 Enhances institution's reputation

The research output of a particular institution projects its visibility and reputation (Asia Pacific international College (2017:2) A study conducted by Calvano (2012) revealed that majority of

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high ranked higher education research Institutions recognise reputations as linked to ethics. Higher education centres serve as role-model statuses and hence their esteemed obligation to academic ethics compliance.

The literature corroborated the findings of the study indicating majority (70.3%) of the respondents attesting to the impact of academic research ethics on the institution's reputation and credibility. The quality of research cannot be compromised when it comes to ethical concerns. The reputation and visibility of creators and authors in international and high impact journals is assured. The quality of research is achieved when it has undergone ethical scrutiny such as appropriate informed consent, acknowledgement of sources used and a plagiarism test count. Librarians are to be mindful to scrutinize appropriately materials uploaded in institutional repositories before publishing them.

5.5.3 Ensures Integrity

The Asia Pacific international College (2017:2) define academic integrity as the capability to act and exhibit the following values ''honesty, trust, fairness, respect and responsibility in learning, teaching and research. Maintaining a sound academic integrity impact positively on individual and institution's reputation. Academic journals ensure integrity through peer-review process, editorial processes and efficient publishing system (Graf1at al 2007:1).

Knowledge about academic research ethics helps to promote integrity and validity in research according to a study by Lindorff (2007:27). This was testified by the findings of the study where majority of the respondents (66.6%) corroborated. It is anticipated that before the research finding is published it would have gone through numerous ethical checklist to ascertain its validity.

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Checking to ensure that the research data is not compromised at the various stages according to Hughes and McCabe (2006:49) ensures integrity in research output.

5.5.4 Ensure standardization in research

This is the ability of a research to meet local, national and international standards. The Association of Social Anthropologists of the UK and Commonwealth (2014) on ethical guidance indicated that it enables one to produce good research. Adherence to academic research ethics promotes consistency and standardisation for ‘’sponsorship, funding and promotion.

Acceptance of publication in International journals ought to meets ethical compliance and standards. The competition and complexities that exist in scholarship are usually as a result of ability of scholarship to meet certain ethical standards. Researchers in developing countries according to the International Network for the Availability of Scientific Publication (2016:2) are provided with Author Aid services and mentoring that equips them to gain the confidence, knowledge and skills needed for publishing and communicating.

Author Aid is discovered to be one of the platforms that equip researchers to conform to international and national standards. Primary research such as laboratory findings must identify the subjects used for the study and acknowledge procedures and sources used to arrive at the findings. Sixty- two percent (62.9%) of the respondents strongly corroborated to the fact that academic research ethics promotes standardization.

5.5.4 Enhances Transparency

Informed consent according to the Association of Social Anthropologists of the UK (2014) promotes transparency in research. Transparency in research with regards to ethics provide a ‘’descriptions of how the research was conducted, how results were obtained and the kind of

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conclusions that were deduced using analytical tools (Baskin, 2015:1). The study findings revealed that majority of the respondents attested to this phenomenon. Sixty two percent (62.9%) of the librarians attested to this as one of the importance of ethics. The importance of transparency cannot be underestimated with regards to medical research which mostly relied on findings from clinical trials. According to Baskin, (2015:1) ‘’truthful, bias free, and detailed information which describes the procedures involved in arriving at the findings is considered crucial. This facilitates continuity, replicability and adoption of finding for further analyses’’.

The ability to discuss one’s research without fear or favour is considered laudable. Researchers ought to have the willingness and desire to openly talk about and seek the opinion of others. Sharing knowledge and ideas broaden researcher’s horizon and scope. There is the tendency of knowing the subject coverage, research topics of colleagues and interest. Awareness of academic ethics helps to control intellectual theft and unnecessary duplications.

5.5.6 Promote openness in research

Modern age research output has become open, resulting from advancement in information Communication Technologies. In this regard, Kamat (2006:4) posited that trends in ‘’authorship, collaboration and accountability’’ has become more open. The ability to freely disseminate and share research findings as a result of practising academic research ethics is laudable**.** Research findings that is open is more likely to capture donors’ attention for future developments. According to Baskin (2015; 3) funders and sponsors as part of their social obligations, encourage openness in research for the purposes of reproducibility and public credibility.

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The respondents attested to this by the majority (55.5%) as one of the merits of academic ethics compliance. It is unethical to hoard research findings. Researchers are obliged to disseminate findings in order to meet partners' requirements. Applied science and engineering findings are usually utilised without testing facts. Credibility of authors and creators are brought to lime light and further honoured. Findings from the Open Access Academy (2017:1) corroborated this acknowledging increased access to relevant literature, increased visibility of readership and authors' credibility as some of the merits.

5.5.7 Ensures Ownership

Ownership and copyright according to Wishart (2009:77) are usually synonymous in academic research. Ethical compliance to academic research exposes one to the rights of ownership. The legal rights and ownership to scholarship has recently been influenced by ICT (Wishart (2009:77) where there is prevalence of abuse and misuse of information without the creator's consent .In reviewing the ownership of faculty research in relation to open access, Denicola and Denicola (2011:353) held the view that university mostly sponsor researchers to publish articles in academic journals, ironically the same university is mostly denied access unless the publication is paid for. The respondents being librarians attested to this phenomenon. Fifty –one (51.8%) acknowledged the importance of ethics in clarifying such discrepancies.

