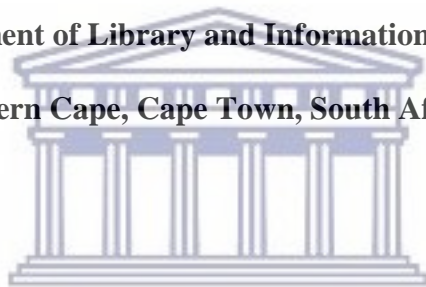


**SCHOLARLY COMMUNICATION GUIDANCE AS A CORE SERVICE OF AN
ACADEMIC LIBRARY TO DOCTORAL STUDENTS: A CASE STUDY OF KWAME
NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

ESTHER WHITE

**A thesis submitted in fulfilment of the requirements for the degree of Doctor of
Philosophy in the Department of Library and Information Science, University of the
Western Cape, Cape Town, South Africa.**



Supervisor: Dr. Lizette King
UNIVERSITY of the
WESTERN CAPE

February, 2019

KEYWORDS

Scholarly Communication Guidance

Research Dissemination

Research skills

Research Portal

Doctoral Students

Academic Library Website

KNUST

Kwame Nkrumah University of Science and Technology

Doctoral supervisors

Institutional repository

Open Access



ABSTRACT

This study investigated scholarly communication guidance as a core service by the Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana, academic library to doctoral students, research and scholarly communication needs and skills of doctoral students and effective dissemination of research findings by doctoral students for national development. The study also explored the adoption of a research portal as part of the academic library website for scholarly communication guidance to doctoral students.

A case study research design with KNUST as research site, with a mixed method approach was used. Semi-structured interviews, questionnaires, documentary analysis and a bibliometric survey of an institutional repository were employed as data gathering tools. A scholarly communication guidance model based on Costa's proposed adaption of Garvey and Griffin's models of scholarly communication, Wilson's information behaviour model and Björk's scholarly communication lifecycle model was developed to frame the study.

It was found that KNUST doctoral students had moderate skill levels in research and scholarly communication issues indicating the need for guidance. Both doctoral students and supervisors preferred online scholarly communication guidance. Although academic librarians had high skill levels in some scholarly communication issues, additional capacity training initiatives to provide effective guidance is recommended. As most doctoral students are often not on campus, face-to-face and workshops by academic librarians should be replicated in a research portal providing 24/7 and on a point of need training and guidance. In order to supply research support, the contents of the research portal should include guidance on copyright, plagiarism,

fair use, creative commons, use of reference and data management tools, research dissemination, open access and the institutional repository. Collaboration among the academic library, doctoral supervisors, School of graduate studies, KNUST information technology services and the KNUST legal department is needed for effective scholarly communication guidance.

The study contributes to the body of knowledge on scholarly communication as limited research studies and literature on guidance by the academic library to doctoral students are reported. A general scholarly communication guidance model and a specific one for KNUST were developed to guide the provision of effective scholarly communication guidance. The study also makes significant contribution to library and information science policy, practice and theory in the area of scholarly communication guidance by the academic library. The study hopes to not only provide all academic librarians with insight and guidelines into the provision of effective scholarly communication guidance for doctoral students, but also to serve as an educational platform for KNUST academic librarians, doctoral students, supervisors, faculty members and the School of graduate studies.

DECLARATION

I declare that *Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology* is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used, have been indicated and acknowledged as complete references.




.....
Esther White



UNIVERSITY of the
WESTERN CAPE

November, 2018

I declare that the thesis *Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology* was submitted to Turnitin resulting in a similarity index of 1%.



.....
Lizette King

February, 2019

ACKNOWLEDGEMENTS

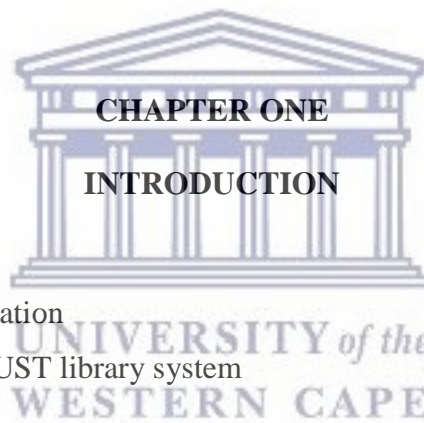
My heartfelt gratitude goes to my supervisor Dr. Lizette King for kindness, support and seeing me through the PhD journey painstakingly and diligently. I am also very grateful to Prof. Zinn, and the entire staff of the Department of Library and Information Science, University of the Western Cape (UWC) for their immense support. Many thanks to the UWC Division of Postgraduate Studies and Library for various workshops equipping me throughout the study.

I am very grateful to the KNUST and Prempeh II Library management for granting me study leave. A very big thank you to KNUST lecturers, the University Librarian, professional librarians, Dean of the School of graduate studies, doctoral students, ICT staff members who acted as respondents. I am very grateful to Mr. Abraham Adusei, Madam Josephine Baffoe, Mr. Victor Teye, Mr. A.S.Y Humphrey-Ackumey, Jeremiah Ofori and Constance Aboagyewaa for their immense support to my gathering of data and analysis.

I thank and are grateful to my parents, Mr and Mrs. Boakye, for encouragement, sacrifices and all that you continue to do for me. Many thanks also to my siblings, Kofi, Kwame and Amma, for your loving support (both in cash and kind), prayers and care. To my husband, Dr. Peter White, as well as my children Peter Holali, Helen Emefa, Jason Kafui and Jesse Makafui your patience, prayers, love, care, sacrifices and support are very much appreciated from my heart. Thanks also to my fellow doctorate students (Selma, Dauda and Patience) and my Ghanaian friends at UWC for support in diverse ways. For being my family in South Africa, I thank Pastor and members of the Redeemed Christian Church of God, Belhar, Cape Town, I ask that God bless you.

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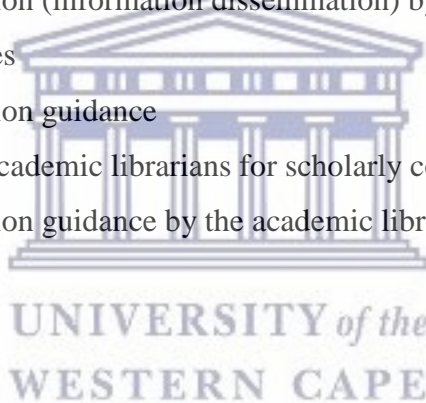
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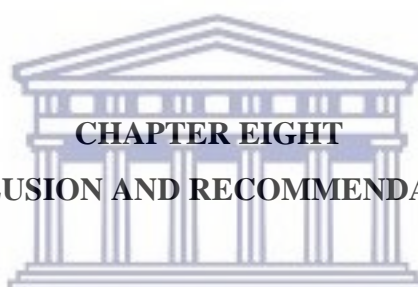


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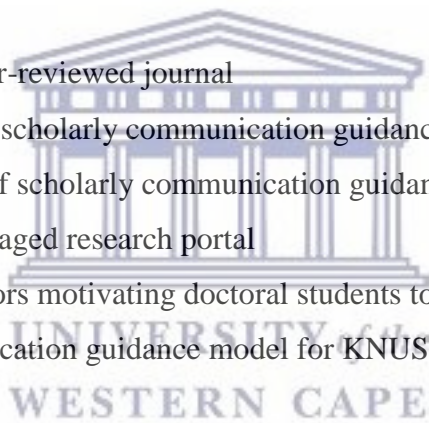
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LIST OF ACRONYMS & ABBREVIATIONS

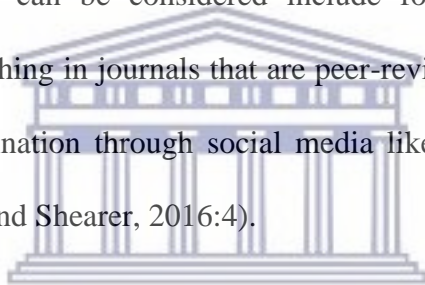
ACRL	Association of College and Research Libraries
DOAB	Directory of Open Access Books
DOAJ	Directory of Open Access Journals
DPP	Draft policy on publication
GHDRS	Guide for higher degree research supervision
ICT	Information Communication Technology
IFLA	International Federation of Library Associations and Institutions
IR	Institutional Repository
KNUST	Kwame Nkrumah University of Science and Technology
OA	Open Access
OpenDOAR	Directory of Open Access Repositories
PhD	Doctor of Philosophy
ROAR	Registry of Open Access Repositories
SCG	Scholarly communication guidance
SPSS	Statistical Package for the Social Sciences
UITS	University Information Technology Services
UWC	University of the Western Cape
WIPO	The World Intellectual Property Organisation

CHAPTER ONE

INTRODUCTION

1 INTRODUCTION

Scholarly communication is defined as “the creation, transformation, dissemination, and preservation of knowledge related to teaching, research, and scholarly endeavours” (Sauer, 2009:52). The Association of College & Research Libraries (ACRL) (2003) defined scholarly communication as “the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use”. A number of measures that can be considered include formal and informal ways of communication such as publishing in journals that are peer-reviewed and electronic listservs. Other approaches are dissemination through social media like blogs, tweets or WhatsApp (Schmidt, Calarco, Kutchma and Shearer, 2016:4).



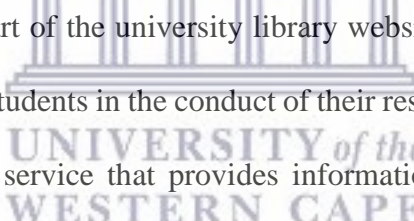
Some authors (Association of College & Research Libraries, 2003; Guru, Gopalswamy, Gandhi & Raghavendra, 2010 and Radom, Feltner-Reichert & Stringer-Stanback, 2012:19) consider scholarly communication issues in terms of the rights of authors, economics of scholarly resources, publishing models like open access and institutional repositories, and intellectual rights that must be preserved.

Guidance has been explained by Singh (2018:46) as a total program of a number of highly specialised activities implemented to help individuals make wise, intelligent choices and decisions. The definition for scholarly communication guidance was not found in literature but combining the explanations for scholarly communication and guidance, it can be explained

as providing training on issues regarding research dissemination, copyright, data sharing, citation techniques, meeting funder's requirements, author requirements and many more.

1.1 BACKGROUND AND MOTIVATION

The changing methods and modes of communication due to technological developments in the 21st century are consequently influencing academic libraries to adapt services to keep parity with technological changes and user expectations. Additionally, there are some graduate programmes that are offered partially or fully online but whose students have peculiar research needs that the academic library has to address. Many of such students do not normally come to the university campus to access library services and training programmes offered by the academic library (Bussell, Hagman & Guder, 2017:978).

The logo of the University of the Western Cape is centered in the background of the text. It features a classical building facade with a pediment and columns, rendered in a light blue color. Below the building, the text "UNIVERSITY of the WESTERN CAPE" is written in a serif font, with "UNIVERSITY" and "WESTERN CAPE" in all caps and "of the" in lowercase.

Having a research portal as part of the university library website would enable the academic library to assist such doctoral students in the conduct of their research. Barman (2014) defined a portal as a website or web service that provides information content to serve a specific community. To him, a library portal is a subset of web portals which is designed for a particular academic community. It is seen as a gateway to the resources of the institution because it normally provides a list as well as creates a link to the interface of all the resources.

Mane and Pange (2016:312), posit that portal technology is a recent innovation which plays an important role in knowledge management as well as in the education sector. They are of the view that a library portal service is one of the prime functions of all libraries and information centres in this digital era. Collaboration and personalization are the unique features of an effective library portal.

Fleming-May and Yuro (2009:200) consider PhD students as future faculty members of academic institutions. This assertion indicates that it is incumbent for academic libraries to assist them through the provision of effective and efficient library services for them to appreciate and access such services while they are students. This can result in their continuous use of the library's resources when they become members of the faculty and also encourage their students to use the library.

The core duties of an academic library is to support teaching, learning and research of its parent institution. For an academic library to effectively provide scholarly communication guidance to doctoral students, their research skills, the information resources needed to satisfy their information needs and the various ways through which their research findings can be disseminated must be determined. Scholarly communication guidance to be offered by an academic library, according to Thomas (2013), can be divided into outreach, educational and services related to hosting and managing digital content. Outreach and educational services include guidance on authors' rights and copyright. Hosting and managing digital content involves providing an institutional repository, data management and digitization services.

An effective scholarly communication guidance is capable of increasing the web visibility of scholars and academic institutions as well as heighten their competitiveness. When publications of an institution are accessed easily on the World Wide Web, it increases their visibility and thereby attracts collaborations from other parts of the world. A paper which is deposited in an institutional repository, enhances its accessibility and citing by other scholars. Scholarly communication guidance can also resolve some of the issues associated with academic research such as ownership of ideas and discoveries (Ebrahim, Salehi, Embi, Tanha, Gholizadeh, & Motahar, 2014:121; Oladokun, 2015:48 & Rao, 2009:392).

Institutional repositories, a strong auxiliary of scholarly communication has been observed by Oladokun (2015:48), as a recent channel for universities to contribute to literature in the world at large. Rao (2009:393) is of the view that universities and those who provide research funds can benefit from their researchers' increased impact.

Scholarly communication guidance can also imbibe into its recipients, the will and capabilities of adopting open access channels of scholarly communication. With open access, the world is brought together in research activities and also provides opportunities for authors to be globally recognised and access each other's works (Rao, 2009:392-393).

At Kwame Nkrumah University of Science and Technology (KNUST), the degree of Doctor of Philosophy (PhD) is awarded on the basis of a research programme in which a candidate has produced an original and significant contribution to knowledge (School of Graduate Studies, Entry Requirements and General Regulations for Graduate Programmes, n.d.:4). For a research work to be known and retrieved by the expected recipients or the general public, there has to be some form of dissemination. Vaughn, Jacoby, Williams, Guerra, Thomas and Richmond (2013:30) are of the view that a research study is not complete until it has been disseminated. According to them, in academia, professional presentations and peer-review articles are the major methods by which research is disseminated but equally important, however, is the dissemination of findings to the people and communities who participated in the research.

This research was therefore undertaken at KNUST, a public university in Kumasi, Ghana to ascertain how scholar communication guidance should be provided to doctoral students by the academic library.

1.2 DESCRIPTION OF THE KNUST LIBRARY SYSTEM

The KNUST library system consists of the main university library and six college libraries. There are also libraries in some departments and research centres (Kwame Nkrumah University of Science and Technology Library. Strategic Plan 2005:1). The library subscribes to over fifty (50) academic databases containing 30,000 online journals and more than 100,000,000 full text documents, bibliographic information, abstracts and book reviews (Kwame Nkrumah University of Science and Technology. Facts and Figures 2015:49). It also hosts the Open Access Institutional Repository, KNUSTSpace (Kwame Nkrumah University of Science and Technology Library. Research Report, 2015:126).

The overall director for the management of the university library system is the University Librarian. “The role of the KNUST Library system is to select and acquire resources to build a comprehensive collection reflecting the goals and objectives of the university. Secondly, the KNUST Library System assists users in meeting their information needs. The KNUST Library system also organizes, preserves and makes available relevant texts and documents that would support the teaching, learning and research in science and technology for national development” (KNUST Research Report, 2015:126). According to the KNUST Library Research Report (2015:126), the library is a depository Library for all materials published in Ghana and also for international institutions and organization like the World Bank and other United Nations Agencies. The KNUST Library formally commenced computerisation in June 2009 (Lamprey, 2010:94). KNUST hosts and manage the Open Access Institutional Repository (KNUSTSpace) in Ghana (KNUST Library Research Report, 2015:126). Lamprey (2010:96) reported that KNUSTSpace was introduced in February 2009. Its establishment was supported by the Association of African Universities who donated a server and a scanner to the library to set up the platform.

Within the KNUST library system, trainings and guidance activities to support research of postgraduate students are organised by the academic support department of the main library and some college libraries. They are generally focussed on guiding students to search for relevant information for their research study. Thus, trainings to enable them assess online databases subscribed to by the library, in the use of plagiarism detectors to avoid plagiarism and on the use of the reference management software Mendeley.

These trainings are organised through face-to-face workshops and seminars either within the main library building or various venues in the colleges. Ralph (2010) found that although students acknowledged such workshops to be very helpful, they desired that some of the information should be presented earlier in their research study while others wished such information should be presented later in their study so they do not forget. These issues call for the need for an online platform for users to access training materials and programmes as and when needed. Although the KNUST library system has an official website, the library has not adopted the use of the academic library website and other online technologies such as research portal, through which presentations from workshops and other trainings could be accessed anytime. Doctoral students who are mostly not on the university campus and may not be able to patronise face-to-face workshops regularly need such technologies to be effectively equipped for scholarly communication guidance.

1.3 PROBLEM STATEMENT

Literature has shown extensive research conducted on scholarly communication and academic library services around the world. These include *scholarly communication outreach and education by the academic library to faculty* (Bazeley, Waller & Resnis, 2014; Duncan, Clement & Rozum, 2013; Klain-Gabbay & Shoham, 2016; Malenfant, 2015 and Swoger, Brainard & Hoffman, 2015) *advocacies on early publishing by doctoral students* (Bartkowski, Deem, & Ellison, 2015; Horta & Santos, 2016; Larivière, 2012; Pickering & Byrne, 2014:536 and Pinheiro, Melkers, & Youtie, 2014) *alternative scholarly communication channels and scholarly communication practices by faculty* (Dawson, 2014; McGrath, 2016:7 and Rao, 2009:392-393). The literature did not discuss scholarly communication outreach and education by the academic library to doctoral students who are supposed to conduct original research per requirements for doctoral degrees. Secondly, although some of the literature discussed the advantages of early publishing by doctoral students, the necessary guidance needed to equip them to acquire scholarly communication skills is missing. Thus, there is a gap in literature about discussions on scholarly communication guidance as a core service of academic libraries to doctoral students. This deficit and gap in literature cuts across the world at large and especially Ghana. Thirdly, at KNUST, doctoral students must show evidence of submission of at least two manuscripts from their thesis for publication in a peer-reviewed journal as part of graduation requirements (Graduate Students' Handbook, 2017:19). There is also an assumption that supervisors will normally mentor doctoral students to publish results from their research study which may not always be the case. The academic library, with its core mandate to support teaching, learning and research of its parent institution, for that matter, has to assist in instilling the necessary skills for scholarly communication in their doctoral users. This study therefore sought to investigate scholarly communication guidance as a core service by the

academic library to doctoral students; research and scholarly communication skills of doctoral students for scholarly communication and effective dissemination of research findings by doctoral students for national development.

Lastly, Ralph (2010) found that although students acknowledged that workshops are very helpful, some of the information are either presented too early or too late in their research study. With this background, this study also explored the need for adopting an online technology such as a research portal as part of the academic library website for scholarly communication guidance to doctoral students using KNUST as the case study.

The Doctoral degree being the highest academic degree awarded by universities mostly involves conducting research to address local, national and international issues. There is a need for universities to encourage students to carry out research, support them and eventually champion their research contributions to a wider society. A core function of academic libraries is to render an effective service to enhance and support research at universities – in particular to doctoral students and academics. In view of these required services, it is essential for the academic library to address doctoral students' research and scholarly communication needs and skills as well as how research findings must be disseminated.

1.4 RESEARCH QUESTIONS

This study addressed the following research questions:

1. What is the research behaviour of doctoral students at KNUST?
 - a. What are their research and scholarly communication needs?
 - b. What skills do they possess for scholarly communication?

- c. What are the systems, sources and library services needed by doctoral students for effective scholarly communication?
2. What has been the research output by doctoral students in the KNUST institutional repository (KNUSTSpace) since it was established?
3. How can the university library establish an effective scholarly communication guidance program for doctoral students at KNUST?
4. How will a research portal for the KNUST library strengthen research output by doctoral students?
5. What are the important features of a research portal?

1.5 OBJECTIVES OF THE STUDY

The main objective of the study was to investigate scholarly communication guidance for doctoral students as a core service of the academic library, which will serve as an educational platform for academic librarians, doctoral students and faculty members. The specific objectives of this research were to:

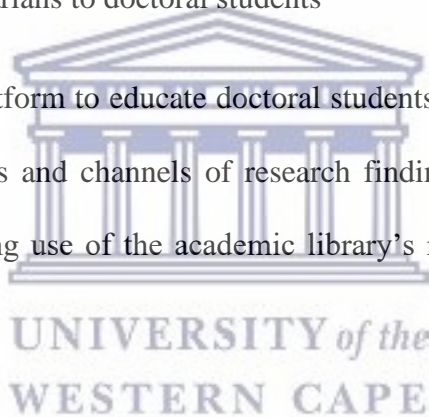
- supply academic librarians with insight into the research and scholarly communication needs, research skills and research dissemination by doctoral students with KNUST as a case study
- provide guidelines for the provision of scholarly communication guidance to doctoral students by the academic library
- provide guidelines and contents needed for the design of a research portal as part of the academic library website for scholarly communication guidance
- identify statistics of past research findings dissemination by doctoral students as reflected by the institutional repository

- serve as a platform to educate doctoral students at KNUST on the effective ways of research findings dissemination for national development.

1.6 SIGNIFICANCE OF THE STUDY

The study hope to give academic librarians insight and guidelines into the provision of an effective scholarly communication guidance to doctoral students. Thus, the study will supply information on the research and scholarly communication skills of doctoral students for decisions to be made on tailor-made guidance for them. The study will also provide information on the contents and forms of scholarly communication guidance programmes to be delivered by academic librarians to doctoral students

The study also serves as a platform to educate doctoral students to be able to make informed decisions on the various ways and channels of research findings dissemination. Lastly, it outlines the benefits of making use of the academic library's research portal on the library website to enhance research.



This study believes that, because doctoral students are mandated to conduct original research for national development, the academic library, in collaboration with faculty and other stakeholders has to offer scholarly communication guidance to enable the university and the nation as whole achieve their objectives on research for national development.

1.7 RESEARCH DESIGN AND METHODOLOGY

1.7.1 Research design

The case study method of conducting research was used for the study. Baxter and Jack (2008:544) stated that a case study method ensures that the issue is not explored through one

lens, but rather through a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood.

“A case study is an approach through which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time through detailed, in-depth data collection involving multiple sources of information” (Creswell, 2013:98-99).

Lawal (2009:78) adds that case studies can utilise several different techniques to get the necessary information. KNUST was therefore used as the research site with specific focus on doctoral students, doctoral supervisors and professional librarians

1.7.2 Data collection instruments

The various data collection instruments and groups of participants from whom data was collected were:

- A bibliometric survey of the Institutional Repository (IR) to ascertain the research output of doctoral students at KNUST since 2010 (a year after the IR was introduced) to 2017.
- Policy documents such as the KNUST library strategic plan, basic statistics of KNUST, graduation list brochures from year 2010 to 2017, draft policy on publication and guide for higher degree research supervision.
- Web based questionnaires to doctoral students through contacts obtained from the University Information Technology Services (UITs).
- Web based questionnaires to supervisors of doctoral students via email addresses obtained from the KNUST staff directory and their departments to identify research and scholarly communication needs and skills of doctoral students. As well as effective ways of providing scholarly communication guidance to their doctoral students.

- Interview with the Dean of the School of Graduate Studies to identify research and scholarly communication needs
- Interview with the two Acting Deputy Librarians (representing the university librarian regarding scholarly communication guidance programme for doctoral students,
- Interview with the senior ICT Assistant regarding the development of a research portal as part of the academic library website and
- Interview with KNUST professional librarians to determine
 - current scholarly communication guidance practices
 - capabilities of academic librarians to provide scholarly communication guidance
 - effective ways of scholarly communication guidance for doctoral students.

Vezzosi (2009:68) is of the view that interviews are considered the best way to explore and understand participants' attitudes, views and perceptions. Interviews were recorded to ensure that all information is captured. Questionnaires were analysed using IBM Statistical Package for the Social Sciences (SPSS) version 21 and the qualitative data were analysed using AtlasTI version 7.

1.7.3 Population and sample method

Best and Khan (2007:13) defined population as “any group of individuals that have one or more characteristics in common that are of interest to the researcher. The population may be all the individuals of a particular type, or a more restricted part of the group”. The population for this study firstly comprised of all doctoral students who registered for the 2017/2018 academic year at KNUST, regardless of their year of enrolment. The population secondly comprised of all academics supervising currently enrolled doctoral students. The population for interviews included the university librarian and the senior ICT assistant of the KNUST Library system.

Professional librarians in the university library system were also interviewed. Alemna (2001:45) noted that the basic qualification that qualifies a librarian in Ghana to become a professional is graduate diploma in library science. The KNUST library system as at February 2018 had 17 professional librarians holding Master of Arts, Master of Philosophy and PhD qualifications in Library or Information Science. They normally head departments or units of the library system.

1.8 DELIMITATIONS AND LIMITATIONS OF THE STUDY

A delimitation of the study was that only doctoral students were included and no other KNUST library users such as undergraduates and masters students. Additionally the KNUST library cannot claim to represent all the academic libraries of Ghana, therefore conclusions drawn might not be applicable to some of the university libraries in other universities. A limitation of the study was the relatively low response rates therefore no generalization was made.

1.9 ETHICS STATEMENT

The researcher maintained ethical guidelines governing research policies from the Higher Degrees Committee of the University of Western Cape. The rights and privacy of participants and all parties involved in the study were duly kept and respected. The research participation was voluntary, confidential and anonymous. Official consent to embark on the study was gained from both the University of the Western Cape (UWC) and KNUST. The ethical approval at UWC was received from the Humanities and Social Science Research Ethics Committee.

At KNUST, the permission to administer questionnaire to doctoral students was sought from the School of Graduate Studies of KNUST and the Deputy Registrar (Academics), KNUST

through writing (Appendix B). Another permission was also received from the University Registrar to help the researcher gain access to the supervisors of doctoral students through the Heads of departments (Appendix C). Participants were assured of anonymity and confidentiality through a consent form (Appendix E) and an information sheet (Appendix D). A statement to indicate anonymity and confidentiality of participants was added to the introductory letter attached to the web-based questionnaires.

1.10 DEFINITION OF CONCEPTS

1.10.1 Scholarly communication

Scholarly communication can be defined as

“the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals, and informal channels, such as electronic listservs” (ACRL, 2003).

The term “scholarly communication” describes the process of sharing and publishing research works and outcomes. This makes research available to a wider academic community and beyond (Gu & Widén-Wulff, 2011:763). They divided the scholarly communication process into three main stages: the communication in informal networks like social media, the initial public dissemination in conferences and preprints, and the formal publication of research in scientific journals.