5.5.8 Rights to confidentiality and anonymity

Ethical compliance ensures confidentiality and anonymity among researchers. Wishart (2009:77) corroborated this by stating that ethical norms regulate the kind of information that may be ''withheld and that which should not, the one responsible and the condition that binds the information''. Researchers have their rights to privacy and confidentiality. Researchers ought to

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be mindful by ensuring appropriate measures to store, disseminate and protect records during and after fieldwork. Additional subjects and respondents used for a study ought to abide by ethical norms in order not to abuse information. Forty-eight (48.1%) of the respondents confirmed this by strongly agreeing to this benefit whilst (40.7%) agreed. This indicates respondents' level of awareness in relations to ethics. Confidentiality does not imply the use of pseudonyms. According to Capurro (2013:164) the use of technological peripherals such as pen drives, disk, external storage devices that has research data ought to be kept well.

Other Benefits

Assurance of legality (48.1%), continuity of research (44.4%), increased dissemination and communication (44.4%), accountability in research (40.7%), trust (33.3%) privacy (29.6%), were respectively influenced positively by academic research ethics. Again ethical compliance promote objectivity thereby reducing bias. It also serve as source of funding as corroborated Resnik (2015). These were testified by the respondents accordingly but the awareness of these impact on research seems to be minimal among the respondents. The above mentioned merits ensures appropriate management of research funds, grant or award from sponsors (Thompson Rivers University,2012:6,10) and (European University Institute, 2013:8).Trust resulting from ethical compliance promotes integrity, accountability and confidence both for the author and users.

Denicola and Denicola (2011:351) indicated that scientists particularly progress and advance by relying on unimpeded and permanent data for discovery and research purposes. Ethics therefore promotes continuity as other researchers could advance the research findings due to its credibility and authenticity.

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5.6 COMPONENTS OF ETHICAL MISCONDUCT

Studies have revealed conducts that are considered as breaches to academic research. Mikesell, Bromley and Khodyakov (2013) in exploring the ethical concerns associated with ‘’Community-Based Participatory Research (CBPR) with regards to ethical compliance define ethics as norms for conduct that distinguish between acceptable and unacceptable behaviour, which play a vital role in research’’ one of the delinquencies identified was the abuse of human biomedical experiments. .

5.6.1 Plagiarism

It was the highest form of dilemma indicated by the respondents. It is defined by Ridley (2012:120), Totolo (2015: 3) as the deliberate act of stealing one’s ideas and words of others without acknowledging them. It is the manner associated with stealing other people’s ideas and pretending that they are your own. It is the situation where insufficient or improper acknowledgement of someone's work is presented (Hughes and McCabe, 2006:52). Majority (88.8%) of the Librarians attested to this menace across the Polytechnics. This affirms a study in the United States and Canada, where plagiarism offences recorded higher rates of 70% among university students (Stone, Jawahar and Kisamore 2010:35)Copying and pasting one’s work without paraphsing and presenting poor acknowledgment of sources used are considered plagiarism.

Plagiarism is better to control than to prevent. Creating the needed awareness, advocacy and education are some the preventive measures. One can also control such by introducing plagiarism detectors such as TurnItIn, Plagscan, and Viper amongst others which comes with cost. As the saying goes, ‘‘it is better to prevent than to control’’.

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Students need to be consciencetized on this menace as it poses negative reputation about academic institution. The more such is recorded the more the institution losses it credibility. The High percentage recorded signifies inadequate awareness on the part of the patrons. Providing education and advocacy will help students to desist from such act. Librarians can liaise with Faculty to create the needs awareness to students.

5.6.2 Academic dishonesty

This comprises data falsification in support of laboratory or field work, sabotaging another student's research, stealing another student's research ideas, taking credit for work not done by oneself, hoarding materials, intellectual theft amongst others. Kisamore, Stone and Jawahar (2007:381) acknowledged that academic dishonesty is usually driven by perceptions of cheating and henceforth reporting cheating portrays honesty.

It also comprises of false information about the subjects used in the research findings. The credibility of research is dependent on the literature used, hence there is the need to acknowledge properly. Confidence and trust is compromised when dishonest is detected. Academic dishonesty recorded 66.6% which shows that greater number of the librarians strongly agree to this menace. The reputation of academic institutions becomes at stake when such is on the increase.

5.6.3 Data Manipulation

This occurs when data is misrepresented or manipulated to suit a participant purpose other than the research objective. This recorded 59.2% as most of the librarians strongly agreed to that among patrons. Data is mostly tempered to suit a particular interest and this does not give the true reflection of the study. Research findings that have been manipulated pose continuity challenge, its application for further research usually becomes a challenge. There are instances where one

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could manipulate ones dissertation to suit his or her research interest. This is unethical and must be avoided.

5.6.4 Fabrication

Fabrication also known as falsification according to Hughes and McCabe (2006:52) was attested as one of the ethical dilemmas. This was also attested by the respondents. Fabrication is the act of diversifying or pretending to have done something which may be inappropriate. There are instances where research data may be falsified in order to attain results. This mostly happens when research data is ‘‘cooked’’ and presented as such. Some researchers refuse to go to the field or use wrong respondents or subjects for the data collection. The use of wrong respondents is unethical and negatively affects research results. Majority of the librarians, (51.8%) strongly agreed to this menace.

5.6.5 Examination malpractice

This forms part of the ethical dilemma where candidates deliberately cheat, impersonate and copy others in order to pass examinations (Akaranga and Ongong, 2013:88). This is unethical and improper practice that does not promote transparency. Forty percent (48.1%) strongly agreed whiles (29.6%) agreed. This demonstrated an increased awareness of this traditional menace. Cheating in examination is becoming prevalent in high schools. Cheating which forms part of misconduct recorded (71%) among university students in Canada and United States (Stone, Jawahar and Kisamore 2010:35). Cheating according to the authors is intentional and could be controlled by adherence to rules and codes of ethical conduct. This affirms the duty based theory adopted for the study which hypothesises that behaviour of man is curtailed as a result of laid down rules.

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5.6.6 Encroachment on privacy

Wishart (2009:77) in assessing the ethical consideration on the implementation of mobile learning at the workplace concluded the possibility of misuse of information and communication technologies and its associated dilemmas. In addressing these questions ‘’what kind of information must be withheld and which cannot, under what conditions, with whom and how should it be protected’’ raises ethical dilemmas. The issue of privacy is highly recognised among the medical and legal practitioners. The respondents (40.7%) strongly attested to this ethical dilemma, and that encroachment on researchers’ privacy is unethical especially for clinical trials. It usually happens when external factors distract and obstruct the creator‘s ideas. Invading on one’s privacy negatively affects the quality of research output.

5.6.7 Conflict of interest

Flicker et al (2007:488) posited that one of the dilemmas that is mostly associated with Community Based Practice Research is conflict of interest .According to them, it is recognised as one of the prevalent dilemmas that has emerged. This is where the authors’ interest conflicts with the objects being used or investigated for the study. Forty percent (40.7%) of the respondents strongly agreed whilst (40.7%) agreed respectively to this ethical misconduct. The finding attested to the facts that respondents were aware of it. The focus and the objective of the research are usually derailed as a resulting from internal and external conflict factors that might affect the study.

5.6.8 Author Inflation/honorary authorship

It is one of the latest forms of misconduct where by authors populate the creators with names of people who never contributed to the research. This is currently becoming commercialized as people pay for their names to be added to studies they have not contributed**.** Mandal, Bagchi and Basu (2015: 401) define author inflation as the phenomenon where similar authors owe duplicate

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publications and or included non−contributing persons as authors (honorary authorship). Thirty-three percent (33.3%) of the librarians agreed to this menace as it has not gained the needed recognition.

5.6.9 Poor record keeping

The Asia Pacific International College (2017:5) policy on responsible conduct of research asserted on the need for researchers to ‘’maintain complete, accurate, and current records to facilitate the continuity of research’’. Poor record keeping according to Thompson Rivers University (TRU: 2012:2) is unethical and forms part of the academic misconduct. Practicing record archiving and good records keeping enables one to track, use and reuse data, accurate records of data, methodologies and findings, in addition to graphical presentation, images, and clinical samples ensures scholarship integrity. Destruction of records makes it difficult to detect wrongdoing (TRU: 2012; 5).The study findings corroborated this menace as (33.3%) strongly agreed whilst (44.4%) were aware of the implication for poor record keeping.

5.6.10 Ghost Authorship

Wislar, Flanagin, Fontanarosa, DeAngelis (2011:1) define this as individuals who have made substantial contributions to works reported in articles but have their names withheld or not mentioned as authors. This is more or less like impersonation. In order to ensure transparency in authorship, Baskin and Gross (2011:2) recommended to journal editors to validate and investigate authors’ contribution to a study. The study revealed that (29.6%) of the respondents strongly agreed to this phenomenon, whilst (33.3%) indicated neutral. This indicates the minimal awareness of this dilemma among respondents. Baskin and Gross (2011:2) attested to this menace among researchers and recommended to journal editors to validate and investigate authors’ contribution made to a study. The prevalent of this dilemma compelled the International Committee of Medical

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Journal Editors (ICMJE) to develop a policy that oblige authors to ‘‘define intellectual contribution made, identify author and creators for a work, acknowledge all versions of the manuscript and sign statements about their specific contributions using manuscript tracking system’’.

5.6.11 Salami publication

Šupak Smolčić, (2013:1) defines this as segmented publication that is mostly characterized by similarity of hypothesis, methodology or results. Thus the research finding for a project is separately reported in duplicates. Rezaeian, (2014:43) acknowledged this as unethical in research but may be permitted for epidemiological studies and publication for different audience or language. Eleven percent (11.1%) of the respondents strongly acknowledged to this, whilst 55.5% indicated that it was neutral to them. This signifies the absence of awareness among the librarians in as much as it exits.

Salami publication, honorary authorship, ghost authorship and Conflict of interest are on the increase as a result of collaborative research. Collaborative and virtual researches are contemporary trends in research and the awareness of these recorded very low responses among respondents. These forms of misconduct affects resulting from modern methods of research such as community base research affect authenticity, integrity and originality of research. Further, encroachment of privacy mostly resulting from abuse of social medial and mobile technologies has escalated. Contrary the traditional forms of misconduct such as fabrication, plagiarism, dishonesty, data manipulation and examination malpractice were known by the majority. Additional “cyber-crime, social network abuses, e-waste and data insecurity were discovered as some of the ethical dilemmas that have recently emerged.

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5.7 CONTROL OF ETHICAL MISCONDUCT BY LIBRARIANS

Librarian's once they become aware and identify the causes of ethical dilemmas could prevent, control or manage the menace. Homnes and Bothma (2013:28) are of the view that the prevalence of ethical misconduct among students was not as a result of lack of content, rather it was attributed to the inability of students to cultivate, be conscious of ethics, conceptualise and practically apply what has been taught. The authors being lecturers in the teaching of information ethics at the University of Pretoria proposed the adoption of practical components in advocating it. According to Homnes and Bothma (2013:31) the African Centre of Excellence for Information Ethics promulgated the development of a "curriculum to teach information ethics in African universities. Furtherance to this were adoption of integrative approach (theoretical and practical approach), adoption of interactive platforms to encourage interaction between the students and lecturers and exploring and researching on the phenomenon (Homnes and Bothma 2013:28) and (Holmner, Penzhorn and Van Wyk, 2013:272).Additionally, the establishment of ethical committees was recommended.