1.10.2 Open access

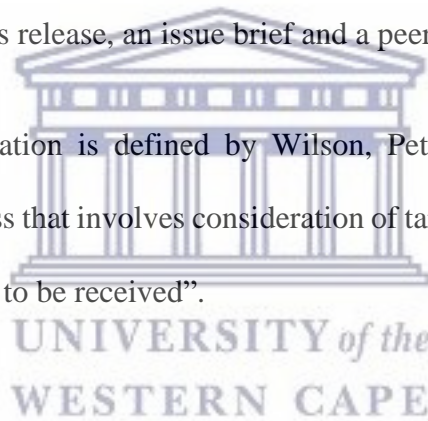
Open access in a broader sense indicates that research output, such as articles and research data, may be accessed and used without restrictions (Fecher & Wagner, 2016:1). According to Papin-Ramcharan and Dawe (2006), authors adopt open access by publishing in open access

journals and/or dropping copies of articles in open access archives or repositories, known as self-archiving. Access to this research is gained through the internet.

1.10.3 Research dissemination

Cook, Cook and Landrum (2013:164) explained dissemination as “planned, systematic efforts designed to make a program or innovation more widely available”. They outlined two aspects of dissemination as active and passive dissemination. Active dissemination refers to diffusion, knowledge utilization, and technology transfer while passive refers to making information available for potential users to locate and interpret. Tabak, Khoong, Chambers, Ross and Brownson (2012:338), posit that research findings dissemination happens when research is completed, in the form of press release, an issue brief and a peer-reviewed publication.

In clinical practice, dissemination is defined by Wilson, Petticrew, Calnan and Nazareth (2010:91) as a “planned process that involves consideration of target audiences and the settings in which research findings are to be received”.



1.10.4 Doctoral students

Tomaszewski (2012:443) described the Doctor of Philosophy degree as the highest academic degree awarded by universities. Most doctoral students in the United States need to take coursework, teach classes, pass qualifying exams, and conduct innovative research as well as submit and defend a dissertation based on original research (Tomaszewski, 2012 and Green & Macauley, 2007). Founded on the British model, the Australian doctoral system is established on student-tutor relationships and is largely based on research in which assessment is based on the doctoral dissertation (Green & Macauley, 2007:318). The structure of programme for doctoral studies at the University of Ghana includes a course work component, comprehensive examination, seminar component and a thesis component. The coursework aspect is designed

to make sure that students acquire academic and methodological training at the highest level with more practical and interactive training (School of Graduate Studies. Handbook for Doctoral Studies, 2014:16-20).

1.10.5 Research skills

Murdoch-Eaton, Drewery, Elton, Emmerson, Marshall, Smith, Stark and Whittle (2010:e153) divided research skill into four main skill areas: research methods, information gathering, critical analysis and review, and data processing. In the context of this study, research skill can be explained as the ability to identify the right research method for conducting a research, the ability to identify and access the right information needed for conducting the research, the ability to analyse data with the right tools and the ability to determine the effective ways of disseminating research findings.



1.11 CHAPTER OUTLINE

Chapter one outlines the essence of the study in the process highlighting the rationale behind the study and the KNUST library system.

Chapter two discusses and analyses relevant research-based studies found in the literature paying attention to research needs and skills of doctoral students, scholarly communication guidance by academic libraries and the possibility of developing a research portal.

Chapter three discusses existing scholarly communication framework and provides a framework developed to be used as a lens to interpret data.

Chapter four provides the research methodology and design adopted for the study.

Chapters five and six present data collected from web-based questionnaires, interviews, document analysis as well as a bibliometric survey.

Chapter seven presents interpretation of findings as underpinned by the literature and developed framework of scholarly communication guidance.

Chapter eight answers the research questions, draw conclusions, make recommendations, highlights future research and reveals as outcomes of the study, a model for scholarly communication guidance at KNUST.



CHAPTER TWO

LITERATURE REVIEW

2. INTRODUCTION

The aim of this chapter is to unearth views of scholars on scholarly communication guidance. The chapter seeks to identify connections, contradictions and gaps in the literature with reference to research and information needs of doctoral students, information behaviour and research skills of doctoral students; scholarly communication by doctoral students; innovative academic library services, scholarly communication guidance by the academic library, scholarly communication guidance by doctoral supervisors and the establishment of a research portal as part of a library website for scholarly communication.

2.1 OVERVIEW OF DOCTORAL STUDIES AND DOCTORAL STUDENTS

Kot and Hendel (2012:345) reports that doctoral education has gone through a lot of changes. According to them, it emerged at the universities of Paris and Bologna in the twelfth century and spread to other countries in Europe and subsequently to other countries around the world. In its beginnings, Universities in Europe such as France, Germany, Great Britain and Italy awarded doctoral degrees in subjects such as law, theology and medicine. Such qualification allowed a scholar to be made a full member of a guild.

Most doctoral students in the United States need to take coursework, teach classes, pass qualifying examinations, and conduct innovative research as well as submit and defend a dissertation based on original research. The North American doctoral model, identified as the taught doctorate, contains extensive taught components and research training. The taught

components are examined independently from the thesis. The length of the thesis is quite shorter than what pertains in the United Kingdom and Europe (Green & Macauley, 2007:318; Tomaszewski, 2012 and Louw & Muller, 2014:5). On the otherhand, the Australian doctoral which is founded on the British model system is established on student-tutor relationships and is predominantly research based, with assessment normally confined to the doctoral dissertation (Green & Macauley, 2007:318).

The doctoral degree, as pertains in Finland involves a thesis, seminars, course work and a public defence of the thesis. The degree is pursued within six to seven years with the thesis forming majority of the requirements for graduation.. Although doctoral education is funded, it is not automatic for students to get funding for the conduct of their doctoral studies. Various ways to fund doctoral studies are personal grants from private foundations, 4-year doctoral school positions funded by the Ministry of Education, university posts, and project funding (Stubb, Pyhältö & Lonka, 2012:442). Although Estonia is in Europe, their doctoral studies are quite different from that of Finland. The normal period for doctoral studies in Estonia is four years according to Leijen, Lepp and Remmik (2015:133). It consists of compulsory and optional coursework and research. A dissertation presented as a monograph or a collection of articles is presented at the completion of the doctoral studies. The requirements include one peer-reviewed article for a monograph and at least three peer-reviewed articles for a collection of papers.

The structure of the doctoral studies programme at the University of Ghana includes a course work component, comprehensive examination, seminar component and a thesis component. The coursework component is designed to ensure that students acquire academic and methodological training at the highest level including more practical and interactive training (School of Graduate Studies, Handbook for Doctoral Studies, 2014:16-20). At KNUST, the

degree of Doctor of Philosophy (PhD) is awarded on the basis of a research programme in which a candidate has produced an original and significant contribution to knowledge (School of Graduate Studies, Entry Requirements and General Regulations for Graduate Programmes, n.d.:4).

A Doctoral Students' Professional Identity Questionnaire was used by Kovalcikiene and Buksnyte-Marmiene (2015:2693) to measure the professional identity of doctoral students in Lithuania. The instrument presents three professional roles of a doctoral student, Thus the role of a teacher, researcher, and a practitioner or service provider - for example, a psychologist. Doctoral students' perception of themselves in these three roles are measured by the instrument. The results revealed that the practitioner's professional role identity of doctoral students was slightly prominent compared to the researcher's professional role identity. Factors that motivate students to pursue doctoral degrees according to Wiegerová (2016:126) include: "the development of their own education, the possibility of a professional career, obtaining a job, employment and a reasonable salary".

In the view of Kovalcikiene and Buksnyte-Marmiene (2015:2693) as well as Miller, Hums, Turner and Heere (2016:533) doctoral education presents a unique opportunity for independent scientific research. It is also a way of developing future experts to participate in the growth of various economies. This will in turn make them professional researchers and independent scholars. Thus, the research doctorate, generally known as PhD is regarded as representing the apex of scholarship.

Green and Macauley (2007:319) discussed doctoral students in the United States and Australia and how they deal with information. The study revealed that the profiles of American and Australian doctoral students, especially those pursuing a doctorate in education, are markedly

similar. Doctoral candidates in Australia and the United States according to them are generally of mature-age, and the average age ranges from the mid-30s to mid-40s.

In Europe, a study by Pyhältö, Toom, Stubb and Lonka (2012:3) gave the mean age of doctoral students as 41 years and the median as 39.5 years. Their study was conducted at University of Helsinki, Finland in the faculties of Arts, Medicine and Behavioural Sciences to explore the challenges of doctoral students during their studies.

The mean age of African doctoral students pursuing their degrees in Africa as presented by Stackhouse and Harle (2014:178) is 37.4 years while that of their European counterparts is 31.8 years. Mouton (2016) on the other hand gave the average age of doctoral students in South Africa at enrolment as 39 years.

A study by Mazerolle, Bowman and Klossner (2015: 227) on doctoral students' perceptions of mentorship in America, reflects a higher response rate of female (19) than male (9) doctoral students. Their average age of 28 years is younger than the ages for American students as reported by Green and Macauley (2007) and those reported in Europe and Africa.

Fry, Tress and Tress (2005) assert that the proportion of female doctoral students is increasing in most subject areas. According to them, in Scandinavia, for example, 50% of all doctoral students are females. They reported that many females are now being recruited to pursue doctoral studies but are still yet to make a lot of contribution in areas such as physics, engineering and computing.

2.2 RESEARCH NEEDS OF DOCTORAL STUDENTS

According to Catalano (2013:260), doctoral students encounter a lot educational experiences (conferences, courses, workshops, recommended readings) through which they are able to

identify gaps in research in areas that are of interest to them. This normally results in a need for information. Green and Macauley (2007:317) submit that recognition of the unique information needs and behaviours of postgraduates has influenced a shift toward a view of the doctoral learner at the centre and information instruction with pedagogically appropriate foundations. They are of the view that doctoral students engage with information as part of a meta-scheme for individualized learning processes and outcomes.

In view of this, Iwara (2015:78) submits that the library would be able to provide the needed services required by doctoral students if their information needs and sources of information are well understood. Bussell, Hagman and Guder (2017:978) identified these needs to include choosing effective keywords which to them, is a foundational skill to advanced skills like finding and analysing data and research findings dissemination.

Information needs of graduate students are mostly different from that of undergraduates. Their information needs are more sophisticated and complex and therefore specific information needs are determined by the user or user group (Catalano, 2013:243 and Iwara, 2015:79). Pinto, Fernández-Ramos, Sánchez and Meneses (2013:146) posit that knowing the specific information needs of doctoral students will guide the library in the delivery of tailor-made information literacy programmes.

In addition to the above, Pinto et al (2013:144) are of the view that information competence is another information need of doctoral students. In their view, information competence is the ability, skills and knowledge of analysing, synthesizing, evaluating, using and disseminating information to effectively address information needs. Information literacy is born out of such

views for users to be equipped not only to recognize their need for information, but to also understand it, evaluate it, and make use of it.

Becker and Chiware (2015:614) sought to analyse the relationship between postgraduate students' information needs and the library's holdings by analysing citations used in masters' theses and doctoral dissertations. The authors adopted a quantitative approach and the use of the bibliometric technique of citation analysis to evaluate references in masters' theses and doctoral dissertations in the Faculty of Engineering at Cape Peninsula University of Technology, South Africa. The theses and dissertations evaluated were drawn from the Institutional Repository. The findings indicated that journals were the mostly used resource, followed by books and other categories such as conference proceedings and online resources. This helped the authors in determining the research information needs of their study population.

Johnson, Kuglitsch and Bresnahan (2015) employed participatory and service design methods to identify emerging research needs and existing perceptions of library services among science and engineering faculty, post-graduate, and graduate student researchers based at a satellite campus at the University of Colorado Boulder in the United States. The authors define participatory design as

“an approach to building spaces, services, and tools where the people who will use those facilities participate centrally in coming up with concepts and then designing the actual products”.

The research participants included six graduate students and six faculty and post-graduate researchers. Research and information needs identified in their study are listed as:

“Knowing what experiments have already been done and which have failed;
Understanding how to analyse data; Keeping up with the literature; Finding a research

question and knowing which methods to use to answer it; Library spaces for convenient access to workshops, group work, browsing collections, and promotion of library services/resources; Dedicated email, phone, and in-person support from librarians; Workshops/tutorials/seminars on skills/tools useful for research and Easier electronic access to journal article.

2.3 INFORMATION BEHAVIOUR AND RESEARCH SKILLS OF DOCTORAL STUDENTS

One factor that drives people to information seeking is information needs stemming from a vague awareness of something missing, which culminates in locating information that contributes to understanding and meaning. Information being a requirement for studying also drives people to start seeking (Ikoja-Odongo & Mostert 2006:147 and Madukoma & Opeke 2013:2). Variables for information seeking such as importance, urgency and complexity of a task situation have been outlined by Agarwal, Xu and Poo (2011:1090), Ikoja-Odongo and Mostert (2006:147) as well as Madukoma and Opeke (2013:2). Steinerová and Hřčková (2014:79) mentioned new types of information seeking to include knowledge discovery, exploratory searching, faceted searching and intelligent searching.

A study by Lee, Anderson and Burnett (2014:1) indicates that doctoral students rely on their colleagues and friends when seeking for information. They see them as important sources of information. The authors address this concern by interviewing six library and information science doctoral students at Florida State University and ascertained the types of peer relationships of these doctoral students as well as how they share information. Their study categorised the findings into special, collegial, and information peers using Kram and Isabella's (1985:119) continuum of peer relationships. Bøyum and Aabø (2015:187) confirmed Lee,

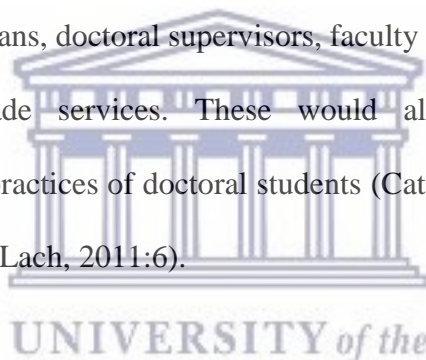
Anderson and Burnett (2014:1) by outlining two forms of information seeking. They are “formal information seeking” and “social information seeking”. Formal information seeking according to them refers to subject searches, citation searching, searching in library databases and using tools, such as alerts. Social information searching refers to recommendations from colleagues or information exchange. Catalano (2013:260) added that the interdisciplinary nature of doctoral studies can make doctoral students consult resources from both their areas of specialization as well as other subject areas. They also mostly consult sources recommended by their supervisors or advisors.

Wu and Chen (2014) argued that although graduate students value the use of library resources and databases, they prefer to use the Internet (Google Scholar in particular). A study that supports Wu and Chen’s assertion was done by Bøyum and Aabø (2015:194) at a Norwegian Business School. It was found that doctoral students used both library resources and Google Scholar. Catalano (2013:263) reported from other studies that doctoral students in the social sciences, arts and humanities preferred print resources and made more use of library resources than in other disciplines, whilst business and economics graduate students who seem to favour Internet resources, were apt to use electronic resources. However, Spezi (2016:84) is of the view that, “despite common assumptions of students’ overuse of Web search engines, library resources, such as the library homepage interface, A-Z journal/database lists or the catalogue, are still very much in use”.

Carpenter (2012:3) researched the research behaviour of Generation Y doctoral students. Generation Y students being students born in the 1980s and 1990s (Krahn & Galambos, 2014:94). Generation Y doctoral students according to Carpenter (2012:3) are sophisticated information-seekers who use information sources that are complex. They are also highly

competent and not afraid to use technology. To him, Generation Y doctoral students are very much aware of authority and authenticity issues in research. When asked what steps Generation Y doctoral students in the United Kingdom took when they needed an e-journal or print journal article that was not available in their institution, More than half said they order a copy through the inter-library lending services of their institution's and document supply service (Carpenter, 2012: 8). A quarter said they would search for what they need in another institution and 47% said they will ask a friend or colleague in another institution to get what they want for them.

It is very important to understand graduate students and their information seeking behaviours because it would equip Librarians, doctoral supervisors, faculty and even the administration to offer needed and tailor-made services. These would also help improve scholarly communication and research practices of doctoral students (Catalano, 2013:243 and Drachen, Larsen, Gullbekk, Westbye & Lach, 2011:6).



An exploratory study seeking to understand the ways in which humanities and social science doctoral students manage their personal information for their dissertation/PhD thesis at different stages of their doctoral programmes was conducted by Cushing and Dumbleton (2017:41). The aim was to inform the development of library services for doctoral students which according to the authors was not available in literature. The findings from this study suggest that academic librarians are capable of providing support to social science doctoral students and understanding their personal information needs at the different stages in their studies is necessary to provide the needed help.

Drisko and Evans (2018:198, 204) sought for the views of the PhD research faculty on the research preparation of entering or new doctoral social work students on a wide range of research knowledge and related skills. The PhD research faculty reported that the typical entering PhD student displayed “solid conceptual, ethics, and writing skills but lesser preparation for conducting quantitative and qualitative research, including methods related to understanding evidence-based practice. The findings also revealed that PhD students are good communicators, understand research ethics as indicated by Carpenter (2012:3), can conduct literature search and can develop good research questions. However, their data collection methods, research designs, and data analysis techniques were rated low. Specific quantitative and qualitative research methods as well as preparation for publication are some of the lowest rated items. Further lower ratings were identified in qualitative research methods in the areas of “understanding qualitative meta-synthesis, understanding maximum variation sampling and use of qualitative data analysis software”.

2.4 LIBRARY RESOURCES AND SYSTEMS NEEDED BY DOCTORAL STUDENTS

Continuous budget concerns especially reduction in library budgets has made it very important for librarians to provide services and systems that are of best value and of most benefit to users. It is necessary for the library to ascertain how, why, and under what circumstances clients use the available systems and services (Connaway, Lanclos & Hood, 2013: 289).

Tomaszewski (2012:442) conducted a study to identify the information and library services needs of doctoral students and postdoctoral scholars in the sciences at Georgia State University, Atlanta. A total of 119 doctoral students and eleven postdoctoral scholars completed the survey. The study revealed that the most frequent response to popular resources used by doctoral students and postdoctoral scholars were journals (106 respondents), databases (87

respondents), books (66 respondents), and interlibrary loan (60 respondents), while the least popular resources were the library blog (zero respondents), subject librarian (two respondents), reference desk (two respondents), research guides (five respondents), and library computers (thirteen respondents). The study revealed that library marketing through online and face-to-face means was very necessary for this category of library users. He recommended that science librarians should consider using social networking channels such as facebook, linkedin, and text messaging for such marketing.

The study also revealed that databases and software used by scientists were primarily those that fell within their subject area of study. Sixty-nine percent of Computer Science respondents used ACM Digital Archive and 61% used IEEE *Xplore*. Eighty percent of Physics and Astronomy respondents used Astrophysics Data System and 64% used arXiv. Only Mathematics and Statistics respondents used MathSciNet. Similarly, only Chemistry respondents used Reaxys and ChemSketch. In addition, 64% of Chemistry respondents used SciFinder Scholar and 70% used U.S. Patent and Trademark Office. Thirty percent of Biology respondents used Biological Abstracts and 32% used PubMed. Only Psychology respondents used Sociological Abstracts. In addition, 70% of Psychology respondents used the Statistical Package for the Social Sciences (SPSS), 45% used EBSCO*host* databases, and 43% use JSTOR. Only Geoscience students used GeoBase.

Spezi (2016:84) encourages university libraries to use their databases effectively for sharing and expanding knowledge of best practices in the conduct of research. He concludes that as far as library resources are concerned, users prefer electronic and full-text offerings.

Carpenter (2012:15) asserts that “doctoral students’ dependence on secondary resources is a signal of a real shift away from doctoral research based on primary sources compared to a decade ago”. According to him, doctoral students depend so much on secondary published

research. Furthermore, a few doctoral students in social sciences, arts and humanities use ‘primary’ materials such as newspapers, archival material, images, artefacts or social data. However, with the sciences he indicated that a few doctoral students depend on large datasets (not specifically linked to pre-published research).

The Cornell University Library and Columbia University Libraries in the United States of America conducted a joint study of humanities doctoral students' research and library needs. Data collection methods included one-on-one interviews, telephone interviews and focus group interviews. This was followed by the distribution of questionnaires. The study was conducted to investigate the needs of their institutions’ doctoral students in the humanities and determine whether the library can influence students’ success. A total of seventy-two (72) doctoral students participated in the study. Gessner, Jaggars, Rutner and Tancheva (2011) reporting on this joint study indicated high use of the library among by doctoral students and an overall satisfaction with the services and resources of the library. Eighty eight percent of participants reported being satisfied or very satisfied with library services and library collections. Most interviewees cited the strength of library collections as one of the reasons they chose these higher education institutions’ doctoral programs. Many noted they were able to find anything they needed, either locally or via a resource-sharing option.

Doctoral students in a study by Carpenter (2012:14) were asked to indicate their levels of satisfaction with the facilities and services available to them. They were in general satisfied with access to institutional library services and interlibrary loan services. However, satisfaction was less in areas such as trainings, subscriptions to e-journals, and institutional access agreements with other academic institutions.

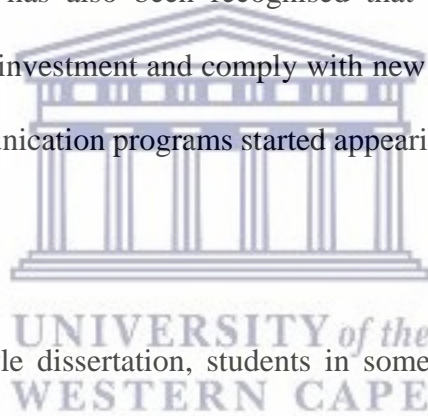
Kannan, Basha and Dhamdhere (2016:5-12) conducted a study to assess the satisfaction of research scholars at the central library of the Manonmaniam Sundaranar University, India. Questionnaires were distributed randomly to a total of 115 selected research scholars. Ninety-three questionnaires were received resulting in a response rate of 80.87%. A survey method was adopted to find customer's needs and problems in order to improve the services and products of the library. Users were highly satisfied with the provision of e-theses/dissertations (DSpace), followed by e-journals, print theses/dissertations, printed books and lastly print journals.

2.5 SCHOLARLY COMMUNICATION

There is no one common definition of scholarly communication. It has been described as a series of activities surrounding “the creation, transformation, dissemination and preservation of knowledge related to teaching, research and scholarly endeavours” (Myers, 2016:13).

In the view of Mulligan (2015:2) as well as Park and Shim (2011:76), scholarly communication is the process of producing, evaluating, disseminating, and preserving the research findings of scholars and scientists shared with academic communities and other interested parties. It consists of four functions: “registration, archiving, certification and awareness. The registration function is reflected in publishing, intellectual property, and licensing services. The archiving function is reflected in digitization and repository services. The certification function is reflected in expert review and research support services. The awareness function is reflected in knowledge-sharing-platforms and search aid services”. The operation of the scholarly communication system is the “bedrock” of academic information literacy and forms the “sociocultural frame of reference” for understanding library research skills (Mooney, 2016:212).

Authors such as Howard (2008:A8), Swoger, Brainard and Hoffman (2015:2) and Thomas (2013:167) posit that technology has made a very huge impact on the conduct, publishing, accessing, and promotion of research; archiving of data; and scholarly communication among scholars. They are of the view that scholars have been largely influenced by attitudes towards free access to information. Thus, mandatory requirements for research funding recipients to digitally disseminate their findings have affected decisions about where to publish. The digital world has again impacted some traditional scholarly processes such as peer review and journal impact factors resulting in the re-examination of such processes. Another issue that has also presented its own challenges in their view is the increased involvement of students in faculty research and publishing. It has also been recognised that universities now have to be accountable, make returns on investment and comply with new regulations. Their researches revealed that scholarly communication programs started appearing in libraries to address these issues.

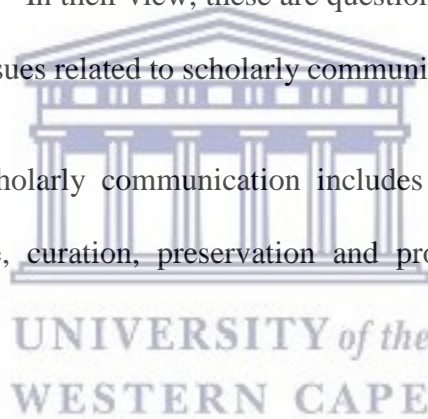


In addition to monograph-style dissertation, students in some countries are encouraged to publish articles, others are also expected to only focus on the production of a thesis or article-based dissertation which can also lead to multiple publications (Marisano, Winstanley, Morojele & Babor, 2017:89). Some students must also produce dissertations that are based on published articles (possibly with multiple authors). Odendaal and Frick (2018:1) assert that the dissemination of PhD research is important, both as a means of growing a research career and as an ethical imperative for researchers who use public money to conduct their research. To them, the conventional monograph ‘only rarely, and certainly not compulsorily’, contains published work. They explained that the publication based thesis, a thesis where the bulk of chapters are formatted as journal articles, can be considered a remedy for this problem. The publication based thesis may encourage dissemination but in most institutions, it is now being

considered - particularly in South Africa. Their findings indicated that unpublished monographs accounted for 41.22% and published 'publication based thesis' for 26.86% of the sample. Monographs where material has been published and publication based thesis with no publications, account for 20.39% and 11.52% of the sample respectively. They concluded that these unique findings are a result of institutional policy directives aimed at addressing the specific social environment of the country.

Some of the questions that come to mind when scholarly communication is mentioned have been outlined by Warren and Duckett (2010:352): "Who creates the information and for what audience? How is the information packaged and distributed? Which technologies and tools are used to discover and access it?" In their view, these are questions that must be considered and addressed when it comes to issues related to scholarly communication.

Another evolving area in scholarly communication includes all aspects of research data management, namely storage, curation, preservation and provision for continued access (Delaney & Bates, 2015:43).



In academic research, scholars need to know what has been discovered so they can draw on the conclusions and recommendations of such works to improve upon theirs. In a similar way, funders want previous studies to be known and accessed by others, as well as ascertain whether their monies have been spent very well. Likewise, policymakers can use the findings to improve services and create better environment in their communities (McGrath, 2016:3). Such findings in the views of Asamoah-Hassan (2010:420) and Resnick (2014: S1) are quickly shared through presentations, publications as well as in the form of drawings, audio and video recordings.