5.7.1 Use of plagiarism detectors

Librarians in order to remain relevant in the current information and technology dispensation, as well as meet the dynamic expectations of students and faculty have assumed embedded roles that ensure academic integrity. According to Capurro (2013:160) and Wishart (2009:77) online social networks, mobile and blended learning as well as collaboration have catapulted discrepancies and misconduct in research. Among them is plagiarism, fabrication and dishonesty hence the need for applications to track such. Plagiarism detectors are tools used to determine the level of plagiarism

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count in publications by measuring ‘’plagdet, precision, recall, and granularity’’ (Potthast et al, 2011:4)

It comes in both proprietary and open source packages. Majority of the Librarians (84.2%) indicated that they were aware of such tools. These included ‘’TurnItIn, plagiascan, and plagiarism checker’’ amongst others. The use of plagiarism detectors serves as a control measure, though it enables authors to assess the count before submission: as the saying goes, it is better to prevent than to control the menace by librarians.

5.7.2 Information literacy

The Wesleyan University (2017: el) defines information literacy as to “involve the ability to recognize when information is needed, the ability to efficiently locate, accurately evaluate, effectively use, and clearly communicate information in various formats”. To be able to search, retrieve and apply information ethically enhances academic research integrity. Librarians as information professionals have the skills to teach patrons to be able to identify, locate, evaluate, synthesise, apply and present information for the purposes of teaching, learning, research and presentation.

Majority of the respondents (81.4%) attested to information literacy as one of the remedies to prevent the dilemmas. This is a preventive measure which prepares patrons to become life-long learners in an ethical manner. Information literacy is appropriate when delivered to first years to prepare them for future research. Though majority of the respondents indicated this, the question is how many of the librarians have articulated this in their libraries as corroborated Simmons (2005:299).

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5.7.3 Promotion of Fair use policy

This policy guides on the percentage of works that could be used for one's research. The fair use policy advocates for usage of one's research work. The policy streamlines the volume, amount and substantiality of literature used in a research (Stodden, 2009:1). It enforces the use of copyrighted materials in moderation, thereby limiting the monopoly of limited usage (Association of Research Libraries 2012:8). There is currently no tool to detect but librarians can advocate and educate patrons on this policy. Majority of the librarians (77.7%) attested to this concept in promoting ethical compliance among researchers. Librarians according Russell (2012:2) need to be committed to ensure compliance with intellectual property law, fair use and the preservation rights. Fair use ensures that copyright owners do not have a monopoly over transformative use of their works.

5.7.4 Increased access to information

According to the International Research and Exchange Board (2016) Librarians in Nigeria increased access to information for women and youth using innovative activities which included training in Information Communication Technology (ICT) and infrastructure. Lack of information for research purposes has increased the prevalence in plagiarism, copying and pasting and falsification which are considered as academic misconduct. Contrary, Homnes and Bothma (2013:28) posited the view that the prevalence of ethical misconduct among students was not as a result of lack of content. Librarians currently serve as mediators between researchers and information. Providing access to authentic literature for academic research prevents abuse and misuse of information. Access to scholarly resources usually indicates the creator, the date of

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publication, the name of the journal and digital object identifiers, amongst others which makes it easier for research purposes.

Libraries of Dehradun through selective dissemination of information have widened the gap on information access (Sharma and Parasar,2014:4). Sixty-two percent (62.9%) of the librarians strongly agreed to this as a remedy to control and manage the menace. Majority of the librarians indicated this. The result seem not encouraging as inadequate access to information propels students and researcher to indulge in unethical behaviours (Sharma and Parasar,2014:).This corroborated the assertion by Homnes and Bothma (2013:28) that lack of content does not call for conduct of ethical behaviour.

5.6.5 How to locate information

Identifying the sources of information is not enough but rather developing the skills of patrons to effectively retrieve the information for research purposes is considered key. In this era of information overload, one will need the skills to search (basic, advance search) and explore the Online Public Access Catalogue (OPAC). This was attested by Boateng, Agyemang and Dzandu (2014:8) that the OPAC serves as a consolidated tool in locating information, being it electronic or print. This was confirmed by majority of the librarians (62.9%) who strongly agreed to this. That they educate patrons to locate authentic sources of information which increases access to eliminate ethical misconduct.

5.7.6 Protection of copyright

This norm grants legal protection to authors and creators to protect their work from misuse. It regulates and protects intellectual knowledge and patents from unauthorized use. It ensures that patrons use the information appropriately in order to minimize abuse (Stodden 2009:1). Copyright

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according to the World Intellectual Property Organization (WIPO: 2015) and IFLA (2016) encompass the protection of patents and innovations (IFLA, 2016). Copyright compliance protects authors' credibility. Fifty-nine percent (59.2%) of the respondents said they educate researchers about compliance to copyright in order to reduce unethical misconduct.

5.7.7 Organization of information

The advancement in Information Technology (IT) coupled with social networks and the overload of information has propelled the need for the skills in information organisation. There is the need for librarians to adopt practical approach to assist researchers to manage and organize information in an ethical manner (Homnes and Bothma, 2013:280). The integration of blended model platforms such as learning management systems posited by Holmner, Penzhorn and Van Wyk (2013:265) and availability of content management applications such as Alfresco, Joomla, Word Press and Drupal can be used to manage and organize information for research purposes. Minimal number of the librarians (48.1%) strongly agreed whilst (33.3%) agreed on this concerning their roles in controlling ethics.

5.7.8 Promotion of Personal Information Management (PIM)

Personal Information Management (PIM) according to Fourie (2011) involves the creative and innovative use of information. It encompasses advanced information literacy, alerts, tagging reference management and responsible use of information. It has been defined as "the practice and the study of the activities people perform to ''acquire, organize, maintain, retrieve, use, and control the distribution of information" (Jones, 2007:452). Personal information management enables one to use and reuse information for research purposes. Librarians have a role to play to introduce patrons to authentic sources of information. Information from peer reviewed sources and scholarly

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search engines with good references are good sources of academic literature. Forty-eight (48.1%) of the respondents strongly agreed that the practice of PIM could control the dilemma whilst (33.3%) agreed.

5.7.9 Use of reference tools and applications

These are applications that facilitate referencing of all formats. They enable students and faculty to organize and cite references use for their research work (MacMillan,2012:561). They include Mendeley, Refworks, Zotero, Endnote, and Refman (Li, Thelwall and Giustini. 2011:3). Thirty three percent (33.3%) of the respondents strongly agreed to this as one of the control measures. This indicates that majority of the librarians are not aware of such tools in controlling ethics.

It facilitates in locating, generating and tagging of citation and bibliographical literature used. Librarians are to acquire these tools to assist students and faculty. They need to teach students on how to use the referencing tools which in other words promotes information literacy. The reference applications support collaborative research via "database connectivity, word processing ,reference list, file formats, numerous citation styles, and the importation and exportation of data (MacMillan,2012:565) .It also supports operating systems such as windows, Linux, Chrome and Android. One is able to cite the various styles such as the APA, MLA, Harvard, Chicago and footnote.

Whilst some of the measures were discovered to be preventive some were mainly curative. The use of plagiarism detectors which is more or less a curative remedy incurs additional cost in situation where proprietary software is considered over open sources. On the other hand the use of reference managers, practice of personal Information management (PIM), information literacy and increased access to information were some of the preventive measures discovered.

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Establishment of Ethics committees

A number of higher educational centers have established academic ethics committees to foresee and address ethical issues resulting from research. The University of Cambridge (2017) Research Ethics Committee addresses complaints, misconduct, sanctions and policies about research ethics. The committee also provides advice and guidance on procedural ways about the conduct of research.

University of Sanford (2017) also has an ethics committee that approves research and its engagement. It seeks to maintain ethical standards and protects subject used in research. Sikes & Heather (2010:207) advocated that the benefit of the committee works to open up research and guarantee authority. This was recommended by the respondents as a way of controlling the menace. Majority of the respondents indicated this as part of the other forms of academic ethics control.

Teaching of information ethics as part of the curriculum

Malan and Bester (2014:2) have considered the need to teach information ethics as part of the curriculum in African universities, preferably in the Library and Information Science (LIS) schools. The content that may be considered to be covered according to them include: information and knowledge society, information age, e-governance, digital divide, cybercrime'', amongst others. Maina (2017:1442) also advocated for the teaching of information ethics in Library and Information Science (LIS) schools. According to her, this will create the needed awareness, enable students to gain understanding on issues that pertain to local and international ethics. Hommes and Bothma (2013:28) corroborated on the teaching of ethics in in order to ethically develop habitual characters among students. Saab (2010:13) has advocated for the teaching of information ethics in

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an ischool. Some of them mentioned were ‘’meta-ethics, information ethics, virtue ethics, deontological ethics, consequentialist ethics and feminist/care ethics.

5.8 AWARENESS OF ETHICAL TOOLS AND APPLICATIONS

The study explored the tools and applications that could detect and control ethical misconduct in academic research. Librarians being proactive have advocated for the use of citation management and referencing support applications such as Mendeley, Refworks, CiteULike, EndNote, Refman, and Zotero (MacMillan, 2012:2) amongst others. Plagiarism Checker, TurnItIn, PlagScan, Viper among others were identified as some of the ethical detection tools. (Lukashenko, Graudina and Grundspenkis 2007:3). The use of citation tools enables one to organize and cite research, generate bibliographies, recover and discover sources used as literature (Li,Thelwall and Giustini,2012:1). Librarians in higher academic institutions are not interested in researchers breaching ethical dilemmas but rather equipping researchers to do things in the right manner (MacMillan, 2012:2).

Plagiarism Checker

This is open source software that detects the plagiarism count of research work. It is a web based application in which the program source key is free. Majority of the librarians (81.4%) strongly agreed to this tool. It also checks for spellings and grammar. It gives instant feedback to enable one to revise and update content.

TurnItIn

This is an application that enables one to find out the extent to which one has plagiarised. It also enables creators to detect the extent by which ones’ writing has been used by others (Ridley, 2012:121). It is a proprietary application that checks the plagiarism count. It operates on both intra and extra corpus (Lukashenko, Graudina and Grundspenkis 2007:3). Majority of the librarians,

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(77.7 %) indicated that it highlights where one has plagiarized. It promotes credibility and integrity in research produced.

PlagScan (6.6%) were known, **Viper** (62.9%) and **CopyLeaks** recorded (44.4%) respectively. These plagiarism detectors used to assess the plagiarism count. They are free and open source, web based applications that enhance data integrity. The processes include checking, scanning and comparing contents for plagiarism and duplication

Mendeley

Mendeley according to MacMillan (2012:2) is a ‘‘set of tools that assist users to discover resource, engage in collaboration and a free information management and citation referencing management tool’’. It serves as data set and research network tool that enables one to organize, store, share and cite ones work. It is a tool that enables one to create bibliographic records that facilitate easy referencing and serve as research evaluation tool (Li, Thelwall and Giustini,2012:9). Sixty percent (60%) of the librarians acknowledged Mendeley. This indicates that the respondents were aware of the tool but probably might not have utilised it to support research as earlier findings revealed minimal use of citation management in support to research.