Published reports, journal articles, book chapters, websites, conference papers, monographs, poster sessions, social media, video clips, brochures and blogs have also been outlined as various forms of scholarly communication (Borrego, 2016:133; McGrath, 2016:3; Puschmann, 2014:91 and Zhang, 2014:6). McGrath (2016:4) is of the view that research reports particularly those with clear brief summaries are very useful to funders; researchers also search for research reports, journal articles, book chapters and conference papers, especially if these are available electronically and free of charge. Practitioners and policymakers find brief papers, research reports and professional journals most helpful.

Apart from the above notable channels for scholarly communication, social media such as linkedin, facebook, twitter and tumblr have also been identified by McGrath (2016:7). It is noted by Priem, Piwowar and Hemminger (2012) that these forms of communication “are beginning to affect the research workflow because growing numbers of scholars discuss and share research literature on Twitter, organize it in social reference managers like Mendeley and Zotero, and review it in blogs, article comments, and post-publication peer review services like Faculty of 1000”. In the view of Puschmann (2014:91), these articles from journals and conference papers as well as scholarly monographs are published online most times rather than in print. They are also disseminated through various channels including social media. When it comes to using social media as a form of scholarly communication, Carpenter (2012:16) differs from these authors. He is of the view that in as much as social media presents a good option for scholarly communication; it may not be beneficial as far as the research status of doctoral students is concerned. He adds that “greater sharing and openness, and collaboration outside of an institutional research group challenge the accepted working practices in the current doctoral models”.

2.6 SCHOLARLY COMMUNICATION (INFORMATION DISSEMINATION) BY DOCTORAL STUDENTS

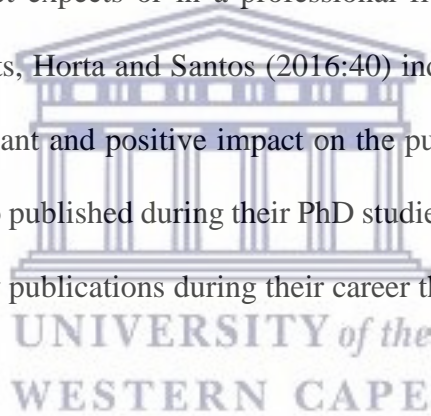
It is natural for doctoral students to consider how they might share the fruits of their labour to a wider academic readership (Lioy, 2013:265). This is because research results not published, diminishes the types of specialised knowledge sharing and dialogue that can take a discipline forward (Kamler, 2008:283).

Aitchison, Kamler and Lee (2010:1) affirm the need for doctoral work to be disseminated. The reason for this assertion is that there is great interest and innovation in higher degree research processes and practices, as universities seek to respond to local, national and international challenges. It therefore implies that with increased competition globally, universities are mandated to be accountable as governments and research funders from industry expect to receive good returns for their investment. Bender and Windsor (2010:147) argue that doctoral students who publish, “offer recent practice experience and advanced methodological training- contributions valuable to research projects and knowledge base”. They are of the view that early publishing prepare students adequately to enter academic and research positions as well as boost their networks and resources. They will thus graduate with skills and experience needed to face the demands and expectations in academia.

Dinham and Scott (2001:49) reported on the experience of disseminating as the result of doctoral research. Although three doctoral students (2.2%) in their study indicated that their sole means of dissemination is placing their thesis in the library, 139 doctoral students (43%) had disseminated the findings of their doctoral work in some way. A number had used more than one avenue, or had more than one publication. The most popular means of dissemination was presentation at a conference (37%), publishing a journal article (36%), book chapter

(6.5%), book (5%), dissertation abstract (3.6%), newsletter article (1.4%) or electronically (1.4%).

Bender and Windsor (2010:147) and later Grant and Tomal (2015:183-191) believe that there are advantages of sharing one's work, therefore faculties working with doctoral students should teach candidates to engage in scholarly communication of their dissertation research through publications and presentations. Publishing in a journal and presenting the dissertation at conferences were outlined by Grant and Tomal (2015:183) as two ways of communicating research by doctoral students. Communicating research according to them is advantageous to graduates pursuing academic positions, furthering careers, gaining personal satisfaction, building reputations as subject experts or in a professional field. Supporting the issue of publishing by doctoral students, Horta and Santos (2016:40) indicated that publishing during doctoral studies had a significant and positive impact on the publication count. The findings indicated that participants who published during their PhD studies had 36 % more publications and 48 % more average yearly publications during their career than those who did not publish during the PhD studies.



Pickering and Byrne (2014:536) also support early publishing by adding that although publishing articles at any time certainly helps with employment, promotion, and obtaining grants, it is better to do it earlier. They perceive that publishing or presenting papers during doctoral studies increases their chances of securing permanent employment opportunities. They are also provided with rich and broader profiles within their research communities compared to only thesis production. It also removes some of the pressure on first completing a PhD and then attempting to publish, which to them can become much harder. Again, the timely publication of results is very necessary to prevent the research from being out-dated.

Meanwhile some studies do not support early publishing by doctoral students. A study by Hartley and Betts (2009) reported that 32 of 58 students (55%) had published papers before submitting their theses. These students all recommended that other students do the same, but contributed their successful publishing to significant support from their supervisors, cited to a greater extent their supervisors as co-authors, and co-published papers with their supervisors in journals with higher impact factors. However, the authors revealed that students who had published papers before submitting their theses took on average four months longer to complete their theses than those who had not done so. An analysis of documents of research degree programs and courses later by Kwan (2010:55) also indicated like Hartley and Betts that it is not so easy for doctoral students to publish. To him, it is very challenging for a new researcher who is intensively researching and writing his thesis to publish alongside, especially to make the publication relevant to the academic community globally.


Kwan (2010:63) investigated instruction in research publishing offered as part of doctoral programs in Hong Kong and reported that these instructions are given little attention. Related to this is the striking small number of publishing courses offered. Of all 155 doctoral courses offered, only six were publishing courses offered at one research and one teaching university. Three of these courses are run by English language units while the remaining three are offered by Science and IT departments exclusively for their own students. The view of this study is to have such programmes run by the academic library to cater for the scarcity of formal instruction in research publishing.

The study by Aitchison, Catterall, Ross and Burgin (2012:435) investigated the writing experiences of doctoral students and concluded that relatively little information about the teaching and learning practices of students and supervisors on doctoral writing is known. From

the above, the merits of disseminating research findings by doctoral students are clear but there are limited studies on how doctoral students go about it.

2.7 INSTITUTIONAL REPOSITORIES

Stanton and Liew (2012:2) define institutional repository and its role in the scholarly communication process “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”. It also preserves and makes digital collections accessible to other users both within and outside of an institution, with few or no barriers to access (Ezema, 2011:478 and Lee, Burnett, Vandegrift, Baeg & Morris, 2015). Institutional repositories according to Lee, Burnett, Vandegrift, Baeg and Morris (2015) are normally housed by university libraries.



“Historically, the first academic institutional repository projects, the ePrints archive at Southampton which was founded in 2001 and now internationally renowned as e-Prints Soton and the DSpace initiative at MIT in 2002 begun in parallel with the Open Access Initiative” (Cullen & Chawner, 2011:461).

A study by Davis and Connolly (2007) revealed non-use of the institutional repository at Cornell University, New York. They attributed this to negative perception on the part of faculty. These negative perceptions are “redundancy with other modes of disseminating information, the learning curve, confusion with copyright, fear of plagiarism and having one's work scooped, associating one's work with inconsistent quality, and concerns about whether posting a manuscript constitutes publishing". Watson (2007:225) confirms their findings. She conducted an author study using a structured open-ended interview at Cranfield University in

the United Kingdom. The study investigated authors' publishing behaviours, attitudes, concerns, and their awareness and use of their institutional repository known as Cranfield QUEprints. The findings suggest that despite a reasonable amount of advocacy, many authors had not heard of QUEprints and were not aware of its purpose. This is evident in the fact that only 43% said they knew what QUEprints was, although 57% had heard of QUEprints. These findings in her view, suggests that the fact that users have heard about an institutional repository does not correspond to their understanding of its use.

Cullen and Chawner (2011:461) report that the OpenDOAR database at the University of Nottingham attempts to list all repositories worldwide and recorded an enormous growth in the number of repositories from about 300 in the middle of 2006 to over 1800 by January 2011. Of these, 1508 (82%) are institutional repositories, compared with 219 (12%) disciplinary or cross-institutional subject repositories. The remaining 6% comprise of governmental and aggregating repositories (aggregating data from several repositories). Nearly three-quarters of institutional repositories are found in North America (24%) and Europe (45%), with Asia accounting for 17%, Australasia for 4%, South America 6%, and Africa 2%. These repositories hold a mix of journal articles, theses and dissertations, unpublished working papers, conference papers, books and book chapters as well as multi-media and other audio visual materials (Cullen & Chawner, 2011:461). As at February 2019, the official website of OpenDoar indicated that the list of all repositories in the world had grown to 3909.

Stanton and Liew (2012) studied New Zealand doctoral students' levels of awareness of open access and the concept of institutional repositories, publishing behaviour and perceptions of benefits and risks of open access publishing. They found low levels of awareness of the university repository. Archiving in an institutional repository according to the study is often

compulsory for doctoral students in New Zealand universities. They are of the view that student authors can disseminate their research to a wide audience through the institutional repositories especially if it is an open access type. Many institutions have adopted mandatory deposits to populate their repositories as well as create a sustainable, accessible collection of research outputs (Carpenter, 2012:13 and Stanton & Liew, 2012:3). The major concern of doctoral students about mandatory deposits focuses on rights issues. Some of the concerns raised bordered on “the ability to publish if a pre-print of an article or a thesis is already available in an institutional repository; confusion and concern over copyright and provenance and quality control, particularly the risk of copyright infringement or plagiarism” (Stanton & Liew, 2012:3).

Jaguszewski and Williams (2013:10-11) proposed the hiring of an institutional repository librarian or a digital repository manager managing all issues related to the implementation of an institutional repository. Such issues include the collection, organisation, preservation, and dissemination of scholarship and creative works of the university.

Institutional repositories have a dual role of providing access to scholarly content published elsewhere and more importantly being a first choice for publishing original content (Mitchell & Chu, 2014:15). Depositing one’s paper in an institutional repository is an alternative way of increasing a paper’s visibility. A commonly cited benefit of an institutional repository is increasing the visibility and citation impact of the institution’s scholarship (Ebrahim, Salehi, Embi, Tanha, Gholizadeh, & Motahar, 2014:121).

Focusing on student research in the institutional repository at Utah State University, Barandiaran, Rozum and Thoms (2014:546) revealed that the university’s Office of Research and Graduate Studies as well as the Merrill-Cazier Library recognized that the institutional

repository made student research highly visible. A collaborative effort was therefore undertaken to investigate the significance of emphasizing student research in the institutional repository in recruitment and retention. Their research showed that in 2013, out of the 283 United States repositories using the Bepress or DSspace platforms, 71% included undergraduate and graduate theses and dissertations. However, other research studies by students such as posters presentations were available in only 38% of these repositories. In contrast Utah State University's institutional repository actively solicits for student works resulting from research, posters and creative works.

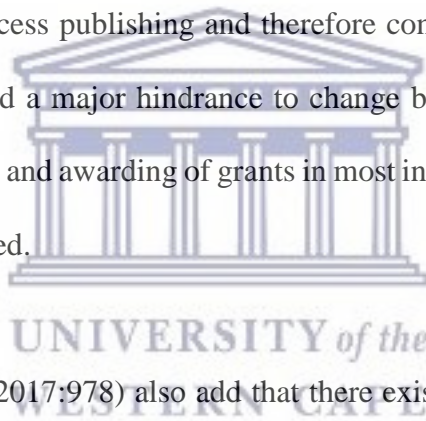
Bonilla-Calero (2014:46) asserts that an institutional repository could be used as a complementary method of evaluating the quantity and quality of research output from a university. She is of the view that although many experts use the Web of Science and Scopus databases to evaluate the research output, it is important to adopt other methods for such evaluation. To her, it is very important to adopt facilities and services with open access which can facilitate the visibility of documents (leading to more citations) while considering the primary goal of changing the publication habits of authors. Oladokun (2015:54) adds his voice by indicating that digital scholarly communication particularly those that focus on open access to scholarly peer reviewed journal articles such as an institutional repository has the potential to solve, or at least minimize the challenge of access to scholarly literature. The goal of an institutional repository has also been identified by Myers (2016:15) as a platform to create a collaborative partnership between faculty who create the scholarship and librarians who act as stewards, curators, and disseminators of that scholarship to a world-wide audience. McGrath (2016:4) asserts that, if a lot of data for a study, especially statistics or personal stories, lodging this (known as a dataset) in an archive allows other researchers to reuse the data and develop

upon the study. This step will create more knowledge, prolong the life of the study and provide much better value for the funders' investments.

Serrano-Vicente, Melero and Abadal (2016:595) conducted a study to determine the awareness of open access among the academic staff of a research-oriented Spanish university - their use of the institutional repository and satisfaction with its services. The study used an anonymous survey containing 37 questions. It was sent to all professors, researchers and doctoral students of the University of Navarra, Spain. Significant differences in opinions concerning open access journals and services of the repository were identified. Although the majority agreed on the need for open access, only half of the respondents adopted open access practices, which included the use of the institutional repository and other pages and academic platforms. The authors report that in as much as there is a good opinion of open access among researchers, it did not reflect in their use of the institutional repository. The study also revealed that although researchers are aware of the repository, they are unsure how to use it to disseminate their own research. The authors concluded that Bibliometric Service could be used to create awareness about the repository. They also identified the need for subject-specific training librarians to offer support. This could be replicated at KNUST as well. The study also ascertained that the mediated deposit service in which the library deposits materials into the repository on behalf of authors, could help remedy researchers' lack of time and lack of expertise.

2.8 SCHOLARLY COMMUNICATION GUIDANCE

The changing methods and modes of communication due to technological developments in the 21st century are consequently influencing academic libraries to adapt services to keep parity with technological changes and user expectations. Dempsey (2003:104) argues that the major service challenge that libraries are encountering now is how to develop a network presence and how to make services available to users at each point of their studies. MacGregor, Stranack & Willinsky (2014:165) also assert that scholarly communication through digital means has given rise to so many new “publishing strategies, models and tools over the last two decades”. In addition, Cullen and Chawner (2011:462) argue that academics have limited knowledge of the vast opportunities for open access publishing and therefore continue to publish in traditional venues. The authors identified a major hindrance to change because of the existing reward systems in tenure or promotion and awarding of grants in most institutions where the traditional publishing avenues are favoured.



Bussell, Hagman and Guder (2017:978) also add that there exists an assumptions on the part of faculty that many graduate students already know how to do research and therefore do not place emphasis on the acquisition of research skills by doctoral students during supervision. Common library instruction formats such as one-shot sessions and orientations are also often ineffective for graduate students and although librarians may work with graduate research methods classes, students often take these at the beginning of their time in graduate school long before they begin work on a dissertation or thesis.

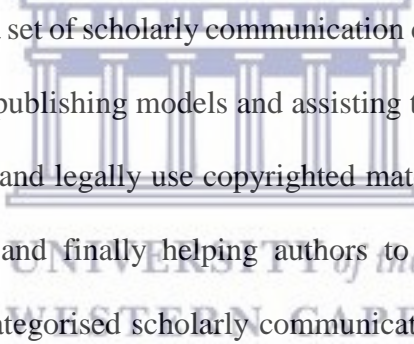
Scholarly communication guidance can include providing training on issues regarding copyright, data sharing, research dissemination, citation techniques, meeting funder’s

requirements and many more. Scholarly communication guidance required of an academic library may be generally divided between outreach, educational and those services to hosting and managing digital content. Outreach and educational services include guidance on authors' rights and copyright. Hosting and managing digital content involves providing an Institutional Repository, data management and digitization services (Thomas, 2013:168). Wright's (2013:3) study supports the issue of an outreach program as part of scholarly communication guidance. He views outreach as an essential job responsibility for the scholarly communication librarian particularly through digital materials and live presentations.

Thomas (2013:170) therefore outlined scholarly communication guidance core services to include open access, copyright and publishing agreements and research support. Open access services should include publishing models. Copyright and publishing agreements services should include assisting patrons to use copyrighted materials legally and to consult authors on their publishing agreements. The research support services should include training users to finding and evaluating open access resources as well as helping authors to comply with funding mandates. Thomas (2013:170) further states that research support can be offered to many categories of library users: from students who need resources to write their papers to faculty conducting a literature review for a grant.

The main intention of Thomas (2013:167) was to provide a wider context of scholarly communication activities across a variety of academic libraries. To do that, a survey of non-Association of Research Libraries was done. A questionnaire was administered to review relevant positions, library organizations, and the variety of scholarly communication services offered. The survey found that, for non-Association of Research Libraries, authors' rights education is still a significant activity. A total of 40 out of 60 respondents (68%) were engaged

in this kind of education across a variety of school types. There were 36 libraries that advise authors on how to make their research open access, and as might be expected, there is a high degree of overlap between schools offering both services. Only 32 libraries (53%) planned group events related to scholarly communications. Sample group events included recent presentations to faculty on journal publishing in open access and traditional publishers and open access week talks. Only 28 of 60 schools (47%) advised researchers on their data management plans, but 20 of these 28 also engaged in data management activities. Advising graduate students about electronic theses and dissertations took place at 29 schools; 10 other schools said this activity is done by another unit, most likely the graduate school or faculty advisors.



Thomas (2013:170) proposed a set of scholarly communication core services to include helping authors to understand various publishing models and assisting them to make their works open access; helping users to fairly and legally use copyrighted materials as well as guide them in their publishing agreements; and finally helping authors to comply with mandates from research funders. He earlier categorised scholarly communication services into outreach and educational activities and those services related to hosting and managing digital content. Thomas further suggests that initially, the core services should focus on outreach and educational objectives, since such activities could precede the technological infrastructure necessary for hosting and managing digital content.

Buehler and Zald (2013:215) report that libraries hosts several graduate seminars focusing on significant elements of scholarly communication. These elements include how to use citation management tools and addressing copyright, plagiarism, and scholarly communication issues. How to effectively design assignments to incorporate research-based learning in the classroom

are also included. Their study outlined that users must be able to identify publishing opportunities, the essentials of presenting a standard article to make it stand out, academic writing styles, the components of a manuscript, article submission and peer-review processes, options and tools for retaining key copyrights and the importance of open access to research. Graduate students were also made aware of factors which may influence whether a article would be published or not.

The contents of scholarly communication according to Gilman (2013:75) should become a popular part of the curriculum for academic institutions. According to Gilman at Pacific University, the library developed a course on scholarly publishing and collaborated with academic faculty to create a new academic minor in editing and publishing. This, according to him will prepare undergraduates to be more effective researchers, more successful in graduate work and to be effective contributing scholars within their respective disciplines. The contents of the course included: professional writing and editing; introduction to digital media; publication, editing and design; editing practicum; introduction to scholarly journal publication; book editing; design and production; and lastly literary magazine production.

2.9 CORE COMPETENCES OF ACADEMIC LIBRARIANS FOR SCHOLARLY COMMUNICATION GUIDANCE

In 2010, the ACRL identified scholarly communication as a top trend in academic librarianship, noting the following developments in librarianship: growth in open access/source products, growth of locally-created digital collections, increase in the complexity of licensing issues, and litigation involving use of course reserves. This calls for a set of competencies on the part of librarians to equip themselves in such matters. Thomas (2013:170) is in agreement that academic librarians need core competences. He posits that in order to assist authors in all issues

related to scholarly communication, the librarians themselves have to be familiar and conversant with the variety of publishing models and types of open access. This competency would include the librarian being able to deposit a permissible copy of a work into an appropriate repository. He further opines that copyright, publishing agreements and research support services must be a basic competency among librarians doing scholarly work.

It has been established in the literature that many institutions are creating or beefing up scholarly communication offices and programs or are hiring librarians with expertise in copyright and intellectual property. The need for academic librarians to educate themselves in scholarly communication topics to increase their knowledge and also gain confidence in handling such issues has also been established. Other basic competencies should include helping academics and scholars to handle copyright issues and how to effectively use institutional repositories (Howard, 2008:A8; Finlay, Tsou & Sugimoto, 2015:2 and Swoger, Brainard & Hoffman, 2015:6). The digital transformation of scholarly communication according to MacGregor, Stranack and Willinsky (2014:165) has also given rise to a wealth of new publishing strategies, models, and tools over the last two decades. In view of these transformations, this study believes that academic librarians definitely need a set of competencies for scholarly communication guidance.

This therefore implies that librarians must be fluent in the ‘language’ of scholarly communication and should be able to address its opportunities and challenges. This is because scholarly communication literacy has become a core competency for academic librarians (Bonn, 2014:132).

Swoger, Brainard and Hoffman (2015:15) identified the need to expand training and education for academic librarians. Their study revealed that some librarians felt unsure when talking with faculty about issues such as self-archiving and open access. Delane and Bates (2015:32) have indicated that as information professionals, academic library staff could act in a more entrepreneurial style and seek out ways to add value to their roles and show the impact of their work and to do so, they must go beyond the traditional parameters of the library. They need to respond more acutely to their users' needs and develop capabilities to build better profiles of their users. For example through continual needs analysis, they expand their metrics and change how they measure success. Academic libraries need to modify assessment from user satisfaction to meeting unarticulated needs.

2.10 SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY AND LIBRARIANS



Scholarly communication guidance has been identified in the literature as 'scholarly communication programs'. Scholarly communication guidance includes the provision of focussed information on how a specific discipline views open access, how authors typically share their work and effective ways to approach authors/creators to gain permission to use their work (Davis-Kahl, 2012:213).

A study by Washington-Hoagland, Clougherty, Walters, Barton Cheng, Forys, Lyles and Persson (2002:125) concluded on the lack of guidance for doctoral students. Their study revealed that graduate and professional students recognized the need for more assistance and instruction on using the library. Spiranec and Zorica (2012:4) revealed that doctoral students are newcomers to research and therefore need advice and training regarding terms and

processes in open access and institutional repositories from library staff. The development of an all rounded approach to educating and creating awareness around scholarly communication issues in the general library environment according to them will enhance the culture of sharing that will impact on the scholarly landscape in the future.

Tomaszewski (2012:444) is of the view that just because students are in a PhD program does not necessarily imply that they are experienced in handling information. Davis-Kahl (2012:214) advocates that scholarly communication guidance to doctoral students can be effectively embedded into information literacy training initiatives. Seminars focusing on writing, research and creating new knowledge, library exhibits, blogs, twitter accounts and other marketing tools can be used on a consistent basis to showcase open access and scholarly communication resources to increase awareness and understanding of especially author rights. Jaguszewski and Williams (2013:10-11) emphasised the need to develop online learning modules, tutorials, short videos and screen casts as a critical part of innovations in library services for researchers, citing the need to employ instructional designers and educational technologists that most libraries currently do not have.

Davis-Kahl, Fishel and Hensley (2014:444) are of the view that there are many strategies for integrating scholarly communication concepts into different areas of a student's academic life. Such initiatives may be "formal instruction, exhibits, symposia and including student work in institutional repositories". The study by Sivakumaren (2014:15) conducted among doctoral students, teachers and Library and Information Science professionals in India found that the majority (87.3%) of the respondents alluded to a lack of guidance for writing research articles and publishing opportunities and indicated that good subject knowledge, access to information

resources and good analytical and writing skills are crucial for publishing quality research articles. These needs can be met through scholarly communication guidance

As mentioned already, Thomas (2013:170) outlined scholarly communication core services to include training users on issues of open access, copyright and publishing agreements as well as providing research support. Open access services should include publishing models. Copyright and publishing agreements services should include assisting patrons to use copyrighted materials legally and to consult authors on their publishing agreements. Research support services should include training users to finding and evaluating open access resources as well as helping authors to comply with funding mandates. Wright (2013:3) posits that the most common methods of delivering this education are through digital materials and live presentations. Thus, supporting the need for a research portal in this study.

Calarco & Ruttenberg (2014) posits that scholarly communication duties can vary, including scholarly publishing services; copyright and open access (OA) advocacy and outreach, scholarly resource assessment, research data management, collection development, copyright advisory services and information literacy. It is therefore important that librarians become involved in copyright and licensing negotiations with their online content providers (Moon, 2014). This, in her view is because, so much of what librarians do involves some aspect of copyright, whether it is document delivery, electronic reserves, online learning tools, and course management systems, or online modules that allow one to share one's references and full-text attachments with others. Knight (2013:753) posited that academic librarians have to find creative ways to support students in an online environment by creating digital libraries that offer innovative library services and other cutting edge electronic resources.

Specific new roles suggested by Myers (2016:17) include advocating for author rights and educating about publishing contracts, managing copyright permissions, promoting the university's research publications, promoting the research repository, advocating for sustainable models of scholarly communication, supporting research data management, formulating policy and workflow management and content recruitment.

Vezzosi (2009:72) reported that although document delivery and interlibrary loans appeared to be crucial library services to all the doctoral students at Parma University in Italy, 44% expressed the need for library staff support in dealing with problems such as citation, impact factors or journal guidelines for authors. Björk and Solomon (2012:1) explained the impact factor to be the average number of citations to the articles in a journal. Impact factor according to Casadevall and Fang (2014:1) was conceived by Eugene Garfield in 1955 to help librarians identify the most influential journals based on the number of citations. Everywhere, supervisors ask doctoral students to publish in high-impact journals (Hicks, Wouters, Waltman, De Rijcke & Rafols, 2015:429-431). In the view of Spiranec and Zorica (2012:4), information literacy is a very important initiative in libraries, which comprises of knowledge, skills and competencies required by researchers for the effective handling of research information and data. This study is advocating for scholarly communication guidance by the academic library to doctoral students to educate and train them to handle most scholarly communication issues.

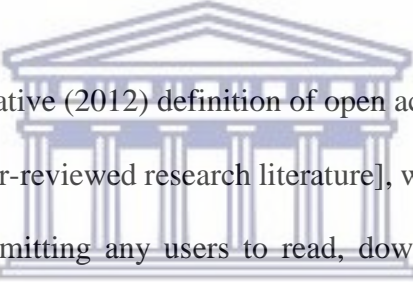
2.10.1 Open access

The term open access has been explained in diverse ways. It is defined as free online access to scholarly works through the removal of price barriers and most permission barriers, making them available with minimal use restrictions. Open access literature of all types is digital, online, free of charge and free of most copyright restrictions', allowing readers to download,

print, distribute and even create derivative works, as long as attribution is acknowledged. Publication and distribution costs are not paid by the reader and are therefore not a barrier to access. The internet propels open access as it has the potential of online dissemination of research findings globally with little or no cost and hindrance as long as the document has no access restriction (Ezema, 2011:477; Carpenter, 2012:7; and Stanton & Liew, 2012:1).