Refworks

This is a web-based and commercial reference management package mostly used by researchers for the purposes of referencing. It supports sharing across databases and search engines. It enables multiple users to add and edit records remotely. Twenty six percent (26%) of the librarians were aware of this application.

Zotero and **Endnotes** were popular to (18.5%) of the population respectively. This indicates minimal awareness of these reference management tools.

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5.9 SUMMARY OF CHAPTER

It was discovered that the traditional roles were being performed by the librarians in support to research. On the contrary, emerging roles such as ‘’academic identity, promotion of open access scholarship, literature gap analysis, creation of virtual research environments, Alert and tagging services, data visualisation services, and promotion of personal information management were minimal. Conflict of interest, poor record keeping, ghost authorship, honorary authorship, Salam publications recorded low awareness among the respondents. Other dilemmas that were discovered were, ‘’cyber-crime, social network abuses, data insecurity, electronic waste among others’’. It was revealed that the use of advanced ICT in support to research among respondents was minimal. This resulted in limited awareness of it associated ethical dilemmas. The practical ways of curbing the menace of misconduct were: copyright and fair use compliance, use of plagiarism detectors, education on information literacy, use of referencing tools, good record keeping and practice of personal information management. Also the establishment of ethics committees and teaching of information ethics as part of the academic curriculum for librarians were identified as part of the preventive measures.

5.10 THEORETICAL INTERPRETATION OF FINDINGS

The deontological theory which was adopted for the study also known as duty-based approach considers ethical action as one perpetuated from duty and for that matter mandates researchers to comply. As a behavioural attitudes study, the need for academic research policies, rules, code of ethics, sanctions, ethics committees, informed consent of parties, respect for confidentiality, anonymity, seeking for research clearance and approval is laudable. The theory hypothesises academic research ethics as obligatory for scholars to conform to. It is not only right to do it but it

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is wrong not to do it irrespective of the environment. It also postulates vigorous scrutiny, subjecting research into enquiry to ensure that research findings improve human condition both present and future. The development of Information Communication Technology (ICT) policies ,licencing agreements and social media policies would serve as remedies to curb delinquencies such as data insecurity, social network abuse and information theft.

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CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 SUMMARY OF STUDY FNDINGS

In reviewing librarians role in academic research, numerous roles deemed traditional and contemporary were discovered to be performed by the polytechnic librarians. Among them were increased access to information of varying formats to support Faculty, students .This recorded the highest reponsibility. Marketing and publicity of materials was a preceding role which aimed to promote visibility of the library resources to patrons and potential users. The use of the social media, web 2.0, mobile applications were minimal integrated but rather webpage was used to enhance visibility. Institutional repository (IR) which showcase the research output of the institutions such as dissertations, journals, artifacts, books amongst others produced by the organization was considered by the librarians. Networking and collaboration was a key role for Inter Library Loan and knowledge sharing purposes.

Information Literacy was discovered to be the fifth role performed by librarians to support academic research. This role comprises of the techniques involved in equipping researchers to become life-long learners.It encompasses one‘s ability to ‘‘identify,locate evaluate ,synthesis, apply and present’’ information in an ethical manner. This is a preventive measure which impacts on behavioural change. Again, Author Aid service was pointed as a crucial service which directly impact on research, Digitisation, Digital Curation, promotion of Open access and research data management were somehow known among the librarians. On the other hand; Promotion of Personal Information Management (PIM), Research Identity Management, Data Visualisation, Creation of Virtual Research Environments (VRE), literature gap analysis and Alert and tagging

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were activities which recorded minimal awareness; these were mostly contemporary information technology inclined roles.

The study ascertained the degree of awareness of these dilemmas among the Senior Polytechnic Librarians. Majority of the respondents were aware of the following ethical misconduct: fabrication, plagiarism, falsification, duplication, and manipulation. Author inflation, salami publication, conflict of interest, poor record keeping, and examination malpractice recorded minimal awareness. Plagiarism was the most prevailing misconduct recorded. Copying and pasting, poor referencing and poor citation forms part of this component. Other components that constituted academic delinquencies and breaches were: cyber-crime, social network abuses, data insecurity and electronic waste.

Respondents were also aware that advancement in Information Technology (IT) has impacted on ethics. It has increased access to information, ensured integrity in research by the use of numerous data analytical tools, facilitated availability of software which detects plagiarized content and promoted collaboration in research. Contrary, it was discovered to have encouraged dilemmas such as encroachment on privacy, honorary authorship, indiscriminate copying and pasting, conflict of interest and ghost authorship.

The study further ascertained the importance of academic research ethics and its impact on scholarship. Compliance to ethical standards was discovered to have promoted integrity on research both for the author and the publication. Promoted transparency, trust, continuity of research, openness in research, standardization in research and anonymity, these were known to majority of the respondents. It enhances the reputation of academic institutions and ranking, promotes virtual, network and collaboration in research. Ethical compliance has become one of

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the criteria sponsors and partners look out for before sponsoring research. It was discovered that compliance to research serves as yardstick for sponsors to fund research. The upgrade of the Polytechnics to Technical Universities requires subjecting research to vigorous scrutiny and ethical compliance that promote quality research. In that case, research could gain the necessary recognition and attention of sponsors.