Kaba and Said (2015:95) reports that, the Bethesda and Berlin declarations consider a work an open access, if the copyright holder agrees on allowing users to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works in any digital medium for any responsible purpose, subject to proper attribution of authorship.

The Budapest open access initiative (2012) definition of open access reads:



“By open access to [peer-reviewed research literature], we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited”.

According to Gargouri, Larivière, Gingras and Harnad (2012:1), articles can be made open access in two ways: by self-archiving them on the web (green open access) or by publishing them in open access journals (gold open access). Yaffe (2016) asserts that many open-access advocates prefer “so-called green open access, under which universities or academic disciplines create electronic repositories of peer-reviewed work that can be accessed for free

by anyone with an internet connection”. She further explained gold open access to mean the process where subscription-based journals already allow authors or their departments, universities or grant funders to pay upfront to make peer-reviewed articles available for free. One of the most important happenings impacting library services in the view of Leng, Ali and Hoo (2016: 35) is the issue of open access repositories.


Dhiman and Sharma (2016:99-100) indicated that open access institutional repositories makes it possible for students and users to easily access faculty papers or the contributions of researchers. It also lower access barriers and offer the widest possible dissemination of a scholarly communication. In view of these statements, this study is of the view that even graduates could still be made to have access to the institutional repositories of their alma mater for any research they are conducting.

It has been noted that hosting open access events projects the issue on campus and hence is an important part of keeping academic libraries relevant (Johnson, 2014:627). An example is the organisation of an open access week on campus. According to Johnson (2014:627), it is not simply an awareness-raising exercise, but also a platform for advancing policy changes on research sharing and dissemination, including institution-wide commitments to open access.

Kim (2013:495) states that major stakeholders including funders, publishers, libraries, and scientists are involved in the efforts to improve the process of scientific communication. Thus, they support the promotion of open access. However, Grgic (2016:255) found that such promotion and education was not being done in Croatian academic libraries. In his study, an anonymous online questionnaire was sent to all the Croatian academic libraries with the aim to determine if libraries are involved in open access and to learn about plans for user education about the aspect of information literacy that is important for using open access information.

Almost all the libraries are involved in open access publishing, either through open access repositories or through open access journals. However, 22% of the libraries did not educate their users about open access. Also, 40% of the libraries do not plan any form of education about open access.

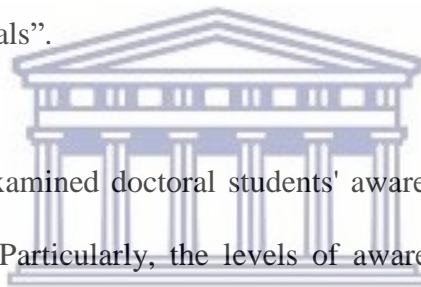
The benefits of open access outlined in literature include: greater visibility of faculty output and accessibility for students; likelihood of works being used and cited more: enhancement of individual's and the institution's reputation over the long term and stewardship and the preservation of publications in digital form which frees them from the need to maintain this content on a personal computer or website (Cullen & Chawner, 2011:461; Swoger, Brainard & Hoffman, 2015:2 and Yaffe, 2016:64).



The *Directory of Open Access Journals* (DOAJ) and *Directory of Open Access Repositories* (OpenDOAR) are comprehensive directories of open access journals. The *Directory of Open Access Books* (DOAB) is a recent addition to the family of directories with the primary aim of increasing discoverability of open access books. These directories can be consulted when one is looking for open access journals and books (Stenson, 2012: 251).

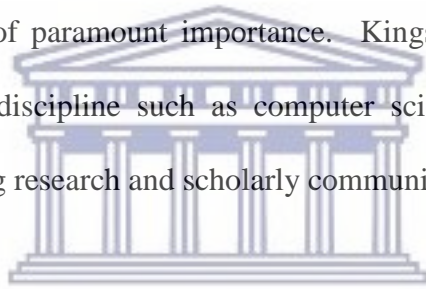
Jeyapragash, Muthuraj and Rajkumar (2016:4) also described DOAJ as an online directory that indexes and provides access to high quality, open access, peer-reviewed journals. In addition to OpenDOAR, the Registry of Open Access Repositories (ROAR) is a directory for open access repositories dedicated to facilitate and promote up-to-date information about the universal growth and status of repositories throughout the world (Chakravorty, Datta & Sinha, 2016:92).

Findings from a three-year “Researchers of Tomorrow” study of research behaviour among ‘generation Y’ doctoral students by Carpenter (2012:12) showed that most doctoral students lacked understanding and were not certain about the nature of open access. In the study, doctoral students were asked to comment on any reservations they might have about publishing or disseminating their own research work through open access channels. The main concerns that emerged were: “lack of impact factor, status or credibility of open access journals in the eyes of academic colleagues and potential employers; strong preference for peer-reviewed journals, with a general assumption that open access journals are not peer-reviewed; importance of being cited in other publications and the assumed impossibility or difficulty of this with open access; cost to the individual researcher and concern that copyright is not protected in open access journals”.



Stanton and Liew (2012:1) examined doctoral students' awareness of and attitudes to open access forms of publication. Particularly, the levels of awareness of open access and the concept of institutional repositories, publishing behaviour and perceptions of benefits and risks of open access publishing were explored. The findings showed that although the awareness of open access and repository archiving is still low, majority of the interview and survey respondents were found to be supportive of the concept of open access. The majority of respondents were supportive of an existing mandatory thesis submission policy. With the issue of doctoral students' use of repositories and open journals in their own research, the findings showed that only a few respondents used open access research services like Kiwi Research Information Service, Australasian Digital Theses and EthOS. However, the majority of respondents used Google Scholar, so it is likely that they access open access material from journals and repositories without realising it.

There seems to be in existence some disciplinary differences in how students perceive open access. A study by Pickton and McKnight's (2006) of graduate students at Loughborough University found science students to be more willing to comply with mandatory submission of their theses to the university repository than their fellow students in the humanities. In relation to the humanities, disciplines there existed a culture of professional prejudice against digital scholarship. The dislike or embrace of open access appear to be socially constructed within the disciplines in accordance with their existing publishing norms (Duranceau, 2008 and Kingsley, 2008). Researchers in the sciences however, have more readily embraced open access in the form of peer-reviewed open journals and the publication of pre-prints in subject-based repositories. This in the view of various authors is because speed of publication and communication of results is of paramount importance. Kingsley (2008) asserts that for a researcher in a fast-moving discipline such as computer science, archiving a work in a repository is similar to existing research and scholarly communication processes.

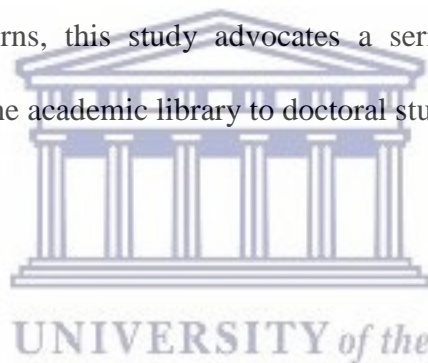


However, the findings of Lwoga and Questier (2014:134) indicated that despite the low usage of open access in terms of self-archiving and publishing in open access web avenues, health sciences faculty are positive about adopting and using open access. Their study sought to investigate factors that affect the adoption and use of open access in Tanzanian health sciences universities. Based on a cross-sectional questionnaire survey, the authors selected 415 faculty members through a stratified random sampling from a population of 679 in all eight health sciences universities in Tanzania.

A similar study was conducted earlier by Creaser, Fry, Greenwood, Oppenheim, Proberts, Spezi and White (2010:152) who investigated the awareness of scholarly authors toward open access repositories and the factors that motivate their use of these repositories. Their study was based

on a mixed methods research approach, comprising of a web-based survey of European researchers and a series of disciplinary (Medical sciences; Social sciences; Humanities & Arts; Life sciences; Physical sciences and Mathematics) focus groups. The findings revealed that authors were familiar with the term open access, especially the notion of free electronic access to full-text of articles. Only a small number of authors (less than 5% of survey respondents) had an unfavourable view of open access, for example considering it to mean low quality, not peer reviewed, not the final version of an article, or vanity publishing. The study concluded that authors from the Social sciences, Humanities and Arts were more likely to be unsure about the concept of open access.

In view of the above concerns, this study advocates a serious and proactive scholarly communication guidance by the academic library to doctoral students.



2.10.2 Copyright

Stodden (2014:227-229) defines copyright “as an exclusive secured rights vested in an author or authors to both reproduce the work and prepare derivative works based upon the original. Stoden (2014:227-229) further states that copyright can be transferred, and in a system established many decades ago, journals that publish the research manuscripts typically request that copyright be assigned to the publisher for free as a condition of publication. Therefore, access to the published articles requires asking permission of the publisher who owns the copyright, which usually involves paying a fee. There are exceptions and limitations to this power, such as Fair Use”. The fair use or permitted use principle, also known as exceptions to the rights of copyright owners is an important part of copyright laws (Darkey & Akussah, 2008:438). Fair use has been explained by Darkey and Akussah (2008:438) as a privilege for

someone other than the copyright owner to use a copyrighted work without seeking permission from the copyright owner or sometimes paying a fee.

Boustany and Mahé (2015:18) are of the view that as students are required to submit a thesis as part of their studies, there is a likelihood of infringement of copyright laws, thus, copyright literacy awareness is very important. Nilsson (2016) adds that there is an increased need for new skills and for a mandate to work with copyright guidance on the part of academic librarians. Librarians not only have to handle restrictions in copyright legislation but must also actively provide digital solutions. He further states that librarians now have the complex task of balancing two positions: providing digital access to information on the one hand and helping to protect publishers' rights on the other hand. Lipinski and Chamberlain (2016:67) made it known that the World Intellectual Property Organization's Standing Committee on Copyright and Related Rights is reviewing world copyright laws and considering drafting an international protocol addressing use rights for libraries and archives.



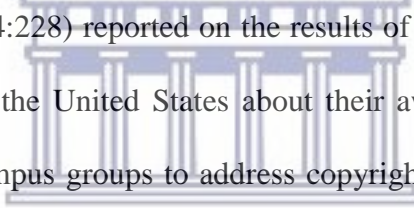
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The World Intellectual Property Organization Standing Committee on Copyright and related rights has identified eleven criteria to protect a library's rights under a copyright law provision. They are preservation, including replacement; copying for patrons, that is, document delivery; legal deposit; lending or ILL; parallel importation; cross border; orphan works; limitation on liability; Technological Protection Measures; contractual override; and translation rights (Lipinski & Chamberlain, 2016:72).

In a presentation, Lipinski (2017:3) outlined proposals and studies from various individuals and groups on copyright limitations and exceptions for libraries, archives and museums. He reported that in 2014, 17% of the 188 countries surveyed had no copyright provision for libraries and archives. A total of 156 of the 188 have at least one statutory library exception –

although 54% have secured basic rights of preservation and 48% for replacement, only 10% have provisions for document supply for patrons or interlibrary loan.

Educause (2013:5) engaged with university general counsels, provosts, copyright experts and representatives from higher education associations on copyright challenges in a Massive Open Online Courses Environment. This study declared that there is a heightened need for copyright education on university campuses. Saunders (2015:286) also supports this view by asserting that academic libraries are further impacted by changes in higher education pedagogy and delivery such as Massive Open Online Courses (MOOCs). Thus it becomes evident that copyright issues and opportunities permeate the higher education landscape.

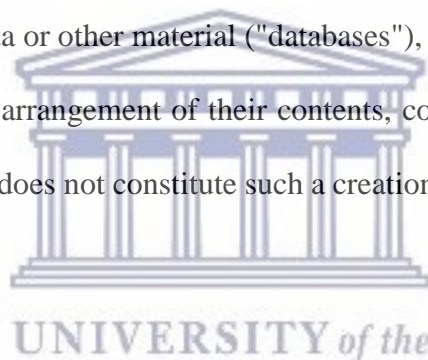


Charbonneau and Prihs (2014:228) reported on the results of a national survey of academic librarians and library staff in the United States about their awareness of various copyright policies, partnerships with campus groups to address copyright issues and training needs. A majority of the survey respondents reported that they have answered copyright-related questions in the work place, yet, only 49% of the respondents perceived they were prepared to provide copyright information to library users. Awareness of various copyright policies among librarians and staff members was minimal. In addition, survey respondents expressed the desire for more copyright-related training. In light of these findings, the authors recommended the development of copyright policies, the engagement of stakeholders across campuses to collaborate in addressing copyright matters, scenario-based learning opportunities to build copyright familiarity among those working in academic libraries, journal clubs for library staff members to keep up-to-date with current copyright cases and to generate discussions about how these scenarios are applicable to particular institutional environments and lastly, the development of copyright tools to support staff such as a checklist for answering copyright

questions. The World Intellectual Property Organisation Copyright Treaty can help answer most of the questions on copyright and intellectual property as a whole.

The World Intellectual Property Organisation, (WIPO) a self-funding agency of the United Nations, is the global forum for intellectual property services, policy, information and cooperation. The mission of WIPO is to lead the development of a balanced and effective international intellectual property (IP) system that enables innovation and creativity for the benefit of all (WIPO, 2017). The WIPO Copyright Treaty mentions two subject matters to be protected by copyright:

- (i) computer programs, whatever the mode or form of their expression; and
- (ii) compilations of data or other material ("databases"), in any form, which, by reason of the selection or arrangement of their contents, constitute intellectual creations. (Where a database does not constitute such a creation, it is outside the scope of this Treaty).



Another group that deals with issues pertaining to copyright is the Copyright and other Legal Matters Advisory Committee of the International Federation of Library Associations and Institutions (IFLA). According to IFLA (2016), the committee was created to advise IFLA and represents the voice of the international library community in copyright and other legal concerns. They keep a watching brief on the activities of WIPO, and represents IFLA at key meetings through its subcommittee on WIPO's Standing Committee on Copyright and Related Rights.

Copyright and other legal matters are also active in issues relating to: "Economic and legal barriers to the acquisition and use of library resources and effective library services;

Subscription and license agreements; Legal issues relevant to broader access to knowledge, in particular and a wide range of other legal matters of international significance to libraries and librarianship” (IFLA, 2016).

The Copyright Act 2005, Act 690 of Ghana deals with copyright issues in Ghana. Act 690, Section 19, deals with permitted use of works protected by copyright. Section 21 deals with permitted use of protected copyright works by libraries or archives (The Copyright Act 2005:9-12). Darkey and Akussah (2008:439) assert that the permitted use of work protected by Copyright in the Ghana Copyright Act is not only inadequate but a dilemma to librarians. They stated that Section 19(2) which limits the reproduction of a book to only sections or chapters of the book is simply not fair as even the Berne Convention, for example, does not expressly restrict the number of copies of material that can be made for teaching purposes or the fair use. To them, it is therefore needless for legislators in Ghana to restrict the number of copies that can be made under the permitted use clause.



Meanwhile Olaka and Adkins (2012:40) reported on the copyright awareness among academic librarians in Kenya. The findings in their study is quite similar to that of Charbonneau and Priehs (2014:228) conducted in the United States of America. Results indicated evidence of insufficient mastery of provisions in the Kenyan copyright law. Morrison and Secker (2015:75) examined the levels of copyright literacy among UK library and information professionals as well as those working in cultural heritage sectors. The study explored the need for copyright education for new and existing academic librarians.

The above show how important it is for academic librarians, scholars and doctoral students to be knowledgeable on copyright issues as they use other scholar’s intellectual property as well

as to protect themselves when research findings are disseminated. Thus, calling for an effective scholarly communication guidance by the academic library.

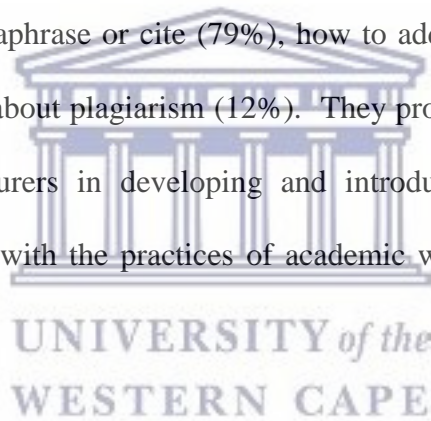
2.10.3 Plagiarism

Plagiarism is the act of falsely owning someone else's ideas or intellectual efforts and giving it one's own name without acknowledging the originator of the content. The aim of plagiarism is to deceive readers and this has increased since the last two decades (Nisha, Senthil & Bakhshi, 2015:281). The reason for this breakthrough in piracy according to them is the considerable know-how of students and academicians about web searching and browsing which leads to ease of copying and downloading of e-resources available on internet.

In view of this challenging issue in the academia, major steps have been taken by academic libraries to check plagiarism in students' research. Turnitin and other plagiarism software have helped to detect plagiarised projects reports, theses and dissertations submitted by faculty, research scholars and students in many research institutions and universities since 2012 (Nisha, Senthil & Bakhshi, 2015:283).

Studies by Cheema, Mahmood, Mahmood and Shah (2011:668) as well as Sentleng and King (2012) indicate that students know very well about the different acts of plagiarism. Cheema, Mahmood, Mahmood and Shah (2011:668) proofed that the majority of students recognised statements on acts of plagiarism as true: converting someone else's work as your own and giving no credit to the author (90%), copying from several sources of knowledge and tweaking the sentences (87%), failed to put a quotation in quotation marks (92%), using his/her own work without citation (84%), and provide incomplete information about the sources so one cannot trace the original source (82%).

Meanwhile, low level of plagiarism awareness is evident in the study by Ramzan, Munir, Siddique and Asif (2012:80). Of the 340 respondents, 124 strongly agreed that they understand the meaning of plagiarism, 132 agreed, 40 remained neutral, 21 disagreed, 18 strongly disagreed while 15 did not respond to statement. Gunnarsson, Kulesza, Pettersson (2014:416) also reported low level of plagiarism awareness in a study conducted among 34 students registered for the Engineering Master degree at Blekinge Institute of Technology, Sweden. Their study investigated how librarians in collaboration with faculty taught international students how to avoid plagiarism. The findings revealed that the concept of plagiarism was totally new to 18% of the participants, 82% learned something new, while no one was fully familiar with the concept. Among the principles that were new to them, were how to write references (85%), how to paraphrase or cite (79%), how to add a reference (74%), Code of Ethics (68%) and everything about plagiarism (12%). They propose that academic librarians should collaborate with lecturers in developing and introducing academic writing web resources since unfamiliarity with the practices of academic writing can be one reason for students to plagiarize.



Ocholla and Ocholla (2016:188) state that the absence or invisibility of a plagiarism policy can be a major drawback in the fight against plagiarism in universities. They report that in May 2013, a content analysis of the policies posted on the internet by 23 South African universities concluded that the majority of the universities had a plagiarism policy. Institutional responsibility for the policies varied, but all the universities underlined that plagiarism was the responsibility of all the stakeholders. All the policies targeted students and teaching staff, and nearly all the policies included infringement penalties, detection software, marketing and publicity, declaration of compliance, and guidelines, including library guides. However, only a few policies articulated the library's role clearly. The study identified training needs on

plagiarism and emphasised the importance of awareness of all aspects of plagiarism to support its prevention.

Literature has outlined various free software available on the Internet and commercial software available that libraries can use to detect plagiarism in doctoral dissertations. Some of the software as listed by Nisha, Senthil and Bakhshi (2015:282) and Ocholla and Ocholla (2016:197) are: Turnitin, iThenticate, Anti-Plagiarism, Dupli Checker, Paper Rater, Plagiarism Checker, Plagiarism Detector, Plagiarism.net, Plagium, PlagTracker, Viper and See Sources. Library instruction in the view of Douglass & Mack (2015:543) should be extended beyond the traditional classroom setting. They are of the view that hardware and software have become more accessible to students, thereby facilitating a transition from paper-based to electronic citation methods.



2.10.4 Creative commons

Academic libraries continue to face new questions about how they can make their online instructional tools more useful and accessible (Fortney, Hennesy & Murphy, 2014:370). Creative Commons is a global non-profit organization that provides a set of standard licenses to enable and enhance sharing and reuse of creative works. Creative Commons exist to enable sharing and use of creativity and knowledge through free legal tools. The licences set out the re-use conditions for someone making use of another's material (Gulley, 2013:169 and Fortney, Hennesy & Murphy, 2014:370). Sitek and Bertelmann (2014:151) report that giving away all rights to the publisher when signing an author's contract has been one of the strongest points of criticism for years. Discussions on how authors can retain copyright brought Creative Commons licenses into the focus.

Copyright imposes restriction on re-use of a piece of work but this has become very challenging in the digital world. The development of open access publishing has also added up to this challenge. Creative Commons licences were introduced to try and bridge the gaps between the barriers imposed by traditional copyright and the realities of the digital environment. Creative Commons licenses provide an option for copyright creators and right holders to structure their rights in a more flexible way. In this way, the “best-of both-worlds” is offered as a way to protect creative works but at the same time encouraging certain uses of them determined by each creator’s individual preference (Gulley, 2013:168 and Maracke, 2010:13)

Maracke (2010:5) reports that Creative Commons licensing suite consists of public standardized licenses that allow authors to decide “whether others may make commercial use of their work, whether to make derivative works, and if derivative works are allowed, whether these derivative works must be made available under the same licensing terms”. All licenses require attribution. Attribution is a key element - not only regarding some of the legal questions, but also in terms of cultural norms and acceptance. A summary of Creative Commons licence types by Gulley (2013:169) with the associate logos have been outlined in Figure 2.1.







CC BY Creative Commons Attribution		Others can distribute, remix, tweak, build on and use commercially provided the original work is cited
CC BY-SA Creative Commons Attribution – Share Alike		Others can do all of the above provided the derivative is published under the same terms as this original licence
CC BY-NC Creative Commons Attribution – Non-Commercial		Others can distribute, remix, tweak and build on provided the original work is cited but commercial re-use is prohibited
CC BY-ND Creative Commons Attribution – Non-Derivative		Others can distribute this work provided the original is not changed in any way and is cited. Commercial re-use is permitted
CC BY-NC-SA Creative Commons Attribution – Non-Commercial – Share Alike		Others can distribute, tweak, build upon and use for non-commercial purposes only and provided the original work is cited and the new work is licensed with the same conditions
CC BY-NC-ND Creative Commons Attribution – Non-Commercial – Non-Derivative		Others can distribute this work provided the original is not changed in any way and is cited. Commercial re-use is not permitted

Figure 2.1 Summary of Creative Commons licence types with the associate logos

[Source: *Gulley (2013:169) Adapted from the Creative Commons website (<http://creativecommons.org/licences/>)*]



The clear benefits of Creative Commons licences are the ease of use and the provision of clarity on what the user can and cannot do with a piece of material. There is a standard format for identifying the citation and the licence itself in the metadata. Creative Commons also brings licensing of copyright material closer to being internationally applicable, although there are still important geographical differences. Adopting the Creative Commons Attribution License could greatly simplify the process by which librarians collaborate and build upon one another's work regardless of institutional affiliations. In a similar vein, libraries implementing the Creative Commons Attribution License will enable library users worldwide to more easily and legally share important library lessons beyond the digital walls of the library (Fortney, Hennesy & Murphy, 2014:373 and Gulley, 2013:169).

2.11 SCHOLARLY COMMUNICATION GUIDANCE BY DOCTORAL SUPERVISORS

This study is of the view that supervisors of doctoral studies can have a major influence in urging their students to access and receive scholarly communication guidance from the academic library.

The doctoral supervisor or advisor is the individual faculty member who directly supervises a student's doctoral research. PhD advisors are central to the doctoral student's success (Russo, 2011:534 and Curtin, Malley & Stewart, 2016:715). Doctoral training is characterized by a strong emphasis on the apprentice relationship of the emerging scholar with her or his more senior faculty advisor. The role of advisors include helping doctoral students to link with their departments and orienting them to their disciplines of study. The supervisors work also involves directing their students to knowledge sources about their field of study. Scholarly communication guidance by doctoral supervisors can be in the form of directing their doctoral students to the appropriate channels to receive explicit training in research methods, information about content, ethics and procedures, and active efforts to ensure that the student has opportunities to learn what she or he needs to know. Also, as graduate and doctoral programs continue to integrate e-learning, hybrid, and online components into the curriculum, these topics have also become increasingly important to the scholarship on doctoral studies and supervision (Erichsen, Bolliger & Halupa, 2014:322 and Curtin, Malley & Stewart, 2016:716-717). This study therefore is of the view that the success of doctoral studies also depends on effective guidance in research processes.

Erichsen, Bolliger and Halupa (2014:322) reported on student satisfaction with graduate supervision in doctoral programs primarily delivered in distance education settings. The study took place at three accredited universities in the USA during spring 2011. The authors submit that students admitted to doctoral programs in education delivered through distance, who either had been assigned or had selected a research advisor or dissertation chair and had a valid email address were invited to participate in the research study. It is clear that the students expected their advisors to be actively involved in leading them through their studies. This is evident in 72% of all respondents using the words 'to guide' or 'provide guidance' to describe the primary role of the advisor, with an additional 34% offering terms like support, assist, or help. "Sub-themes of this primary role include informing students and answering their questions, mentoring, advising, encouraging, advocating for, offering clear communication and expectations, offering content and research expertise, setting goals, and being responsive". The authors stressed instructions in the conduct of research, which includes the methods and design, conception of ideas as well as the construction of arguments and scholarly writing. Doctoral students in general desire mentors who serve as role models, value the students, are generous with their time, and provide research support (Miller et al 2016:533). Thus, helping them to receive the needed guidance in all aspects of their doctoral study which include final dissemination of research findings.

Warburton and Macauley (2014:171) posit that it was the role of academic supervisors to train doctoral students to acquire the skills needed to design feasible research projects or to develop publishing strategies to boost publication output. According to Pickering and Byrne (2014:534) many universities now provide practical support for early-career researchers including PhD students. This support includes greater involvement of supervisors in the publication process; publication workshops; writing groups; and other types of practical training. Recent studies

suggests that many benefits accrue from such programmes, especially increasing publication rates.

Baker and Wilson (1992:204) evaluated the scholarly productivity of 284 randomly selected doctoral graduates from 30 social work programs. The sampling source was the annual list of doctoral dissertations published in Social Work Abstracts and later in Social Work Research and Abstracts. Each doctoral graduate whose dissertation title was published in the list from 1970 to 1980 was included in the sampling frame. Before the selection of the sample, all graduates were sorted by program. Only those programs that had produced six or more graduates from 1970 to 1980 were included in the final sampling frame. The authors accumulated and aggregated for each program counts of publications appearing in the source index of the social sciences citation index. Their findings indicated that the productivity of doctoral program faculty was related to the productivity of the program's doctoral graduates. The authors suggested that perhaps productive faculty provide positive role models to their students, in other words, mentoring relationships contribute to doctoral scholarly productivity outcomes. Thus, scholarly communication guidance by doctoral supervisors also include mentoring and preparing doctoral students for academia. Barnes and Austin (2009:299) explain that within the doctoral education literature, the terms advisor and mentor are frequently used interchangeably to describe the relationship between a faculty member and a doctoral student because often it is with faculty advisors that doctoral students develop a mentor–mentee relationship.

Tomaszewski (2012:448) submits that the best way to promote library events to graduate students is to have the information come from their advisors to them. This study is therefore suggesting that the academic library should do their best to collaborate with doctoral supervisors for effective scholarly communication guidance.

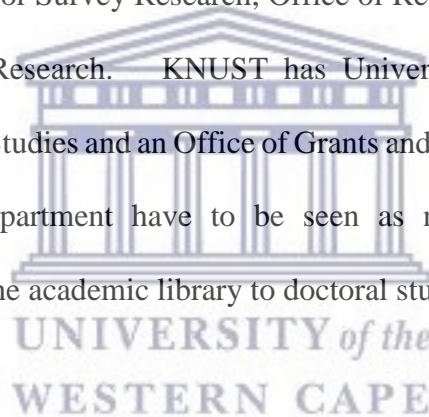
Feldon, Shukla and Maher (2016:178) examined the contribution of faculty–student co-authorship to the development of graduate students’ research skills in the sciences, technology, engineering and mathematics. They quantitatively assessed rubric-measured research skill gains over the course of an academic year compared to students who did not report participating in co-authorship with faculty mentors. The results indicate that students who co-authored with faculty mentors were likely to develop significantly higher levels of research skills than students who did not. In addition, less than half of the participants reported having such experiences, suggesting that increased emphasis on this practice amongst faculty could enhance graduate student learning outcomes. The sample consisted of 88 (male 47) graduate students, of which 52 were enrolled in doctoral programs and 36 in master’s programs. Most were in their early years of graduate education, with 49 students in the first year of their respective graduate programs. However, Maher, Timmerman, Feldon and Strickland (2013:121) asserts that faculty-student co-authorship depends on a number of factors. Using faculty narratives, their study identified norms of the discipline, resources, faculty goals for students, faculty goals for themselves, and institutional expectations as factors underlining faculty-student authorship. A total of nineteen faculty participants identified as science, technology, engineering and mathematics doctoral advisors who co-authored with their doctoral students were interviewed.

2.12 COLLABORATION WITH OTHER CAMPUS UNITS FOR SCHOLARLY COMMUNICATION GUIDANCE

Thomas (2013:169) believes that scholarly communication will be easier if libraries can take advantage of “shared support for expertise and technical infrastructure”. Shared support for technical infrastructure presupposes libraries working together on any of several different software packages designed to offer the following services: institutional repositories, e-journal

publishing and data management. Shared support for expertise includes several web resources, a working group and a new resource person. Harkema and Nelson (2013:198) argue that in as much as the library is a crucial partner in planning and envisioning the future of preserving, using and even creating scholarly resources, so are the technology professionals. Creation of archives, analytic tools and statistical analyses of aggregate data requires the combined expertise of technical, professional and scholarly personnel.

In the view of Thomas (2013:169), the graduate school, university research office, and/or university legal offices make natural partners. A study by Gilman (2015:30) listed scholarly communication guidance partners and campus units to include University Information Technology Services, Center for Survey Research, Office of Research Administration and the Office of Vice-Provost for Research. — KNUST has University Information Technology Services, School of Graduate Studies and an Office of Grants and Research. These departments in addition to the Legal department have to be seen as natural partners of scholarly communication guidance by the academic library to doctoral students.



A study by Thomas (2015:5) revealed that at the North Carolina libraries, the web resources highlighted were the ACRL “Scholarly Communication Toolkit and the Association of Research Libraries “Developing a Scholarly Communication Program in Your Library.” The ACRL Scholarly Communication Toolkit is an educational resource primarily directed to librarians to assist them with integrating a scholarly communication perspective into library operations and programs and preparing presentations on scholarly communication issues for administrators, faculty, staff, students or other librarians (ACRL, 2016). The Association of Research Libraries has stated on their website that “Developing a Scholarly Communication Program in Your Library” outlines steps for setting up a scholarly communication program at any institution.

Myers (2016:18) encouraged librarians to learn new skills and aptitudes to carry out their new roles. Thus, librarians are increasingly required to collaborate with colleagues across campus to learn their institutional needs and decide how best to meet them. They must find ways to reach out to faculty and show them the value of depositing their work, as well as to seek buy-in from campus administrators who have to decide whether or not to finance new infrastructure and operations).

2.13 INNOVATIONS IN ACADEMIC LIBRARY SERVICES

Sputore, Humphries and Steiner (2015:15) stated that the library profession has already witnessed new technologies and service delivery models requiring rapid skills development, process adaptation and organisational change. Sauders (2015:286) through a content analysis examined academic libraries strategic plans: top trends and under-recognised areas. She reiterated that rapid developments in technology, as well as changes in areas such as scholarly communication, data management, and higher education pedagogy are affecting user expectations and forcing academic libraries to develop new resources and service areas. At the same time, these libraries must balance new initiatives with core service areas such as instruction and collection development. In addition to responding to current trends, academic libraries are also being challenged to anticipate future needs and to develop innovative initiatives to meet those needs.

Jantz (2012:5) discussing innovation in academic libraries, reported that for many years, the academic library responded to the requirements of its parent institution rather than the direct pressures from the forces that shaped the supporting culture. But there is the need for innovations including a standing research and development budget, a copyright advisory office,

creation of new standards for e-journal publishing, joint publishing with the university press as well as library outposts serving as reference points. He therefore grouped academic library innovations into two: administrative and technical innovations with administrative innovations including products that support the administrative structure such as a revenue producing unit, a standing research and development budget, an associate university librarian for digitization projects, budget reallocation to digital projects, business plans for new projects and a digital program office. Technical innovations should include creating a copyright advisory office, new standards for e-journal publishing, new library services, joint publishing with the university press, leasing library space, library outposts (reference services), mass digitization, selling library services and the provision of assistance with technology to faculty.

Tomaszewski (2012:445) points out that a multi-pronged approach using of a variety of communication methods like printed flyers, email, phone, and personal communications is needed to provide library news and communications effectively, since individuals have different preferences for receiving such communications.

2.13.1 Academic library website

Liu (2008) states that academic library websites are libraries' virtual presentation to the world. Thus, beyond providing information about libraries and library services, academic library websites provide access to online catalogues, electronic databases, subject resources, library instruction/tutorials, and digital collections. He adds that, in alignment with each institution's mission, academic library websites are gateways or portals to information that supports faculty and student research and educational needs.

The digital era has had a particular impact on the functioning of libraries: it has changed both the means of communicating with the users, and the way libraries deliver services to users (Kim, 2010 and Mierzecka & Suminas, 2018). Various authors have also realized that physical library visitation have decreased over the years. Although recently incorporated information commons and equivalent models may partially reverse the trend, there is the need for libraries to revamp their websites to include software that facilitate easy interaction with their universities (Macauley & Green, 2009:74; Vezzosi, 2009:72 and Tuñón & Ramirez, 2010:992). Pant (2015:896) investigated the usability of the website of Central Science Library, University of Delhi, India. The results showed a need for the improvement of the website in terms of efficiency, effectiveness and learnability for better usability. The need to enhance the visual appeal of the website was also reported by users. However, information resources provided through the central science library website were found useful for users.

For a university to be accredited by the National Accreditation Board in Ghana, there should be a very good library facility and so it is in the right direction that these libraries get very good interactive websites to aid their reference services especially to doctoral students (Ghana National Accreditation Board. Tertiary Institutions Establishment and Accreditation Regulations 2010:3, 8). The Quality Assurance and Planning Unit (2016) of KNUST, on their website has outlined the various requirements needed by the National Accreditation Board before the accreditation of a new programme is given. These requirements include the availability of Sources of information, for example Library and other relevant resources (Quality Assurance and Planning Unit, 2016). Therefore, every department at KNUST that introduces a new programme is mandated to follow all these needed procedures.

In view of the importance of research to society and academia, it is essential that academic librarians should be familiar and up-to-date with web services that unite their users with the

information they need. In the view of this study, academic library websites are very much needed to train doctoral students on all matters related to their research study and subsequent dissemination of their thesis.

2.13.2 Web 2.0 tools

An effective academic library provides an Information Communication and Technologies service that aids timely delivery of information in response to users' needs (Lamprey, 2010:87).


Bawden and Robinson (2009:186) are of the view that there is no clearly accepted definition or explanation of exactly what Web 2.0 is, but rather that it is generally known to encompass a variety of sites and tools for shared information creation and updating, as well as social networking and communication. Generally subsumed within this are blogs, wikis, RSS feeds, podcasts, sites for sharing photographs and videos, sites for social interaction and social bookmarking and virtual worlds. Although the initial usage of such tools and resources was largely for social recreation and popular culture purposes, a professional and 'serious' dimension has emerged. One dimension is by using blogs as a notebook that records thoughts and progress of the doctoral studies as observed by Zhu and Procter (2015:35). Other types of contents may be book reviews, summary of chapters, teaching, conferences, social issues and personal stories to give audience a sense of 'who I am'.

The term Library 2.0 according to Xu, Ouyang and Chu (2009:324) was first coined by Michael Casey in September 2005. They reported that although the term initially provoked a considerable number of doubts, practitioners and researchers alike in libraries soon began actively exploring how Web 2.0 applications could be introduced to libraries for service enhancement and for encouraging participatory librarianship. In spite of the fact that a specific

consensus on the usage of Web 2.0 applications is still developing, examples of Web 2.0 applications in libraries include blogging, instant messaging, information sharing (e.g., Flickr, YouTube), RSS (Really Simple Syndication or other variants), social bookmarking (along with tagging and folksonomies), social networks (e.g., facebook, MySpace), virtual communities (e.g., Second Life), and wikis.

A study conducted by Kim and Abbas (2010:211) on the adoption of Library 2.0 functionalities by academic libraries and users through a knowledge management perspective on a randomly selected 230 academic library Web sites and 184 users shows that RSS and blogs were widely adopted by academic libraries while users widely utilized the bookmark function.

2.13.3 Data curation and management



Weber, Palmer and Chao (2012:305) assert that digital research data have introduced a new set of collection, preservation, and service demands into the tradition of digital librarianship. The role of an information professional has evolved to include the activities of data curation. This field more specifically addresses the needs of stewarding and preserving digital research data. According to them, the understanding of what data curation entails has necessarily evolved since being originally defined as the activity of managing and promoting the use of data from its point of creation, to ensure it is fit for contemporary purpose and available for discovery and re-use. Shankar (2015:161) has added that in many cases, conversations conducted via professional and scholarly publications, formal and informal workshops and classes, white papers, conferences, online forums, and social media, emphasize the technologies needed for acquiring, preserving, describing, and disseminating the digital products.

The study by Riley (2015:504-506) on the Purdue University Libraries' program in data curation reported that the creation of the Purdue University Research Repository models the centrality of the role libraries can play in offering these services to their parent institutions. Riley (2015:506) concludes that as part of librarians' role in preserving scholarship, offering researchers help to find places and ways to preserve the data in and from their research is an essential extension of the ways librarians have for many years helped authors find places to publish, and then have kept the books and journals that have resulted.

Heidorn (2011:663, 668) argues that libraries must come to curate digital data to protect and disseminate the intellectual capital of society. Curation of the data is within the libraries' mission, and libraries are among the only institutions with the capacity to curate many data types. The reason for data curation is for access, use and reuse of the data. In this regard, users must be able to find the data, additional metadata and indexing may be required to map the data to the potential users' vocabulary. Librarians are familiar with this necessity because of their experience with the creation of keyword systems, Library of Congress or Dewey cataloging and other operations they have performed for text-oriented documents for hundreds of years.

2.14 RESEARCH PORTAL AS PART OF THE LIBRARY WEBSITE

Many graduate degree programs are currently being offered either partially or fully online implying that some students may never set foot on campus but their research and information needs should be catered for by the academic library (Bussell, Hagman & Guder, 2017:978). This calls for an online technology such as a research portal as part of the academic library website to provide such services.

Barman (2014:120) defined a portal as a website or web service that provides information content to serve a specific community. He further explained a library portal as a subset of web portals which serve specific academic research communities. Library portals typically provide a gateway to an institution's resources by listing them for users and creating a direct link to the interface of each resource. Systems and services can be better designed and positioned in the context of the open web to meet the academic communities. The Massachusetts Institute of Technology Libraries "created a research group in 2002 to design and develop tools to support discovery, offering a new vision of the role of the librarian on campus as research partner and innovator," strengthened research partnerships on campus, and redefined subject specialist roles to shift their emphasis from collections and reference to services and tools (Connaway, Lincolns & Hood, 2013:295 and Corral, Kennan & Afzal, 2013:640).

A portal makes the library mediate the engagement of users and resources in a network environment. It is an information hub and an entry point to information resources (Das & Saha, 2015:111).

Mane and Pange (2016:312) posit that portal technology is a recent innovation which plays an important role in knowledge management as well as in the education sector. According to them, a library portal service is one of the prime functions of all libraries and information centres in this digital era. They further state that, due to the advancement of ICT in libraries and users living in modern digital information environment, a well-defined e-platform is needed to organize, store, retrieve and disseminate information effectively. Collaboration and personalization are the unique features of an effective library portal.

Looking at the fact that doctoral programmes have varying times for completion with varying course contents, it may be ineffective to lump all doctoral students together when one student may have a few months' experience in a programme, while another student could have five or

more years of experience in programme. This research therefore believes that a research portal can help support all the stages in a doctoral programme, whether the student is in the beginning, middle or final stages of the research. Academic libraries should therefore consider research portals as part of the library website.

2.14.1 Contents of a research portal

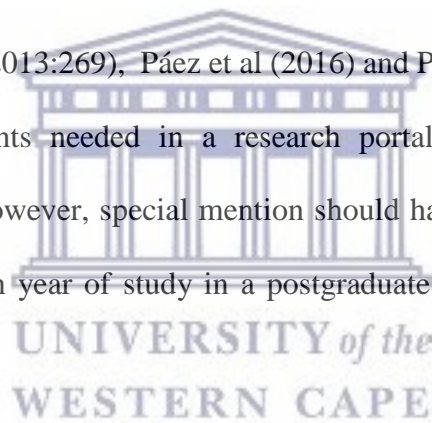
Duncan, Clement and Rozum (2013:269) reporting on the development of copyright and scholarly communication outreach program at Utah State University indicated that there was a need to develop a comprehensive website for such guidance. A copyright committee was set up in relation to this scholarly communication outreach program. The committee felt that one of the primary ways in which they could meet their charge to provide campus outreach in training and increase awareness of copyright issues, was to create a website that, although it was a more passive form of education, would incorporate the group's collective expertise on matters related to copyright. Hence a robust destination site called - Copyright website - for the campus community was linked from the university's website. It was instrumental in assisting subject librarians with an orientation to copyright issues as well as assisting them with outreach.

Patnaik and Mishra (2015:118) are of the view that library portals not only offer services but also enhances scholarly communication and research among the patrons of the library. They reported on the portal of Space Applications Centre Library at the Indian Space Research Organisation Ahmedabad, Gujarat. The portal content according to them is divided into two broad categories: Information about the library (resources, services, floor plan, working hours, general forms, users' guide, circulars, staff list, frequently asked questions) and digital services (access to library content, online public access catalogue), CD/DVD collection, digital

repository, National Programme on Technology Enhanced Learning, current awareness service, and electronic resources.

A presentation by Páez, Font, Pastor-Ramon, Sastre- Suárez and Costa-Marin (2016) stressed the need for thematic research portals. The highlighted contents included ejournals and e-books of each specialty, journals of each specialty with impact factors, clinical practice guidelines, training courses from the their users training service aimed at specific groups and other useful links. Their motivation for a thematic portal was the fact that users of their virtual health sciences library had different professional profiles (physicians, nurses, pharmacists) as well as from different specialties (Primary Health Care, Internal Medicine, Oncology).

Duncan, Clement & Rozum (2013:269), Páez et al (2016) and Patnaik and Mishra (2015:118) have outlined various contents needed in a research portal for research and scholarly communication guidance. However, special mention should have been made of tailor-made and specific contents for each year of study in a postgraduate programme such as doctoral study.

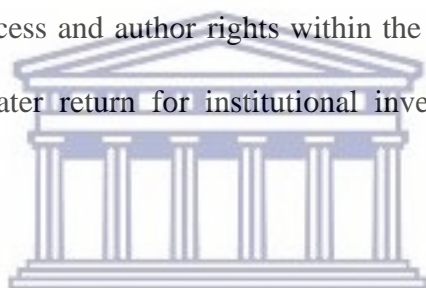


2.14.2 Cost of developing a research portal

Touching on the cost of developing a research portal, Greene (2010:98) describes University College Dublin Library's participation in a series of parallel projects. These projects include building a national open access portal, developing an international subject based portal, and the planning, development and management of a university institutional repository service. With particular reference to project management methodology, he reported that staff time spent on the project was by far the highest cost.

2.15 BENEFITS OF SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY

Houghton (2011) is of the view that publicly funded research which is disseminated to the society have the following benefits: “an increase in the stock of useful knowledge, an increase in the supply of skilled graduates and researchers, the creation of new scientific instrumentation and methodologies, the development of networks and stimulation of social interaction, the enhancement of problem solving capacity, the creation of new firms, and the provision of social knowledge”. Davis-Kahl (2012:214) adds that integrating elements of open access and other scholarly communication issues into the general library environment will increase awareness and understanding of open access and author rights within the library. The benefits include more publications and a greater return for institutional investment of money, time, and resources to PhD students.



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2.16 CONCLUDING SUMMARY

This chapter provided views of scholars on scholarly communication guidance. The chapter identified connections, contradictions and gaps in the literature with reference to information behaviour and skills of doctoral students; scholarly communication by doctoral students; academic library services and scholarly communication guidance by the academic library. The chapter also reviewed scholarly communication guidance by doctoral supervisors and the establishment of a research portal as part of a library website for scholarly communication.

The literature review suggests that doctoral students are sophisticated information-seekers, users of complex information sources and are more likely to consult more authoritative sources recommended by advisors. It was also revealed that, in academic research, practitioners need

to know what has been discovered so they can use the conclusions and recommendations to improve their own work. In a similar way, funders want to know what has been learnt in order to know that their money was well spent and will want others to learn from previous studies. Likewise, policymakers can use the findings to improve services and create better communities. The literature showed that scholarly communication programs started appearing in libraries to address these issues.

Thus, understanding these needs would act as an indicator for the development of scholarly communications guidance and appropriate research practices by the academic library, faculty, doctoral supervisors and the university administration. Scholarly communication guidance issues outlined in the literature include open access, copyright, publishing agreements and research support. Open access services should include publishing models. Copyright and publishing agreements services should include assisting patrons to use copyrighted materials legally and helping authors on their publishing agreements. Research support services should include training users to finding and evaluating open access resources as well as helping authors to comply with funding mandates. The literature review established that, copyright, publishing agreements and research support services must be a basic competency among academic librarians doing scholarly communication guidance.

The next chapter will discuss the theoretical framework adopted by the study.

CHAPTER THREE

THEORETICAL FRAMEWORK

3 INTRODUCTION

Case (2007:120) explained a theory as a set of related statements that explain, describe, or predict phenomena in a given context. Theories are speculative answers to perceived problems, and are tested by observation and experiment (Walliman, 2011a:63).

To achieve the research objectives, this study was framed by aspects of the proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment proposed by Costa (1999), Wilson's model of information behaviour (1999:250-251) and aspects of the scholarly communication lifecycle model developed by Björk (2007). Björk and Hedlund (2005) and later Björk (2007) incorporated new models of publishing available through institutional repositories and the open access movement. Sejane (2017:18) asserts that the goal with social science models is not necessarily to include all features of the system being modelled but only those necessary for research purposes. For scholarly communication guidance by the academic library to doctoral students to be effective, their information behaviour needs to be ascertained. The information behaviour models were used in this study to inform academic librarians on the information behaviour of doctoral students thus preparing them for scholarly communication guidance. It is also very important to establish the processes used to disseminate and communicate research findings either by print and/or electronic media.

3.1 COSTA'S PROPOSED ADAPTATION OF GARVEY AND GRIFFITH'S MODEL OF SCHOLARLY COMMUNICATION FOR A PRINT PLUS ELECTRONIC ENVIRONMENT

Costa (1999:50) reports that in the scientific context, the work of Garvey and Griffith provided some of the earliest contributions to the study of the communication process among scientists. Garvey and Griffith's model according to Costa (1999:51) is concerned with the dissemination aspect of the process and was entirely based on the printed media. Thus, it depicted the information channels used to make research information public, including both the informal and the formal channels. Hurd (1996) as cited by Costa (1999:52) asserts that computer-based communication was not foreseen by the Garvey and Griffith's model.

Costa (1999:249) proposed a hybrid scholarly communication process model. It is based on work done by Garvey and Griffith on print-based communication by scholars in the 1970's and the adaption thereof by Hurd to accommodate the electronic environment used by contemporary scholars and researchers. Costa is of the view that scholarly communication based on printed media only no longer existed. A model based entirely on electronic media also did not depict all the interactions within the communication system to illustrate the various ways of disseminating research findings. Although Costa acknowledged the irreversible trend towards the prevalence of electronic media at all stages, the proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment differentiated between printed and electronic communication.

The model represented the co-existence of the printed and the electronic media, as was perceived by social scientists in Brazil and the UK. It is illustrated in Figure 3.1.

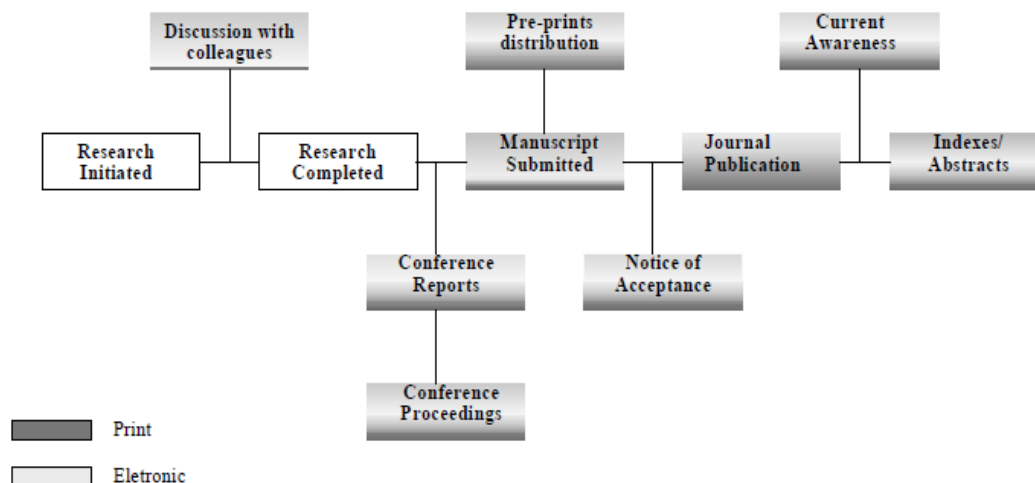


Figure 3.1 Proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment (Costa, 2000)

Costa (2000) stressed that, as intrinsic components of the scholarly communication process, informal and formal channels should co-exist, whatever the media employed. As the media change, however, there is an impact on the channels. Standing on the premise that both the print and electronic dissemination channels should co-exist, a hybrid system of scholarly communication was proposed. Both informal and formal channels of scholarly communication (discussion with colleagues, conference proceedings, journal publications) highlighted on both the print and electronic media.

A review of literature so far did not show this model being validated but it has been adopted in this study to complement other validated models in order to construct a workable conceptual framework for scholarly communication guidance by the academic library for doctoral students. It has also been adopted because it deals with channels and various ways of scholarly communication which doctoral students in this study would be educated on in order to effectively disseminate their research findings.

Costa's (1999) model was used to help seek answers to the following research questions:

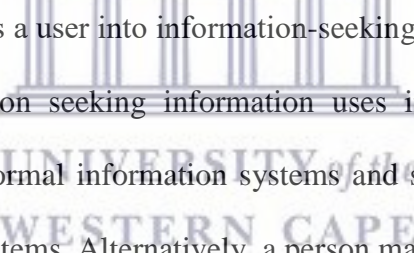
- What is the information behaviour of doctoral students at KNUST?
- What are their research and scholarly communication needs?
- What skills do they possess for scholarly communication? and
- What are the systems, sources and library services needed by doctoral students for effective scholarly communication?
- What has been the research output by doctoral students in the KNUST institutional repository (KNUSTSpace) since it was established?

3.2 WILSON'S MODEL OF INFORMATION BEHAVIOUR

Information behaviour is defined by Wilson (1999:249) as "those activities a person may engage in when identifying his or her own needs for information, searching for such information in anyway, and using or transferring that information". He further describes information behaviour models as "frameworks for thinking about a problem that may evolve into a statement of the relationship among theoretical propositions". Wilson's 1981 model suggests that information-seeking behaviour arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in success or failure to find relevant information. If successful, the individual then makes use of the information found and may either fully or partially satisfy the perceived need. If unsuccessful, the information seeker would have to reiterate the search process. That behaviour according to Wilson (1981:4) may take several forms: for example, the user may make demands upon formal systems that are customarily defined as information systems (such as libraries, on-line services, Prestel or information

centres). Prestel was adopted by the British Post Office as the trade name for its development of view data (Bright, 1979:251). Plaister (1981:345) explains that view data systems of which Britain's Prestel is one, aim to provide consultation of an information bank using telephone lines to link up with computers so that the information can be displayed on a television screen.