Recommendations identified included the use of innovative applications such as plagiarism detectors, reference managers, learning and content management systems .The use of plagiarism detectors recorded the highest commendation as majority of the librarians indicated plagiarism as the major misconduct in research. Interactive approaches such as practice of Personal Information Management (PIM), establishment of writing centres, information literacy, establishment of ethical committees coupled with vigorous accreditation standards were indicated. The application of punitive measures and sanctions were also identified as curative measures. It was also discovered that majority of the delinquencies were as a result of behavioural attitudes, henceforth the deontology theory which the study adopted complements the need for academic research policies, rules and code of ethics to bind researchers. .

The Committee as part of its mandate approves research, provides advice and guidance on procedural way about the conduct of research, issues on informed consent, conflict of interest, conducts amongst others. The Librarians could liaise with Research Departments in order to get this done. Further, the teaching of Information Ethics as part of the curriculum preferably in the Library and Information Science (LIS) schools will expose librarians to some of the dilemmas and ways to control them.

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Finally, respondents expressed some of the ethical tools and applications they were aware of. Majority of them mentioned Plagiarism checker which is a free and open tool for detecting the extent of the count, TurnItIn, Plagscan, Viper, Copy leaks. In addition to these were referencing managers which assist in compiling the references used: Mendeley, Zotero, Endnote and Refworks, among others facilitate tracking, export, import and compilation of references. The use of the reference managers also enhances collaboration among researchers.

6.2 CONCLUSION

The study explored the awareness of academic research ethics among Senior Polytechnic Librarians, expediting their preparedness and commitment to integrate, advocate and promote academic research ethics. The transition of the Polytechnics to Technical Universities, reputation building and ranking, research funding, the exponential growth of information as well as changes in technological trends has impacted on the task and expectations from librarians. Their traditional roles are currently embedded with new and challenging task in order to meet the demand and desires of Faculty, students and Researchers. As information professionals, they have assumed the roles of partners, mentors and lecturers equipping students to become life-long learners.

In the light of the above, polytechnic librarians ought to commit themselves to ensure that academic research norms are compiled and ethical benchmarks are in place. It was discovered that majority of the librarians were aware of some of the ethical dilemmas. The study assessed the impact of Information Communication Technology (ICT) on research ethics. It ascertained some of the control measures that could manage and curb the menace of violations of research ethics. Recommendations base on the findings were finally provided.

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6.3 RECOMMENDATIONS

The under listed recommendations and suggestions were discovered as remedies to prevent and manage the menace of misconduct. These were categorised under: ‘‘use of innovative applications, interactive and collaborative approach, policy and compliance, intensified advocacy and education on academic research ethics, behavioural change’’ amongst others.

The use of innovative applications such as plagiarism detectors was recommended. These are tools used to detect the plagiarism count in publication before submission. It enables one to work on plagiarized areas before submission. Examples include Plagiarism Checker, Plagscan and TurnItIn. Further the Use of referencing tools that facilitates referencing on numerous formats and styles is recommended. It enables one to import and export materials for future use. Examples include: Refworks, Mendeley, Zotero, and Refman amongst others. Also learning and content management systems such integrated library system, learning management system provide one platform which enables one to carry out integrated research thereby controlling the misuse of information.

Interactive and collaborative approach encompass research support, best practices and emerging roles assumed by librarians to curb the menace of violation. Academic Identity Management which has recently emerged is a platform where creators’ “publications, intricate hierarchies, networking and federated identities and mapping’’ are created and projected. It makes the credentials and profile of researchers visible and streamlines ownership. It is an online profile application to enhance reputation of authors in order to attract collaborators. Examples include: ‘‘Web of Science, Scopus, and Google Scholar’’ Academic identity enables one to know the bibliometric and impact of research publication produced.

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Creation of Virtual Research Environments (VRE).This is an environment that ensures that requisite resources and facilities are available to support collaborative research. Librarians are recognized as stakeholders and partners in research data .They are to collaborate among virtual researchers and share information via :Telephone, Web 2.0 ,email, instant messaging, forums, wikis, blogs, meeting tools, project management tools, video conferencing, data-based conferencing, Access, Grid, project calendars and task assignments computers for effective and collaborative research.

Also integration of Research Data Management where different researchers come together to produce publications with the assistance of Librarians using the research data lifecycle approach. Librarians ought to facilitate the various stages of the research lifecycle thus" creating data, processing data, analysing data, preserving data, disseminating data and ensuring the re-use of data for effective research".

Promotion of Personal Information Management (PIM) - Practicing PIM enables one to "create, organize, retrieve, use and distribute information to fulfil various responsibilities". One will be able to use and reuse information thereby enabling the possibility to have the right information in the right place and in the right form. Additionally, author aid services should be intensified. This is the practice of providing support, training and mentoring researchers to publish and communicate their work.

Policy and compliance - On the issue of policies and compliance, academic Research and Ethics Committee is to be establish to advocate, enforce, sanction and penalize offenders. The committees should be an accreditation requirement. Again establishment of ethical standards and policy that

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will promote conformity and compliance on the type of consent needed to carry out research is commended. The policy also outlines the areas of focus as well as the dos and don'ts in research.

Improvement in accreditation Standards were also recommended. The accreditation entities ought to produce checklist which encompass ethical compliance. The scope of accreditation should be widening to encapsulate the establishment of academic ethics committees and academic writing centres of which the Librarians could champion them.

As part of the recommendation, the development of checklist is recommended for the Research and Ethics Committee to develop checklists that will explore integrity. The checklist may guide researchers on relevant areas to review literature, select a design and adopt sound methodologies.