Wilson's 1981 model also shows that part of the information seeking behaviour may involve other people through information exchange and that information perceived as useful may be passed to other people, as well as being used (or instead of being used) by the person himself or herself (Wilson, 1999). Case (2012: 135) considered Wilson's model to be one of the most prevalent models of information seeking behaviour that is used in the library and information science field on a regular basis. Robson and Robinson (2013:178) summarises Wilson's model by stating that:



“A particular need leads a user into information-seeking activities, and these may take various forms. A person seeking information uses information systems or other information sources. Formal information systems and sources may be used, such as libraries and on-line systems. Alternatively, a person may seek information from other people and this is shown in the model as “information exchange”, with “information transfer” representing the communication of information. If information is found it can be used and may fully or partially satisfy the perceived need, or it may fail to do so, in which case the user may look for further information.”

Wilson's model is illustrated in Figure 3.2. This figure according to Wilson (1999:251) is a variation of the 1981 model.

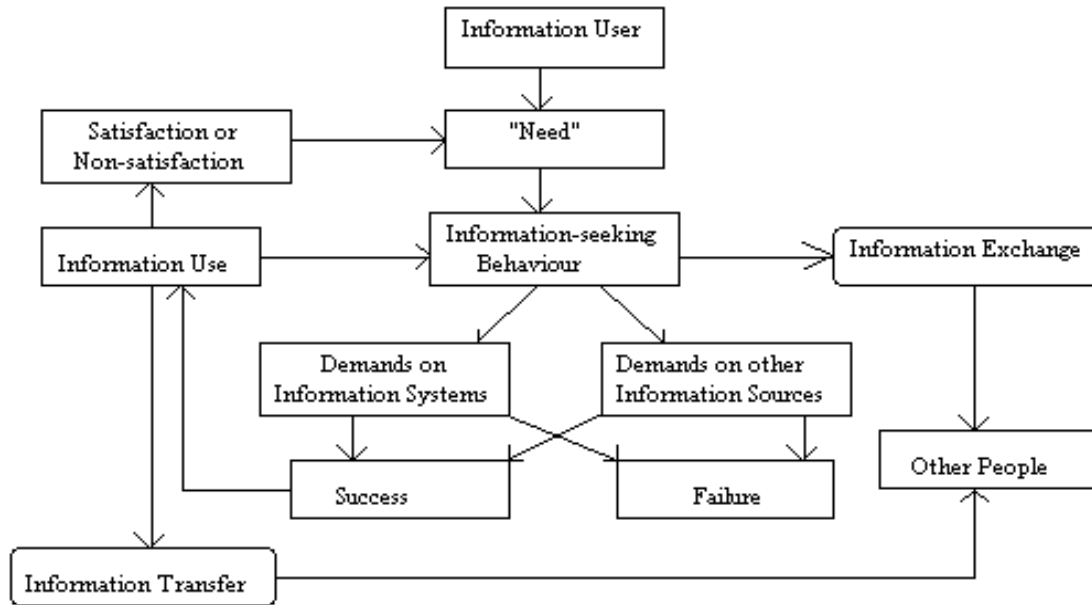


Figure 3.2 Wilson's 1981 model of information behaviour (Wilson, 1999:251)

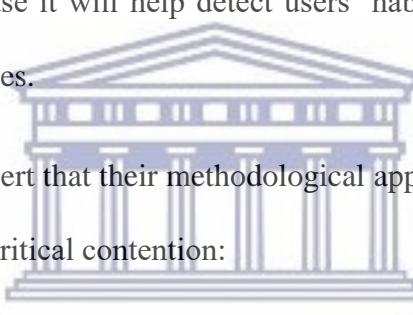
Wilson's model is adopted because it refers to information systems, information sources and the information user. It also introduces concepts of results of information seeking (success/failure) and degree of satisfaction of information need. This model of information behaviour was adopted to address these research questions:

- What is the research behaviour of doctoral students at KNUST?
- What are the systems, sources and library services needed by doctoral students for effective scholarly communication?
- What are their research and scholarly communication needs?
- What skills do they possess for scholarly communication?
- How can the University library establish an effective scholarly communication guidance program for doctoral students at KNUST?
- How will a research portal for the KNUST library strengthen research output by doctoral students?

According to Wilson, Ford, Ellis, Foster and Spink (2002:705), this model suggests that information-seeking behaviour is goal-directed behaviour with the resolution of the problem and, possibly, the presentation of the solution as the goal. It has been used successfully in many studies which investigated information seeking behaviour of graduate students, researchers and faculty members in various parts of the world.

Pinto and Sales (2007:532) adopted Wilson's model in conjunction with other models to establish the information behaviour of translation students at the Universitat Jaume I, Castellón, Spain. The authors believe that the study of the information behaviour of specific communities is one of the objectives that need to be designed and planned by teachers of applied documentation. This is because it will help detect users' habits and needs, resulting in the provision of tailor-made services.

Pinto and Sales (2007:536) assert that their methodological approach is defined by qualitative methods, following Wilson's critical contention:



“An orientation towards the user in the true sense that is, avoiding preconceptions about what constitutes ‘information’ while concentrating upon the problems that create cognitive and/or affective needs in the information user, must result in a greater humility about the potential value of traditional information practices and a greater willingness to innovate and experiment.”

They believe that if one is to examine information behaviour from the user viewpoint, the most suitable methodology will be one centred on the gathering of primary data.

Tury, Robinson and Bawden (2015:313) studied the information seeking behaviour of a large constituency of distance learners who are distributed across several continents, and who predominantly depend on an online library at their host institution. The purpose of the study

was to gain an understanding of the information needs and information-seeking behaviour of distance learners, using the students of the International Programmes of the University of London as a case study. They adopted and extended Wilson's model to cater for the specific features of the distance learning context. This model according to them is comprehensive, applicable to various contexts, roles and disciplines and is well established in the field; as such, it is applicable in different contexts, roles and disciplines.

Their study concluded with a task for information providers to work within the context of providing ease and speed of access to resources as well as familiarity of sources while trying to promote the value of high-quality relevant sources. The researchers recommended that practical lessons such as promotion of systems and resources and training in their use are particularly important to these physically separated groups; but these need to be tailored to sub-groups, subjects and demographics (Tury, Robinson & Bawden, 2015:319).

Majyambere and Hoskins (2015:63) also adopted Wilson's model of information behaviour to fit an African context for international postgraduate students. The study is based on a doctoral dissertation which investigated the information seeking behaviour of Humanities/Arts international postgraduate students in public universities in KwaZulu-Natal, South Africa. The study accepted and applied Wilson's definition for information seeking behaviour since surveyed students were engaged with both computer-based and manual information systems available at host universities. Wilson defined information seeking behaviour as Wilson (2000:49).

“The purposive seeking for information as a consequence of a need to satisfy some goal. In the course of seeking, the individual may interact with manual information

systems such as a newspaper or a library or with computer-based systems such as the World Wide Web”.

Wilson’s model indicates that an individual may consult different systems or sources of information based on the nature of a goal to achieve or a problem to deal with. Therefore, a person may either succeed or fail to satisfy a perceived need during information seeking behaviour. Majyambere and Hoskins (2015:80) are of the view that the model accepts that people are flexible when searching for information to satisfy a perceived need and they may change searching strategies at any time depending on information obtained.

One recommendation in the study by Majyambere and Hoskins (2015:80) was the fact that faculty offices should collaborate with the university libraries when planning library training sessions and designing the content to be covered in each session. Lecturers and supervisors should liaise more closely with subject librarians to suggest content for the library training and discuss information needs of postgraduate students with the subject librarians.

3.3 THE SCHOLARLY COMMUNICATION LIFECYCLE MODEL DEVELOPED BY BJÖRK

This model was developed by building on previous models. Björk and Hedlund (2005) and later Björk (2007) incorporated new models of publishing available because of institutional repositories and the open access movement. The fourth version has been adopted in this study. It consists of 33 separate diagrams, arranged in a hierarchy up to seven levels deep (Björk, 2007:8, 10). The whole life-cycle is seen as consisting of four separate stages: they are Fund Research and Development, Perform the research, Communicate the results and Apply the

Knowledge (Björk, 2007:12). One important aspect of the process is the funding of the activities. Bjork (2007:8) indicated that, although parts of the overall process are carried out by commercially operating parties, almost all stages are predominantly funded by public finance via university budgets, research grant organisations and many more.

He further states that, Fund Research and Development is included in the model to show the importance research funders (understood in the widest sense including basic university funding) have in the shaping of the scientific communication chain, since they, through research contracts and university guidelines, potentially have the power to strongly influence a move towards Open Access. Perform the research, according to Björk is the most resource demanding part of the system. Communicate the results is the most extensive part of the model, with an end result called disseminated scientific knowledge, reflecting the viewpoint that scientific results which have been published, but which are not read by the intended readers are rather useless. The downstream activity, apply the Knowledge in the model is important in order to achieve the improved quality of life which research funders mainly are looking for. The first diagram in the model (Björk, 2007:12), which contains a summary of all the activities in the model is shown in Figure 3.3.

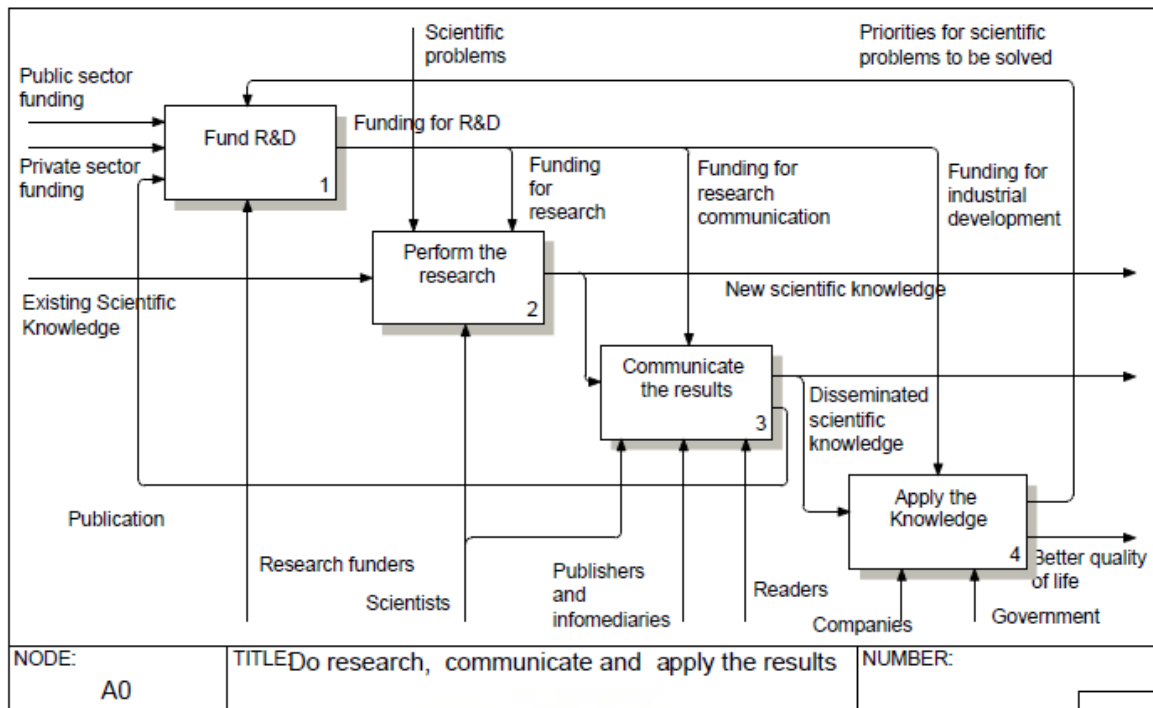


Figure 3.3 Do research, communicate and implement the results – breakdown (Björk, 2007:12)

This model has been found to be useful for assessing scholarly communication. It has also been successfully used by authors and researchers to support academic scholars' information dissemination processes.

A presentation by Mercer and Dyas-Correia (2011:236) gave a summary of Björk's model. They stated that it is a model that focuses on activities, inputs, outputs, controls, and mechanisms. They added that Björk describes it as follows:

“The scope of the model is the whole scientific communication value chain, from initial research to the assimilation of research results to improve every-day life. The model treats both informal and formal communication, as well as the publishing of data, but the major focus is on modelling the publishing and indexing of traditional peer reviewed

journal articles, as well as the activities of readers to find out about them and access them. The new business models and parallel functions enabled by the Internet, such as open-access journals and e-print repositories, are also in focus” (Mercer & Dyas-Correia, 2011:236).

Mercer and Dyas-Correia (2011:236) suggest that the model is applicable to all scholarly communication, although Björk presents his model as one for scientific communication. Björk’s scholarly communication lifecycle model was depicted in a forty-eight-page document with thirty-three diagrams in hierarchies up to seven levels deep (Ketchum, 2017:80).

The model according to Bjork (2007:6) explicitly includes the activities of all the stakeholders in the overall publishing process including the activities of the:

- *Researchers* who perform the research write the publications and act as reviewers
- *Research funders* who strongly influence the process
- *Publishers* who manage and carry out the actual publication process
- *Libraries* who help archiving and in providing access to the publications
- *Bibliographic services* which facilitate the identification and retrieval of publications
- *Readers* who search for, retrieve and read publications
- *Practitioners* who implement the research results directly or indirectly

Roosendaal and Geurts (1997) list four functions of scholarly communication in their presentation at the first international workshop of Cooperative Research Information Systems in Physics in Oldenburg, Germany in 1997. These functions are registration, archiving, certification and awareness. They add that, four main forces come into play: the actor pair (author/reader), accessibility, content, and applicability. Park and Shim (2011:76) explain the

registration function as reflecting in publishing, intellectual property, and licensing services; the archiving function reflecting in digitization and repository services; the certification function, reflecting in expert review and research support services and; the awareness function reflecting in knowledge-sharing-platform and search aid services.

The scholarly communication lifecycle model developed by Björk has been adopted by various authors in literature to discuss these issues raised by Roosendal and Guert (1997) as well as Park and Shim (2011).

Collie and Witt (2011:166) discussed the scholarly communication lifecycle in terms of the e-thesis and dissertation and the new role it is creating for the university and its student-authors, faculty, graduate programs and librarians. They are of the view that implementing new practices such as the ability to co-link data and document; self-archive research data and widen the access to data can augment the value of e-thesis and dissertation collections. Thus, there would be an improvement in research impact. Björk's model stipulates that doctoral theses are special cases since they usually undergo rigorous quality control and are lengthy compared to reports and articles. Increasingly, universities are putting students' theses into their institutional repositories to make them accessible to a wider user community. This, according to Collie and Witt, means that students who wish to present research data should expect a greater return on their initial effort with a more valuable research output. Opportunities to disseminate data as citable, scholarly objects, alongside the document, increase exposure and potential impact at a critical point in the students' careers, when they are applying and interviewing for their first postdoctoral jobs.

This would therefore make faculty and researchers have supporting data immediately in-hand to evaluate results and more effectively vet the student's research. Librarians who interpret and

apply collection development policies to evaluate prospective datasets can make a strong argument for including e-thesis and dissertation data in their collections as a part of the intellectual record of the institution (Collie & Witt, 2011:166).

Heidorn (2011:667) aligns the scholarly communication lifecycle with the digital curation lifecycle. He first explains that the role of libraries is to collect, preserve, and disseminate the intellectual output of the society. This output includes books and serials as well as the digital versions of the same. He further states that, scientists, other scholars, and all of society are now producing, storing, and disseminating digital data in much larger volumes than the text and posits that the survival of this data is in question since the data are not housed in long-lived institutions such as libraries. It has also been reported in the study that funding agencies are looking for new institutions to handle this form of scholarly output. This is because the funders have come to realize that much of the data they are paying to have generated is not being properly curated or fully utilized and is often lost. Heidorn (2011:662) is of the view that libraries are the institutions that could best manage this intellectual output. Therefore, librarians should work side by side with the researchers. The librarians and data managers act as advisors for researchers by helping to identify the project data management needs and mapping these needs to existing tools for data curation (Heidorn, 2011:666).

The model has also been used to discuss the impact and cost-benefit of the open access (OA) system of scholarly communication by authors such as Ayris (2011), Collie and Witt (2011), Houghton (2010) and Swan (2010).

Analysis of the potential benefits of more open access to research findings by Houghton (2010:387) suggested that open access could have substantial net benefits in the longer term, and while net benefits may be lower during a transitional period, they are likely to be positive

for both open access publishing and overlay alternatives in gold open access and for parallel subscription publishing and self-archiving in green open access. Houghton's study again, sought to map activities throughout the scholarly communication lifecycle, then attached costs to each of the activities to explore the direct activity cost differences and indirect system-wide cost differences between publishing models. In the final step, the costs are set against system-wide cost savings and benefits in the form of increases in returns to research and development to estimate cost-benefits.

Houghton (2010:387) further asserts that the benefits of more open access exceeded the costs across a wide range of values, and it is difficult to imagine any plausible values for the main variables that would result in a fundamentally different answer.

A study by Ayris (2011) reports that Houghton's study was for knowledge exchange which compared the benefits of Open Access in the UK, the Netherlands and Denmark. According to him, in the three national studies, the costs and benefits of scholarly communication were compared, each based on three different publication models. The study by Ayris (2011) agrees with Houghton revealing that the greatest advantage would be offered by the Open Access model. Swan (2010) submitted a report on modelling scholarly communication options: costs and benefits for universities to the Joint Information Systems Committee (JISC) in the UK. Swan (2010) asserts that moving to open access as the basis for disseminating research outputs can bring economic and academic benefits for all universities. He listed benefits in the areas of open-access repositories and open access journals. He asserts that, if universities continue to pay for subscription-based journals while simultaneously making their outputs freely available through their repositories as they currently do, they are likely to make savings. The amount saved by the universities studied ranges from 0.1 million GBP to 1.32 million GBP per annum. Thus, savings accrue from increased efficiencies in the research and library handling

processes. He added that, if universities switch to a system of using their repositories as the locus for collecting articles that are ready for publication, and use paid-for peer review and editorial services (overlay publishing services) to validate and control the quality of those articles, savings can be made by most universities.

In relation to open access journals, Swan (2010) reports that, if universities switch from the current subscription-based system to publishing all their articles in open access journals that charge an article-processing fee, there would be savings for all universities. Another issue discussed was academic benefits from open access. Academic benefits according to him include increased visibility, usage and impact for their research outputs. Collie and Witt (2011:172) are of the view that providing an option to self-archive doctoral dissertations and data in a local open access repository can improve usage and reduce the time it takes for a document to become available online during a critical time in the student's career.

Waller and Bazaley (2014:488) applied the scholarly communication lifecycle in their study on empowering faculty in transforming scholarly communication. The study was conducted at Miami University, Oxford Ohio. It was generated from the background that Miami University has a large and active body of faculty members who perform research and publish regularly, yet, the University community has been slow to recognize the changes occurring in the scholarly communication landscape.

“Librarians are deeply invested in the scholarly publishing lifecycle. This investment, in tandem with an evolving scholarly communication system, has encouraged librarians to become advocates for transformation in this landscape. At the same time, some faculty members have been slower to understand the complexities of the current system and its evolution” (Waller and Bazaley, 2014:488).

Their study reports that as a response, several librarians designed and co-facilitated two Scholarly Communication Faculty Learning Communities (FLCs) for two academic years. The authors assert that these FLCs have been the most successful method of increasing faculty understanding about scholarly communication and academic publishing issues. The study revealed that, it was very important not to overestimate faculty awareness of institutional subscription costs, journal economics, or the scholarly research lifecycle. It was ascertained that librarians have been asking faculty to advocate for change in a system that they know only as authors, editors, and reviewers.

Walley and Bazaley (2014:494) report that there were several very gratifying faculty behaviour changes in both years of the FLC. One faculty member who was originally sceptical about open access ended up publishing articles in two different open access journals, both of which required article-processing charges that he paid for with grant funding. A second faculty member was at the time working on the creation of an open access history of mathematics journal (hosted by the library), to be managed by his students in a particular course. The intention is to teach undergraduates about the lifecycle of research and scholarship by immersing them in peer review and editing.

This study believes that faculty members who supervise doctoral students cannot be left out of scholarly communication guidance by the academic library. The academic library therefore has to identify ways of involving faculty in such issues.

O'Brien (2010:152) however, asserts that the primary motivation of a scholar is to choose an outlet that will have the highest visibility with the specific audience they want to reach, even if that audience is small, preferring a prestigious commercial publisher over an open access publication without a prestigious imprimatur. She adds that young scholars were particularly

conservative in their research dissemination behaviour whereas established scholars could afford to be more innovative. It therefore behoves on the academic library to effectively conduct scholarly communication guidance especially to doctoral students who in turn become established scholars.

3.4 PROPOSED SCHOLARLY COMMUNICATION GUIDANCE MODEL FOR ACADEMIC LIBRARIES

In view of the proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment by Costa (1999), Wilson's model of information behaviour (1999:251) and aspects of the scholarly communication lifecycle model developed by Björk (2007), the researcher developed and proposed the Scholarly Communication Guidance model for academic libraries as presented in Figure 3.4.

For a library user, (who in this case is the doctoral student) to be able to utilise both print and electronic ways for scholarly communication as proposed by Costa as well as open access channels proposed by Bjork, there should be some form of guidance. This calls for a scholarly communication guidance model. Guidance can also be offered when their information behaviour has been ascertained.

The Model proposes that scholarly communication guidance should be offered to doctoral students immediately they enroll for their programs, throughout their research process, and finally when the research is completed.

The model also proposes that funding for effective scholarly communication guidance should be provided through meaningful financial budgets for the academic library by the parent university.

At KNUST where the academic library does minimal scholarly communication guidance to doctoral students, the model can be adopted as a guide for the development of an effective scholarly communication guidance program to doctoral students. The model can also be adopted by other universities in Ghana where scholarly communication guidance by the academic library is lacking as well as other West African Countries.

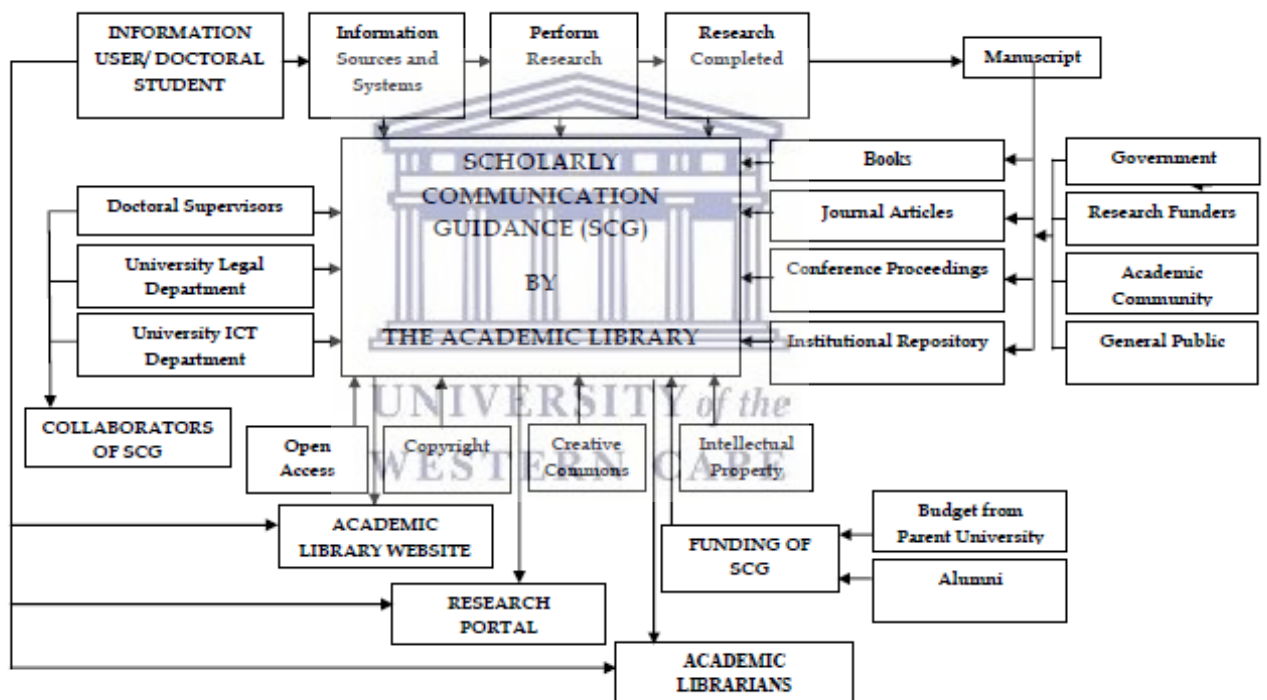


Figure 3.4 Scholarly Communication Guidance Mode

3.4.1 The Information User/Doctoral Student

The information user is the doctoral student who has identified an information need. This need urges the student to consult various information sources and information retrievals systems. The information user moves to conducting research when he or she has retrieved sufficient information to satisfy his or her information needs. A research portal (which is updated regularly) as part of the academic library website should be available for the doctoral student from the time of registration to guide him or her in the process.

3.4.2 Scholarly communication

Various issues that are raised when scholarly communication is mentioned have pointed to the need for scholarly communication guidance. This includes open access, copyright and plagiarism, intellectual property and creative commons. Types of scholarly communication systems have been outlined in the model. The doctoral student has various options to disseminate research findings to the general public, research funders, the government and the academic community. The institutional repository serves as both a type of scholarly communication system and an information source.

3.4.3 Collaborators of scholarly communication guidance

The supervisors of doctoral students and the university information communication department have to support the academic library to provide effective scholarly communication guidance. The information communication department can support with the required technical infrastructure such as the design of software packages for the institutional repositories and data management. The university legal services department should assist in issues related to copyright.

3.4.4 The academic library website and a research portal

A research portal, as part of the academic library website as well as the library's homepage are very important platforms for providing scholarly communication guidance. The whole research process, what is required of students and their supervisors, platforms of research findings dissemination should all be stipulated in the research portal to guide students.

3.4.5 Funding for scholarly communication guidance

For scholarly communication guidance to be effective, funding is very critical. This could be in the form of money or provision of logistics.

3.5 MAPPING RESEARCH QUESTIONS WITH THEORIES/MODELS AND THEIR KEY VARIABLES



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The key variables in the theories and models have been mapped with the research questions for this study in Table 3.1.

Table 3.1 Mapping research questions with theories/models and their key variables

	Research Questions	Theory/Model	Key Variables from Theory/Model
1	What is the information behaviour of doctoral students at KNUST?	Costa's proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment	Sources of Information
	What are their information needs?		
	What information seeking skills do they possess?	Wilson's Model of Information Behaviour	Information sources, Information behaviour and skills and
	What are the information retrieval systems, sources and library services needed by doctoral students?	The scholarly communication lifecycle model developed by Björk	Retrieval systems, Scholarly Communication
		Scholarly Communication Guidance Model	Information User, Information Sources and Systems

2	What has been the research output by doctoral students in the KNUST institutional repository (KNUSTSpace) since it was established?	The scholarly communication lifecycle model developed by Björk	Institutional Repositories , Scholarly Communication
		Scholarly Communication Guidance Model	Institutional Repository, Completed Research, Open Access
3	How can the University library establish an effective scholarly communication guidance program for doctoral students at KNUST?	Wilson's Model of Information Behaviour	Information behaviour and Skills
		The scholarly communication lifecycle model developed by Björk	Types of Scholarly communication, Scholarly communication issues (copyright, open access, plagiarism, creative Commons)
		Costa's proposed adaptation of Garvey and Griffith's model of scholarly	Types of Scholarly communication

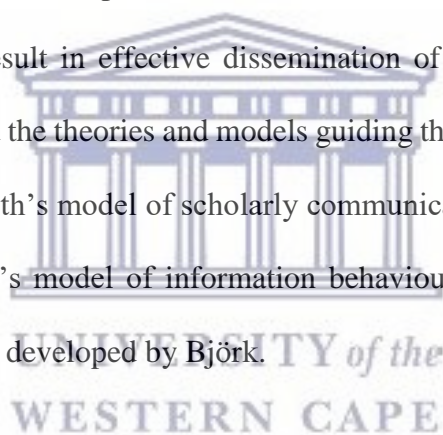
		communication for a print plus electronic environment	
		Scholarly Communication Guidance Model	Academic Librarians, Academic Library Website Research Portal, Funding of Scholarly Communication Guidance, Collaborators of Scholarly Communication Guidance
4	How will a research portal for the KNUST library strengthen research output by doctoral students?	Wilson's Model of Information Behaviour	Information Use, Information Seeking
		Costa's proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment	Scholarly communication

		The scholarly communication lifecycle model developed by Björk	Research Impact, Author and Institutional Visibility
		Scholarly communication Guidance Model	Academic Librarians, Academic Library Website, Research Portal, Funding of Scholarly Communication Guidance, Collaborators of Scholarly Communication Guidance
5	What are the important features of a research portal?	The scholarly communication lifecycle model developed by Björk	Perform research and communicate results, Types of Scholarly communication, Scholarly communication issues (copyright, open access, plagiarism, creative Commons), Scholarly Communication
		Scholarly communication Guidance Model	Academic Librarians, Academic Library Website,

			Research Portal, Funding of Scholarly Communication Guidance, Collaborators of Scholarly Communication Guidance
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3.6 CONCLUDING SUMMARY

The academic library should be able to spearhead all the issues related to scholarly communication guidance. This will in turn result in effective dissemination of research findings by doctoral students. This chapter discussed the theories and models guiding this study. They are the proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment by Costa, Wilson's model of information behaviour and aspects of the scholarly communication lifecycle model developed by Björk.



The suitability of these models as well as their key variables were discussed. The identified variables were: retrieval systems, information Sources, institutional repositories, information behaviour and skills, information use, research impact, author and institutional visibility, information seeking, types of scholarly communication and scholarly communication issues (which included information dissemination, open access, copyright, creative commons, plagiarism and digitisation). A scholarly communication guidance model for academic libraries was developed. The Model proposes that scholarly communication guidance should be offered to

doctoral students immediately they enroll for their programs, throughout their research process and finally when the research is completed.

The next chapter will discuss the research design and methodology for the study.



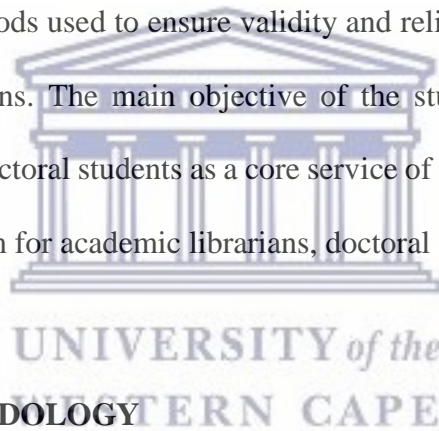
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CHAPTER FOUR

RESEARCH METHODOLOGY AND DESIGN

4 INTRODUCTION

This chapter discusses the research methods chosen to investigate scholarly communication guidance as a core service of an academic library to doctoral students. It includes a discussion of the research methodology, the philosophical assumption underlying this research, the research design, the population of the study, data collection procedures and how data was analysed. The chapter also discusses the methods used to ensure validity and reliability of the data for the study as well as ethical considerations. The main objective of the study is to investigate scholarly communication guidance for doctoral students as a core service of the academic library which will serve as an educational platform for academic librarians, doctoral students and faculty members.



4.1 RESEARCH METHODOLOGY

Research methodology has been explained by Kothari (2004:8) as a systematic way to solve research problem. Kothari adds that it includes the various steps normally taken by a researcher in the study of one's research problem.

Gray (2014:29) outlines several factors that determine the choice of a research methodology. They include: "whether the researcher believes that there is some sort of external 'truth' out there that needs discovering or whether the task of research is to explore and unpick people's multiple

perspectives in natural field settings”. It is also influenced by the researcher’s attitude towards the ways in which he or she thinks theory related to his or her research should be used. Again, it is influenced by whether research should begin with a theoretical model or perspective (deductive approach) or whether such models should emerge from the data itself (inductively).

4.1.1 Mixed methods

“The mixed method is defined as an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data using distinct designs that may involve philosophical assumptions and theoretical frameworks” (Creswell, 2014:4). Kothari (2004:3) made a distinction by stating that quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with qualitative phenomenon, that is phenomena relating to or involving quality or kind. According to Creswell (2014:4), qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem.

Mixed method resides in the middle of quantitative and qualitative methods because it incorporates elements from both methods (Creswell, 2014:3). The core assumption of the mixed method is that, the combination of both qualitative and quantitative approaches provide a more complete understanding of a research problem than either approach alone.

This study adopted the mixed method approach in order to get an in-depth understanding of the phenomenon under study.

4.1.1.1 Types of mixed methods approach

Creswell, Plano, Clark and Garrett (2008:67) explained the types of mixed methods as those that can be conducted concurrently and those that can be conducted sequentially. Creswell (2014:219) presented three basic mixed methods design as: convergent parallel mixed methods design, exploratory sequential mixed methods design and explanatory sequential mixed methods design.

4.1.1.1a Convergent parallel mixed methods design

This method according to Creswell (2014:219) involves a researcher collecting both quantitative and qualitative data, analysing them separately and then comparing the results to see if the findings confirm or disconfirm each other.

4.1.1.1.b Exploratory design

Researchers begin by exploring the topic with qualitative methods and then build to a second quantitative phase where the initial results may be tested or generalised (Creswell, Plano, Clark and Garrett, 2008:68). It is also explained by Creswell (2014:225) as a method where the researcher first begins by exploring with qualitative data and analysis and then uses the findings in a second quantitative phase.

4.1.1.1.c Sequential explanatory design

The mixed-methods sequential explanatory type has been summarised by Ivankova, Creswell and Stick (2006:5) and Creswell, Plano, Clark and Garrett (2008:68) as consisting a quantitative method phase and then a follow up with qualitative methods. Thus, a researcher first collects and analyzes the quantitative data. The qualitative data are collected and analyzed second in the

sequence and help explain or elaborate on the quantitative results obtained in the first phase. The two phases are then connected in the intermediate stage in the study.

Ivankova, Creswell and Stick (2006:5) indicates that the basis for this approach is that the quantitative data and their subsequent analysis provide a general understanding of the research problem and the qualitative data and their analysis refine and explain those statistical results by exploring participants' views in more depth.

The sequential explanatory type is adopted in this study. In this study, the quantitative data was collected through questionnaire responses from doctoral students and doctoral supervisors. The qualitative data was also elicited through interviews, documentary analyses and bibliometric survey. An analysis of the quantitative data helped shaped and improved upon the questions asked during the interviews as well as the information sought from the documents and the bibliometric survey. For this study, the qualitative data was not elicited from the respondents of the questionnaire but rather those who will be providing the services requested by the respondents in the questionnaire.

4.1.2 Rational for a mixed method approach

Thomas (2003:7) asserts that most research does not fit clearly into one category (qualitative or quantitative). The best often combines features of each because in the same research project, some data may be collected that is amenable to statistical analysis, while other equally significant

information is not. Although he believes that neither quantitative nor qualitative is superior to the other.

To fully answer the research questions and achieve the purpose for this study, the mixed method research approach has been adopted. Some of the research questions require qualitative data collection strategies such as open-ended interviews and document analysis to fully answer them. Through the conduct of interviews, participants would be able to supply qualitative data concerning scholarly communication guidance to doctoral students and the establishment of a research portal as part of the library website for scholarly communication. Only quantitative data in the form of numbers would not be able to supply the insight needed to answer some of the research questions.

4.2 RESEARCH PHILOSOPHY

Research philosophy has been explained by Pandey (2016:54) as a belief about the way in which data about a phenomenon should be gathered, analyzed and used. The discussion of research philosophy according to O’Gorman, Lochrie and Watson (2014:59) helps set out the foundations for one’s study and explain to the reader, the basis for one’s knowledge claims. They assert that, when anyone is undertaking any research project, it is considered a good practice to clearly outline the philosophical basis for claiming to know what we know which is commonly called the research paradigm. Creswell (2014:6) chooses to call it worldview and highlighted four that are widely discussed in literature: post-positivism, constructivism, transformative, and pragmatism.

The focus of a research study that adopts post-positivism is to make claims and reform, abandon or refine them for other more strongly warranted claims. It involves empirical testing and

controlled research methods in the achievement of this goal (Kelly, Dowling & Miller, 2018).

On the other hand, constructivism according Antwi and Hamza (2015:217) is the theoretical framework for most qualitative research. It is interpretive in nature and the purpose of inquiry is to understand a particular phenomenon, not to generalize to a population .

Romm (2015:411) indicates that researchers who embrace the transformative worldview have social justice issues in mind so that their inquiries become interwoven with a political agenda and are action-oriented towards generating increased fairness in the society.

Rahi (2017:1) posits that supporters of pragmatism worldview believe that true knowledge can be obtained by mix method approach. Thus, the problem is most important and researchers should use all approaches to understand the problem statement. He is of the view that pragmatic researchers are free to use both quantitative and qualitative approaches; the essential is to find the best techniques and procedure of research that solve problem statement.

4.2.1 Research philosophy adopted for this study

For the sake of the objectives of the study, this research falls within the pragmatism worldview. Pragmatism as a worldview arises out of actions, situations, and consequences rather than antecedent conditions. Thus, for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis (Creswell, 2014:10). With this background, the strategies adopted in conducting this study are in line with the pragmatism worldview.

4.3 RESEARCH DESIGN

A research design is a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately and economically (Kumar, 2011:94). Gray (2014:128) defines a research design as the overarching plan for the collection, measurement and analysis of data.

Pandey and Pandey (2015:20) assert that a good research design minimizes bias and maximizes the reliability of the data collected and analyzed. Thus, the design giving the smallest experimental error, is reported to be the best design in scientific investigation. Similarly, a design which yields maximum information and provides an opportunity for considering different aspects of a problem is considered to be the most appropriate and efficient design.

4.3.1 Case study

This study used the case study research design. Creswell (2013:98-99) submits that a case study is an approach through which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time through detailed, in-depth data collection involving multiple sources of information. Baxter and Jack (2008:544) stated that a case study method ensures that the issue is not explored through one lens, but rather through a variety of lenses allowing for multiple facets of the phenomenon to be revealed and understood.

Insights gathered from case studies can directly influence policy, procedures and future research (Hancock & Algozzine, 2006:11). A case study may be qualitative as well as quantitative in nature depending upon the content (Pandey & Pandey, 2015:12). This study therefore adopted the mixed method approach in conducting the case study research.

4.3.2 Research site

The research site for the study is Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (KNUST). The University was officially opened on 22nd January, 1952. KNUST has six colleges. These colleges are made up of departments, faculties and research centers. The colleges are: College of Agriculture and Natural Resources, College of Art and Built Environment, College of Humanities and Social Sciences, College of Engineering, College of Health Sciences and College of Science.

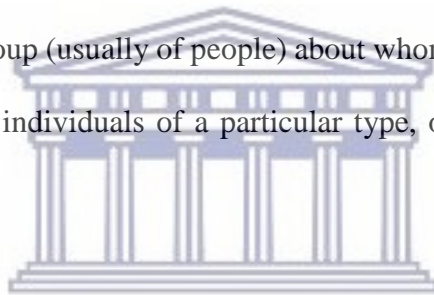
The university library system consists of the main library and the six college libraries. Some of the college libraries have smaller libraries in their departments and faculties. The departments in the main library are Collection Development Management, Academic Support, Student Support and Technical Unit, and Systems Support.

The researcher found KNUST an appropriate site for the study because KNUST is the premier science and technology university in Ghana. The academic library of KNUST also hosts the first institutional repository (KNUSTSpace) in Ghana (Corleley, 2011). The vision of KNUST is “Advancing knowledge in Science and Technology for sustainable development in Africa” (KNUST, 2018). This vision is in line with the Draft National Science, Technology and innovation policy (2017-2020) of the Ministry of environment, science, technology and innovation on basic research (Ministry of Environment, Science and Technology, 2017). This policy seeks to promote and encourage basic research as the bedrock of scientific and technological innovation. One intervention of this policy is to support researchers to undertake basic research relevant to socio-economic development. Alemna (2012:1) has stated that libraries can assist in national development by providing educational, social, political, health and economic information.

This study believes that, because doctoral students are mandated to conduct original research for national development, the academic library in collaboration with faculty has to offer scholarly communication guidance to enable the university and the nation as a whole achieve their objectives on national development.

4.4 POPULATION

Best and Khan (2007:13), defined a population as any group of individuals that have one or more characteristics in common that are of interest to the researcher. Babbie (2005:112) adds that the population for a study is that group (usually of people) about whom we want to draw conclusions. The population may be all the individuals of a particular type, or a more restricted part of the group.



The population for this study firstly comprised of 699 doctoral students registered for the 2017/2018 academic year at KNUST, regardless of their year of first enrolment.

The population secondly comprised of 215 academics supervising doctoral students registered for the 2017/2018 academic year at KNUST. The supervisors were selected as part of the population to help identify the research and scholarly communication skills of doctoral students, because they are in close and direct contact with the doctoral students and are able to access skills they possess. Secondly, the supervisors were chosen in order to ascertain how the academic library can collaborate with faculty to offer scholarly communication guidance to doctoral students and vice versa.

The population for interviews included the two acting deputy librarians of the university library system (representing the university librarian, whose tight work schedule could not permit an interview) and the senior ICT Assistant of the KNUST Library system on technical issues regarding research portal and the academic library website

Professional librarians in the university library system at KNUST were also interviewed. The KNUST library system as at February 2018 had seventeen (17) professional librarians with qualifications such as Master of Arts or Master of Philosophy in Library or Information Science. Two (2) of the professional librarians are the acting deputy librarians, therefore, for this study, the population for the professional librarians is fifteen (15). They normally head departments, sections or units of the university library system. The choice of the professional librarians is to determine current scholarly communication guidance practices (if any), the skills and systems needed by academic librarians to provide scholarly communication guidance library to doctoral students. The professional librarians were also interviewed to identify the needed information to be used in the designing of a research portal as part of the academic library website. The university Librarian who is the overall boss of the professional librarians holds a doctoral degree. The population has been outlined in Table 4.1.

Table 4.1 Population for the study

Participants	Population
Doctoral Students	699
Supervisors of doctoral students	215
Professional librarians	15
Senior ICT Assistant	1
Dean of the School of graduate studies	1
Acting deputy librarians	2
TOTAL	933

4.5 SAMPLING TECHNIQUE

Sampling can mean any procedure for selecting units of observation – for example, interviewing every tenth passer-by on a busy street (Babbie, 2005:185). Babbie (2005:112) is of the view that, we are almost never able to study all the members of the population that interests us, we then select a sample from among the data that might be collected and studied.

Gray (2009:148) is of the view that, if it is not possible to evaluate the entire population (because of its large size or a lack of research resources), then we might select a sample for evaluation. Kumekpor (2002:135) has outlined two main types of sampling techniques as Probability and Non-Probability Sampling. Probability sampling is sometimes called random sampling and non-probability sampling is sometimes called non-random sampling.

When researchers want precise, statistical descriptions of large populations, they turn to probability sampling (Babbie, 2005:192). Types of probability sampling according to Gray (2009:150) are simple random sampling, stratified random sampling, cluster sampling and stage sampling.

The four types of non-probability sampling have been listed by Babbie (2009:188) as reliance on available subjects, purposive or judgmental sampling, snowball sampling and quota sampling.

4.5.1 Probability sampling

In order to explain probability sampling, the types thereof need to be explored.

4.5.1.1 Simple random sampling

Simple random sampling is applied in such a way that each unit in the universe stands an equal chance or probability of being included or excluded in the final sample (Kumekpor, 2002:141). It is used when it is believed that the population is relatively homogenous with respect to the research questions of interest (Gray, 2009:151).

4.5.1.2 Stratified random sampling

It consists of taking a sample from various strata (Gray, 2009:152). Kumekpor (2002:148) adds that the universe is divided into layers or components of strata and each stratum is sampled separately.

4.5.1.3 Cluster sampling

Kumekpor (2002:149) explains that for this type of sampling, the units of investigation are grouped into a number of larger units or clusters from which a number of clusters, not individual units of investigation are selected. Babbie (2005:215) adds that cluster sampling may be used when it's either impossible or impracticable to compile an exhaustive list of the elements composing the target population.

4.5.1.4 Stage sampling

Gray (2009:152) posits that stage sampling is an extension of cluster sampling that involves successive random selections.

4.5.2 Non-probability sampling

In order to explain non-probability sampling, aspects thereof need to be explored.

4.5.2.1 Reliance on available subjects

Another name for reliance on available subjects has been stated by Gray (2009:152) as convenience or volunteer sampling. Samples are selected purely on the basis that they are conveniently available.

4.5.2.2 Purposive or judgmental sampling

The researcher deliberately selects the subjects against one or more trait to give what is believed to be a representative sample (Gray, 2009:152). He asserts that this approach may indeed succeed in achieving a true cross-section of the population. The main objective according to Kumekpor

(2002:136) is to select a portion of a universe that the results may or could be extended to the whole population.

4.5.2.3 Snowball sampling

Gray states that, with snowball sampling, the researcher identifies a small number of subjects, who in turn, identify others in the population (Gray, 2009:152)

4.5.2.4 Quota sampling

In quota sampling, the researcher non-randomly selects subjects from identified strata until the planned number of subjects is reached (Gray, 2009:153)

4.5.3 Sampling technique adopted for this study

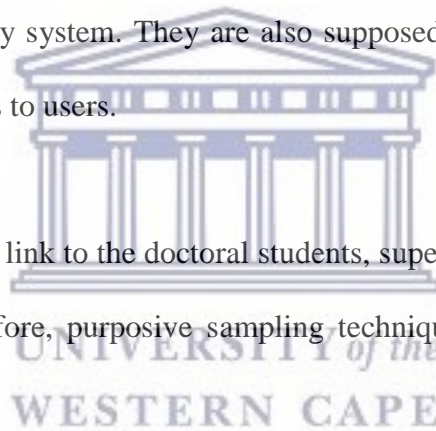
Purposive sampling technique was adopted in this study. Types of purposive sampling outlined by Sharma (2017:751) are maximum variation purposive sampling, homogeneous purposive sampling, typical case purposive sampling; extreme (deviant) case purposive sampling, total population purposive sampling and expert purposive sampling.

Types of purposive sampling outlined by Sharma (2017:751) are maximum variation purposive sampling, homogeneous purposive sampling, typical case purposive sampling; extreme (deviant) case purposive sampling, total population purposive sampling and expert purposive sampling.

Total population purposive sampling technique which involves the selection of the entire population that have a particular set of characteristics was specifically adopted in this study. All doctoral students at KNUST irrespective of their year of enrolment were selected for this study and questionnaires administered to all of them.

Supervisors of doctoral students were also purposively sampled out of all academics in the university because they are in close and direct contact with the doctoral students and are able to access every skill they possess. Out of all the staff in the academic library system, the professional librarians were also selected with this technique because they normally head departments, sections or units of the university library system. They are also supposed to offer training programmes, orientations and liaison services to users.

This research study has a direct link to the doctoral students, supervisors of doctoral students and professional librarians. Therefore, purposive sampling technique is the appropriate sampling technique for this study.



4.6 DATA COLLECTION INSTRUMENTS AND ADMINISTRATION

A case study typically combines data collection methods from a wide variety of sources including archives, interviews, surveys and participant observation (Gray, 2014:266). Pandey and Pandey (2015:57) are of the view that each tool is suitable for the collection of certain type of information. Mixed methods, the research design for this study, has been described by Creswell (2014) as involving the combination or integration of qualitative and quantitative research and data. For this

study, the following data collection instruments were used: questionnaires, interviews, bibliometric survey and documentary analyses.

4.6.1 Questionnaires

A questionnaire is a written list of questions, the answers to which are recorded by respondents (Kumar, 2011:145). Pandey and Pandey (2015:58) asserts that questionnaires are normally used where one cannot see personally all of the people from whom he desires responses or where there is no particular reason to see them personally. Web based questionnaires and self-administered questionnaires were used in collecting data from doctoral students and doctoral supervisors respectively. The questions were asked in relation to the research questions, objectives, and theoretical framework adopted for this study.

Questionnaires have been used by authors such as Kannan, Basha and Dhamdhare (2016:5-12) to find customers' needs and problems in order to improve the services and products at the central library of the Manonmaniam Sundaranar University (MSU), India.

The questionnaires had both open-ended questions and closed-ended questions. According Kothari (2004:101), the form of the question may be either closed, that is of the type 'yes' or 'no' or open that is inviting free response

4.6.1.1 Questionnaire to doctoral students

The questionnaire for the doctoral students (Appendix F) used for this study was divided into four main sections as follows:

- **Section A: Profile of doctoral students** - This section solicited for information such as gender, college, faculty, age, year of study and mode of study (part-time or full time).
- **Section B: Information needs, behaviour and research skills of doctoral students** - In this section, information on the research skills and abilities, scholarly communication needs and knowledge on scholarly communication were solicited.
- **Section C: Scholarly communication guidance by the academic library** – This section sought for information on how the academic library can establish an effective scholarly communication guidance program for doctoral students. Information on systems, information sources and library services needed by doctoral students for effective scholarly communication was also sought in this section. Data on the content of a research portal for scholarly communication developed as part of the academic library website was also sought in this section.
- **Section D: Scholarly communication guidance by supervisors of doctoral students** – This section investigated the extent to which doctoral students are guided in scholarly communication issues by their supervisors. This would enable the academic library to know the areas in which there should be collaboration with faculty for scholarly communication guidance. This section also sought for information on how doctoral students disseminate or intend to disseminate their research findings to stakeholders. This section equally gave doctoral students the opportunity to offer suggestions and other comments on scholarly communication guidance

4.6.1.2 Questionnaire to supervisors of doctoral students

The questionnaire for the supervisors of doctoral students (Appendix G) used for this study was divided into three main sections. They are as follows:

- **Section A: Profile of doctoral supervisor** - This section solicited for information such as gender, college, current position (such as lecturer, senior lecturer, associate professor and full professor), number of years as doctoral supervisor, number of doctoral students they have graduated, number of their doctoral graduates who published peer-reviewed articles number of doctoral students they are still supervising and their level of knowledge on some scholarly communication issues.
- **Section B: Scholarly communication by doctoral supervisors** - In this section, information on the research skills and abilities of their doctoral students were sought. The scholarly communication needs and knowledge on scholarly communication issues in relation to their doctoral students were also sought. The extent to which doctoral students are guided in scholarly communication issues by their supervisors was also sought in this section. This would enable the academic library to know the areas in which there should be collaboration with faculty for scholarly communication guidance. This section also sought for information on how their doctoral students go about scholarly communication as well as the guidance offered by the supervisors.
- **Section C: Scholarly communication guidance by the academic library** – This section sought for information on how the academic library can establish an effective scholarly communication guidance program for doctoral students. Information on systems,

information sources and library services needed by doctoral students for effective scholarly communication was sought for in this section. Information on how the academic library can collaborate with faculty for effective scholarly communication guidance was also sought. Data on how a research portal and its important features can be developed as part of the academic library website to help strengthen research output by doctoral students was also sought in this section. This section gave doctoral supervisors the opportunity to indicate how they motivate their students to publish.

4.6.1.3 Administration of questionnaire to doctoral students

Web-based questionnaires were administered to all the 699 doctoral students who had registered for the 2017/2018 academic. It was sent via email addresses obtained from the University Information Technology Services at KNUST. Ten (10) email addresses were not valid.

The web-based questionnaire was designed using google form and participants could answer them from their emails and submit. Another way through which the questionnaire was administered was through a bulk text messaging service facilitated by the University Information Technology Services of KNUST with a link to the questionnaire. Respondents could go to the link through the text messages and respond.

The questionnaires were administered between October 2017 and January 2018. During this period, two email reminders were sent to participants. Two text messaging reminders were also sent to participants. The text messages were sent through a bulk text messaging system facilitated by the University Information Technology Services who has the data of all registered students.

Response Rate

One hundred and twenty-three (123) responses were received constituting 17.9% of the 689 administered questionnaires.

4.6.1.4 Administration of questionnaires to supervisors

The researcher encountered challenges in getting a list of doctoral supervisors. This is because the data on doctoral students at the University Information Technology Services does not include the names of their supervisors. The school of graduate studies could also not provide the researcher with the names and addresses of doctoral supervisors. A letter was therefore obtained from the University Registrar of KNUST (Appendix C) to enable the researcher get access to the doctoral supervisors through heads of departments. Their email addresses were then obtained from the KNUST Staff Directory. A Web-based questionnaire designed using google form was sent to them but unfortunately only one response was received. Some of the email addresses were even not valid. A printed version was then self-administered by the researcher to the doctoral supervisors in their offices. Sixty (60) questionnaires were self-administered to doctoral supervisors who were purposively selected from each college which was selected by the doctoral students in their responses.