Intensified advocacy and education on academic research ethics -Teaching of Information Ethics as part of the curriculum in Library and Information Science (LIS) schools is recommend to enable librarians to impact the knowledge. Also establishment of academic writing Centres where research papers and works are proof read and edited to ensure that academic writing meet certain standards and pedestal are recommended. Example is the Carnegie Writing Centre at the University of Ghana.

There is the need to educate researchers and students on the preventive measures such as effective referencing and citation other than the use of plagiarism detectors which will incure additional cost. Information literacy sessions are also commended to guide patrons. The sessions must be offered to students to equip them to become life-long learners.

Behavioural change- Ethical obligations according to the deontology theory entail rules of behaviour for scholars to abide by. ‘‘Thus it is not only right to do it, but that it is wrong not to do it irrespective of the environment. Henceforth the use of sanctions and punitive measures such as

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rejection, retraction, demotion amongst others may be introduced to bring about desired behavioural change.

6.4 SUGGESTIONS FOR FURTHER RESEARCH

It was discovered that Information Communication Technology (ICT) plays a critical role in research hence the researcher suggests further investigation of ethical delinquencies associated with the use of social networks and mobile technologies in advancing research.

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APPENDIX

QUESTIONNAIRE: ACADEMIC RESEARCH ETHICS

I am MPHIL student of the Department of Information Studies University of Ghana, Legon. This study is being conducted across Polytechnics in Ghana to seek the views of Senior Library staff on the topic **"Awareness of academic research ethics among Senior Polytechnic Librarians"**.

Completion is anonymous and voluntary. The data will not be retained once the study is complete**.**

Biodata

1. Please indicate the name of your Library and Address.

   .....

   ……

   ……..

2. Librarians' role in Academic research

The under listed are some of the roles of librarians to support academic research, kindly rank the following roles using the rating scale 1-5 where

1 means I Strongly agree

2 means I Agree

3 means I am Neutral

4 means I Disagree

5 means I Strongly disagree

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Librarians Roles	**Rating**
Increase access to information	
Promote Information Literacy	
Digitization	
Virtual Research Environment (VRE) Managers	
Institutional repository (IR) Managers	
Digital Curation and preservation managers	
Research Data Management (RDM) Managers	
Author Aid Services	
Marketing and publicity of scholarly materials	
Promote Personal Information Management (PIM)	
Ensure copyright compliance	
Promote Open Access Scholarship	
Data Visualization	
Academic identity management	
Alert and Tagging Services(Articles and Grants)	
Networking and collaboration	
Literature gap analysis	
Other (specify)	

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Awareness of Academic Research Ethics among Senior Polytechnics Librarians.

3. Are you aware of academic research ethics?

   Yes …….. No……

4. Is there an impact of Information Communication Technology (ICT) on academic research?

   Yes…….. .. No……

5. Kindly state how ICT impacts on academic research.

   ……..

   ……

   ……

6. Kindly identify some of the research and academic codes of ethics you are familiar with.

   ……

   ……

   ……..

Importance of Academic Research Ethics on scholarship.

Please rank the following benefits of academic research ethics using the rating scale 1-5 where:

1 means I Strongly agree

2 means I Agree

3 means I am Neutral

4 means I Disagree

5 means I Strongly disagree

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Benefits of ethical compliance	**Rating**
Promotes Transparency	
Ensures Integrity	
Enhances institution reputation	
Improves Privacy	
Increased Dissemination and communication	
Improve Trust	
Ensures Ownership	
Openness in research	
Continuity of research	
Eliminates plagiarism	
Legality assured	
Rights to anonymity	
Enhances Accountability	
Promote standardization	
Other (specify)	

Components of Ethical Misconduct

7. Please rank the following ethical dilemmas using the rating scale 1-5 where:

1 means I Strongly agree

2 means I Agree

3 means I am Neutral

4 means I Disagree

5 means I Strongly disagree

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Misconducts/Dilemmas	Rating
Academic Negligence	
Academic dishonesty	
Plagiarism	
Examination/Assignment Malpractice	
Author Inflation	
Censorship	
Encroachment on privacy	
Data manipulation	
Fabrication	
Ghost Authorship	
Conflict of interest	
Salami Publication	
Poor recording keeping	
Other (specify)	

Control of Ethical dilemmas by Librarians

8. Can librarians play a role in controlling academic research ethical dilemmas?

   Yes…… No…….

9. Please rank the following control measures using the rating scale 1-5 where

1 means I Strongly agree

2 means I Agree

3 means I am Neutral

4 means I Disagree

5 means I Strongly disagree

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Control of dilemmas	**Rating**
Information literacy	
Authentication of information	
How to locate information	
Evaluation of information	
Organization of information	
Creation of information	
Use and communicate information	
Protection of personal data	
Promote Personal Information Management (PIM)	
Increased access to information	
Copyright compliance	
Use of referencing tools	
Fair Use compliance	
Others(specify)	

Ethical Tools and Applications

10. Please which of these ethical tools and applications are you familiar with? Please tick

Tools /applications	**Yes**	**No**
TurnItIn		
Mendeley		
Refworks		

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Plagscan		
Plagiarism Checker		
Mendeley		
Viper		
Refworks		
CopyLeaks		
Zotero		
Endnote		
Others (specify)		

11. Are there measures in place to reduce/ detect ethical misconduct in your institution?

    Yes …… No……

12. If yes, kindly indicate some of the measures to reduce /control ethical breaches in your institution

    ……

    ……

13. Why do the Polytechnics need this?

    ……..

    ……

14. Please provide any relevant information on academic ethics.

    ……..

    ……