Response rate

A total of 28 responses were received resulting in a response rate of 47%.

4.6.2 Interviews

Interview is a very common form of data collection in case study research. It allows the researcher to attain rich, personalised information (Hancock & Algozzine, 2006:39). Thomas (2003:64) posits that an interview can be designed to yield either qualitative or quantitative information and to provide information about both knowledge and or attitudes.

Interviews can be structured and unstructured. In a structured interview, Kumar (2011:145) is of the view that the researcher asks a predetermined “set of questions, using the same wording and order of questions as specified in the interview schedule. One of the main advantages of the structured interview is that it provides uniform information which assures the comparability of data”. Kumar (2011:145) further explains that in an unstructured interview, the researcher is free to order the sequence of content and structure. There is complete freedom in the wording used and the way questions are explained to respondents. This study adopted an unstructured interview as part of tools for data gathering. The researcher interviewed some key people in KNUST School of Graduate Studies and the University Library.

4.6.2.1 Interview with the Dean of School of Graduate Studies

A face-to-face interview (see Appendix H) was conducted with the Dean of the School of Graduate Studies in his office to identify needs and practices regarding scholarly communication by doctoral students. Information on how the academic library can establish an effective scholarly communication guidance program for doctoral students was retrieved. His opinion on the establishment of a research portal as part of the academic library website was also sought for. The researcher booked an appointment and followed it up with a telephone reminder before the actual

interview was conducted. A semi-structured interview schedule under the following themes was designed for this particular interview.

- Research and scholarly communication needs of doctoral students
- Scholarly communication by doctoral students
- Scholarly communication guidance for doctoral students
- Establishment of a research portal
- Benefits of scholarly communication guidance to doctoral students and the university as a whole

4.6.2.2 Interview with the two Deputy Librarians

The two deputy librarians in the university library system were interviewed to represent the University Librarian (whose tight work schedule could not permit an interview). This face-to-face interview boarded on the research and scholarly communication needs of doctoral students, skills doctoral students must possess for effective scholarly communication, policies in the academic library on promotion of scholarly communication by doctoral students, and issues concerning the establishment of a research portal as part of the academic library website for scholarly communication guidance (Appendix J).

4.6.2.3 Interviews with the professional librarians in the KNUST library system

Ten (10) of the fifteen (15) professional librarians were interviewed. The reasons why five could not be interviewed were that, one was on sick leave, one had been bereaved and three said they were very busy. Those who were interviewed were administered with a written interview containing both closed ended and open-ended questions for respondents to provide answers or

their views. The responses were received at a later date after each one of them had finished answering at their own pace. During collection, the researcher still tried to have some discussions with some of them on their responses and notes were taken in addition to their responses. This was done because of their busy schedules and the fact that the study could not materialise without their inputs. The interview schedule (Appendix I) had the following sub-headings:

- Information and scholarly communication needs, behaviour and skills of doctoral students
- Scholarly communication by doctoral students
- Knowledge of academic librarians on scholarly communication guidance issues
- Scholarly communication guidance by the academic library
- Development of research portal for scholarly communication guidance

4.6.2.4 Interview with the Senior ICT Assistant of the university library system

Further to the preceding interview, the Senior ICT assistant in charge of the university library system was also interviewed (See Appendix K) regarding the establishment of a research portal. The interview was conducted in his office at the Technical Support Unit of the library.

4.6.3 Documentary analysis

Documents are rich sources of information with which to augment data collected through interviews and observations (Hancock & Algozzine, 2006:52).

Policy documents and other booklets were analysed to ascertain information on doctoral students, scholarly communication by doctoral students, scholarly communication guidance and data on doctoral graduates. The following documents were analysed:

1. KNUST Library Strategic Plan - The KNUST Library Strategic Plan was published to cover the periods 2005 to 2014. A new one for the next decade starting from 2015 has not been published yet. This study therefore had to analyse that of 2005- 2014 to ascertain policies on scholarly communication guidance by the academic library.
2. Basic statistics of KNUST - The basic statistics of KNUST (a publication that gives statistics of graduating numbers and other information for each academic year) from 2010 to 2016 was analysed to ascertain the number of doctoral graduates from 2010-2017.
3. Graduation brochures from year 2010 to 2017 - The graduation list brochures from 2010-2017 were analysed in order to ascertain the names and colleges or departments of the doctoral graduates. This data was used as keywords for the bibliometric survey in the institutional repository.
4. Draft policy on publication – This document is a publication from the School of Graduate Studies. It was analysed to ascertain the presence of issues regarding scholarly communication guidance by supervisors, school of graduate studies and the academic library. These issues include collaboration of the school of graduate studies and the academic library, guidance on copyright, authorship, determination of predatory journals, preparation of good manuscripts for publication.
5. Guide for higher degree research supervision – This document is also a publication from the School of Graduate Studies. It was analysed to ascertain statements on scholarly communication guidance by doctoral supervisors, especially policies on guiding students to access the academic library resources.

4.6.3.1 Techniques for documentary analysis

The table of contents for all the documents were accessed to enable the researcher find all pages that may contain the information needed for this study. Pages that were found to contain the relevant information were noted. Portions were highlighted for easy referral.

4.6.4 Bibliometric survey of the KNUST Institutional Repository

The institutional repository of KNUST, an open-access repository, was surveyed to identify doctoral thesis/dissertations and other publications from doctoral graduates from 2010 till 2017. This was to ascertain the existence of their works in the institutional repository for access by other students and the world at large. These theses, if accessed by scholars worldwide can help increase the web visibility of both the students and the university as a whole.

4.6.4.1 Techniques for bibliometric survey

Searching was done using the surnames of each doctoral graduate taken from the graduation list brochures, other names, the year of graduation and other search term such as PhD or Doctor of Philosophy. Bibliometric survey of an institutional repository can also help academic librarians to determine the research and information needs of their postgraduate users (Becker and Chiware, 2015:614).

4.7 ANALYSIS OF RESEARCH DATA

Data analysis is the process of making sense out of data (Merriam, 2009:175). Two forms of research data namely, numbers and words (Blaikie, 2010:6) can be analysed. A case study according to Creswell (2014:170) involves a detailed description of the setting or individuals, followed by analysis of the data for themes or issues. The data collected were therefore analysed thematically under various subheadings.

4.7.1 Analysis of questionnaire data

The data received from Google form was exported to Microsoft excel 2007 and subsequently exported to the Statistical Package for Social Sciences (SPSS) 21 for analyses. SPSS was used in generating frequencies and charts for the data analysis.

4.7.2 Analysis of interview data

The recorded interviews were transcribed by typing them in Microsoft word 2016. Each individual interview was saved as one file in Microsoft word. After reading through the transcription thoroughly, keywords to be used as codes were generated based on the variables derived from the research questions and the theories adopted for this study. Other themes and ideas that emerged from the interviews were also taken into consideration.

These individual Microsoft word files were then exported into AtlasTi, version 8. In AtlasTi, selections of text and paragraphs were tagged and named with the predetermined codes. The codes included words such as scholarly communication needs, dissemination, guidance, portal, portal content, collaborators, liaising, guidance by supervisor, funding, graduate school, guidance by

academic librarians and policy. Codes were then grouped under themes to facilitate in the presentation of the data. The major themes developed out of the codes have been used for discussion and interpretation of the research findings.

4.7.3 Analysis of documents

The pdf versions of the documents outlined in section 4.6.3 were also exported to AtlasTi version 8. The software helped to group paragraphs that contained information needed for the analyses of this study.

4.8 VALIDITY AND RELIABILITY OF DATA

Data validity is a process by which the researcher checks for the accuracy of the findings by employing certain procedures (Creswell, 2014:173). Data reliability is concerned with the stability or consistency of research data (Salkind, 2006:106). This was done in this study through pre-testing of data collection tools and triangulation of data collected. Details are as follow:

4.8.1 Pre-testing of data collection tools

The questionnaire for doctoral students was pre-tested on two doctoral students who were contacted in the research commons of the main library at KNUST. The pre-testing identified questions that participants would have difficulty in understanding or interpreting. One respondent was of the view that he had to keep referring to the scales provided before selecting an option which in his view was too time-consuming resulting in him taking longer time to answer the questionnaire. Prior to this, the questionnaire and the interview schedules were reviewed by the

supervisor and other academics in the Library and Information Science Department as well as the Research and Higher Degrees Committee at University of the Western Cape.

The questionnaire for supervisors of doctoral students was pre-tested on two supervisors. One from the College of Humanities and Social Sciences and the other from the College of Art and Built Environment at KNUST. Their comments and suggestion further improved the questionnaire. Pre-test according to Kumar (2011:323) should be done with a few respondents from a population similar to the one to be used for the study. The purpose of the pre-test according to Kumar is not to obtain information but to uncover problems with the instrument. Triangulation among others has been cited by both Creswell (2014:242) and Walliman (2011b:73) as strategies to be used to ensure validity and reliability.

4.8.2 Triangulation for validity and reliability of data

Morse (1994) as cited by Creswell (2014:271) suggests that using qualitative and quantitative methods to address the same research problem leads to issues of weighing each method and their sequence in a study. Based on these ideas, she advances two forms of methodological triangulation: (a) simultaneous, using both methods at the same time, and (b) sequential; using the results of one method for planning the next method.

Gibbert, Ruigrok and Wicki (2008:1468) assert that “first researchers have been encouraged to establish a clear chain of evidence to allow readers to reconstruct how the researcher went from the initial research questions to the final conclusions”. Secondly, researchers should triangulate their data, that is, adopt different angles from which to look at the same phenomenon, by using

different data collection strategies and different data sources. This, in their view will enhance construct validity in case studies. Gray (2014:279) states that construct validity refer to the extent to which the study investigates what it claims to investigate.

In this study, methodological triangulation was employed to authenticate the validity of the data collected. Data was collected by means of questionnaires, semi-structured interviews, bibliometrics as well as document analysis.

4.9 ETHICAL CONSIDERATIONS

In this study, the researcher adhered to the ethical guidelines of the Humanities and Social Science Research Ethics Committee of the University of the Western Cape (UWC).

4.10 CONCLUDING SUMMARY

This chapter discussed the research methodology and the research design adopted to investigate scholarly communication guidance as a core service of the academic library for doctoral students.

A case study research design was adopted for the study. Mixed method approach for conducting research and the pragmatism philosophical worldview were adopted for the study. Their suitability for the study was discussed. The population for the study, sample techniques, data collection instruments and the data collection procedures were also outlined. Procedure for data analysis, procedure for ensuring validity and reliability of data and ethical considerations for the study were also discussed in this chapter.

The next chapter will present and analyse the research findings.

CHAPTER FIVE

PRESENTATION OF QUESTIONNAIRE DATA

5 INTRODUCTION

Chapter five presents the data elicited from the two questionnaires distributed to the doctoral students and the supervisors of doctoral students in KNUST. One hundred and twenty-three (123) completed questionnaires were received from doctoral students while 28 questionnaires were received from supervisors of doctoral students. The response rate was therefore 17.9% and 47% respectively. Because the focus of the study and data collected were from KNUST, it cannot be generalized that the outcome can be applicable to other universities in Ghana.

To achieve the research objectives, questions in the questionnaires were framed by aspects of Costa's (1999) proposed adaptation of Garvey and Griffith's model of scholarly communication for a print and electronic environment, Wilson's model of information behaviour (1999:250-251) and aspects of the scholarly communication lifecycle model developed by Björk (2007). Data is presented in the order of the questions in the questionnaires; however, some of the data were cross tabulated in some of the sections.

5.1 QUESTIONNAIRE FOR DOCTORAL STUDENTS

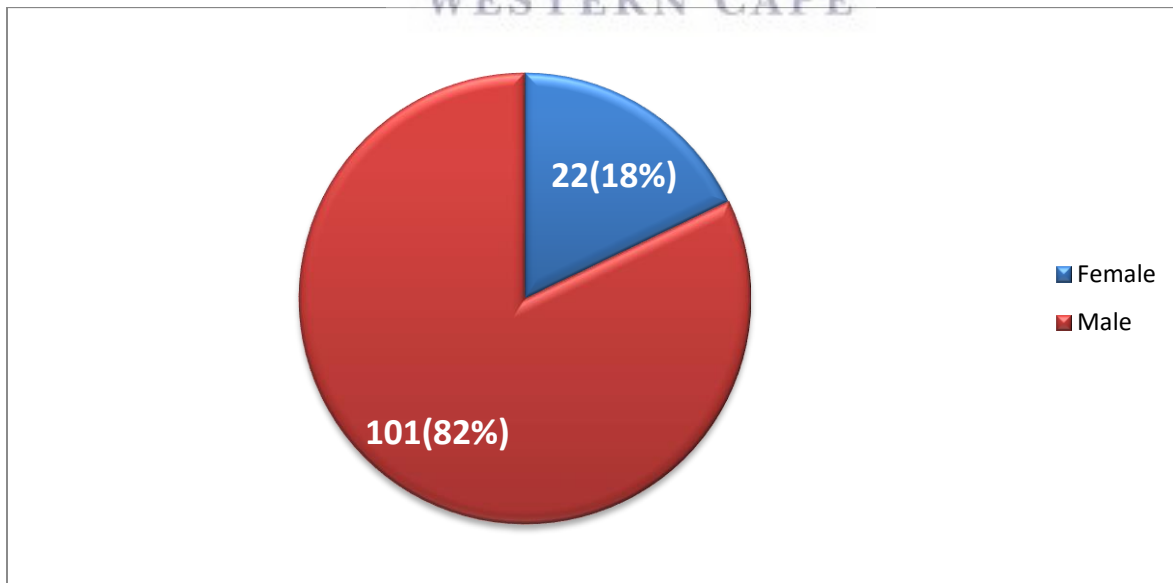
Data from the questionnaires completed by doctoral students is presented in the order of the questions in the questionnaires. Some cross tabulation are shown.

5.1.1 Section A: Biographical data of doctoral students

This section provides biographical data on the doctoral students. The information sought were gender, college, faculty, age, year of study and mode of study.

5.1.1.1 Gender of doctoral students

Question 1 was asked to establish the gender of the doctoral students. The gender of respondents is needed to ascertain the research and scholarly communication skills of female doctoral students as against their male counterparts. This will enable the academic library to draw an effective scholarly communication guidance at KNUST. As can be seen from data presented in Figure 5.1, 101 (82%) respondents were male and 22 (18%) female indicating that more male students had registered for a doctoral program than females. Relating this data to the statistics of registered doctoral students in the 2017/2018 academic year at KNUST, it can be confirmed that more males 549 (78.7%) had registered than females 149 (21.3%).

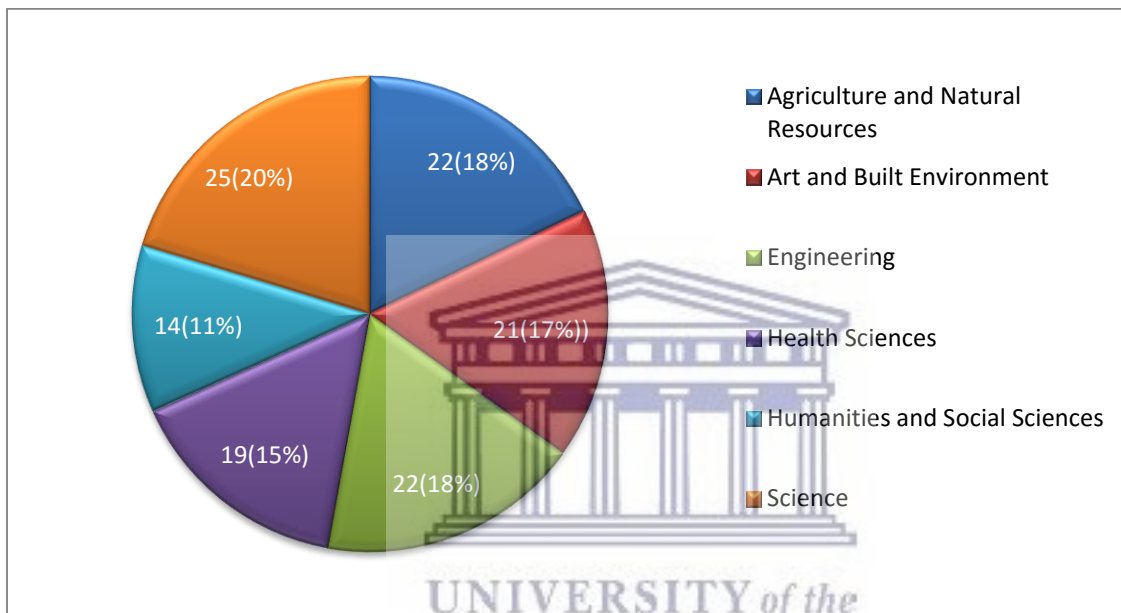


N=123

Figure 5.1 Gender of doctoral students

5.1.1.2 Colleges of doctoral students

Question 2 was asked to establish the colleges in which the doctoral students had registered. Identifying the colleges of doctoral students will enable the academic library to have an idea of the number of doctoral students in each college when establishing an effective discipline orientated scholarly communication guidance programme.



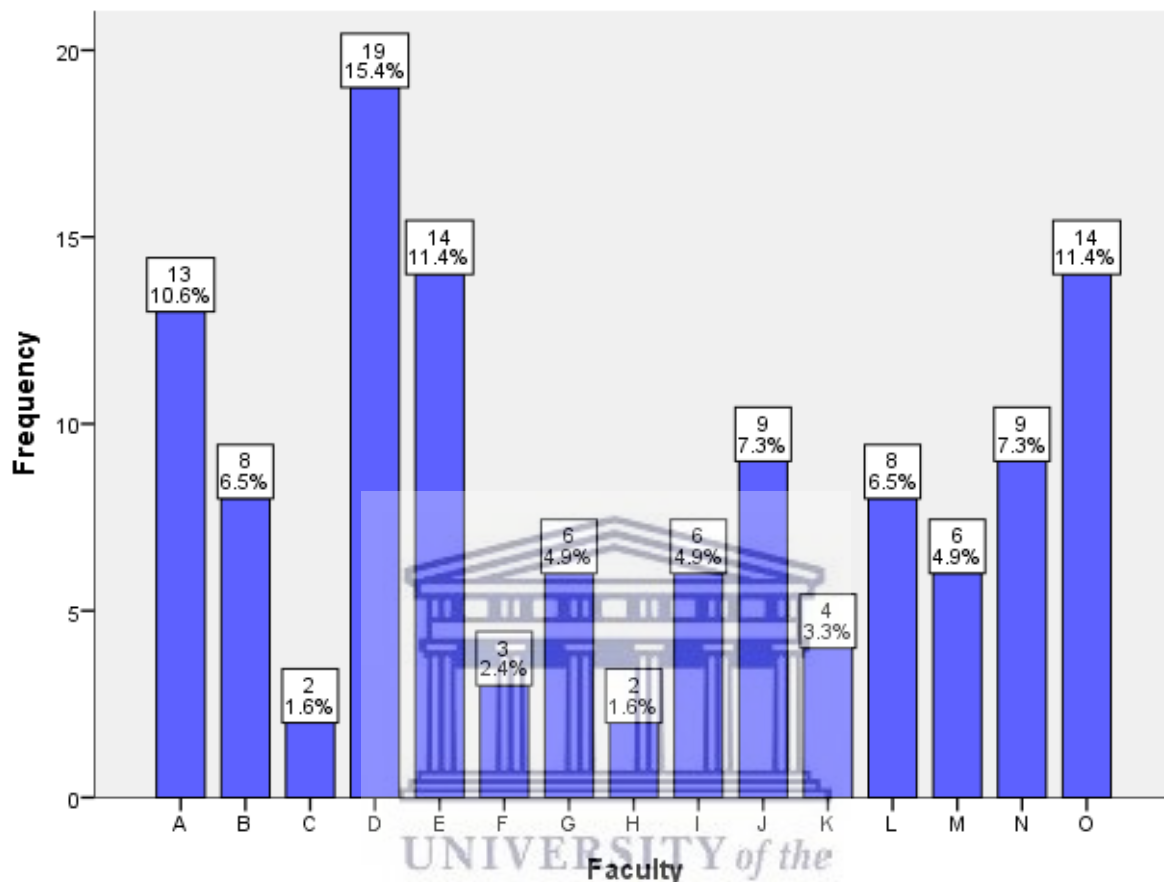
N=123

Figure 5.2 Colleges of doctoral students

Data from Figure 5.2 shows that the College of Science had the highest number of responses (25) constituting 20% of the population. The least responses 14 (11%) came from the College of Humanities and Social Sciences.

5.1.1.3 Faculties of doctoral students

Question 3 was asked to ascertain the faculties under the various colleges in which doctoral students had enrolled. Figure 5.3 shows the distribution of respondents in the different faculties under the various KNUST colleges:



N=123

Figure 5.3 Faculties of doctoral students

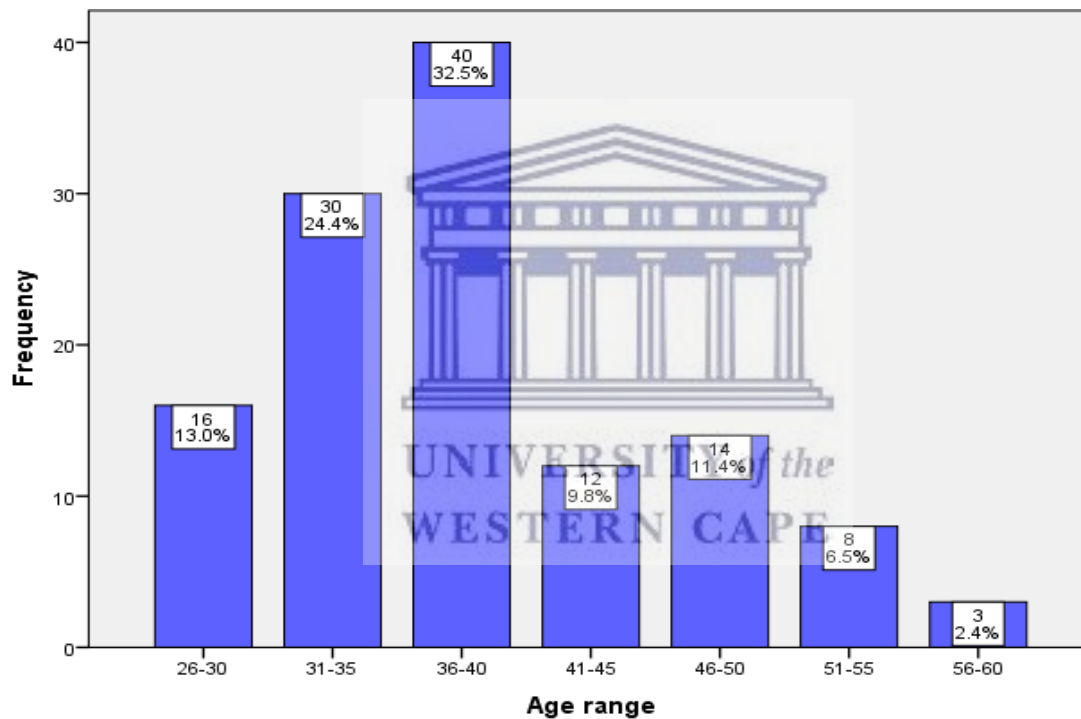
- A = Faculty of Agriculture
- B = Faculty of Renewable Natural Resources
- C = Faculty of Art
- D = Faculty of Built Environment
- E = Faculty of Civil and Geomatic Engineering
- F = Faculty of Electrical and Computer Engineering
- G = Faculty of Mechanical and Agricultural Engineering
- H = Faculty of Allied Health Sciences
- I = Faculty of Pharmacy and Pharmaceutical Sciences
- J = School of Medical Sciences
- K = School of Public Health
- L = Faculty of Social Sciences
- M = School of Business
- N = Faculty of Biosciences
- O = Faculty of Physical Sciences

- College of Agriculture and Natural Resources – This college consists of the Faculty of Agriculture (13 respondents) and Faculty of Renewable Natural Resources (8 respondents). Although the College of Agriculture and Natural Resources in Figure 5.2 had a total number of 22 respondents, the total for these two faculties is 21. Therefore, there is a shortage of one respondent.
- College of Art and Built Environment – This college consists of the Faculty of Art (2 respondents) and Faculty of Built Environment (19 respondents).
- College of Engineering – The Faculty of Civil and Geomatic Engineering (14 respondents), Faculty of Electrical and Computer Engineering (3 respondents) and Faculty of Mechanical and Agricultural Engineering (6 respondents) form the College of Engineering. The total number of respondents for the three faculties is 23, but in Figure 5.2, 22 respondents are reflected. This means there is an additional one respondent
- College of Health Sciences – This college comprises of the Faculty of Allied Health Science (2 respondents), Faculty of Pharmacy and Pharmaceutical Sciences (6 respondents), School of Medical Sciences (9 respondents) and School of Public Health (4 respondents). The total is 21 meanwhile, this college had 19 respondents in Figure 5.2. Therefore, there is an additional two respondents.
- College of Humanities and Social Sciences – This college consists of the Faculty of Social Sciences (8 respondents) and the School of Business (6 respondents). The total for the two faculties is fourteen respondents.
- College of Science – This college comprises of the Faculty of Biosciences (9 respondents) and Faculty of Physical Sciences (14 respondents). The total is 23 respondents for the two

faculties. Figure 5.2 reflects 25 respondents. There is therefore a shortage of two respondents.

5.1.1.4 Age group of doctoral students

Question 4 was asked to establish the age range of the doctoral students. The age ranges were grouped into ten categories, ranging from the youngest group 21 to 25 years and the oldest age group 66 years or older. The details of the responses are presented in Figure 5.4.



N=123

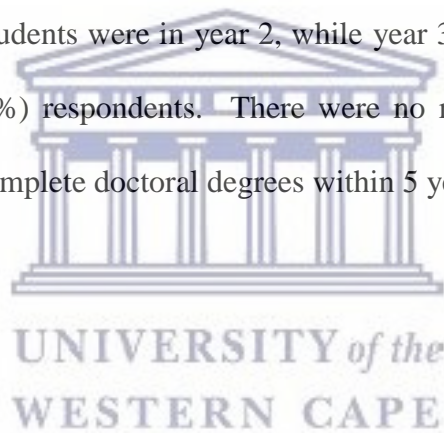
Figure 5.4 Age groups of doctoral students

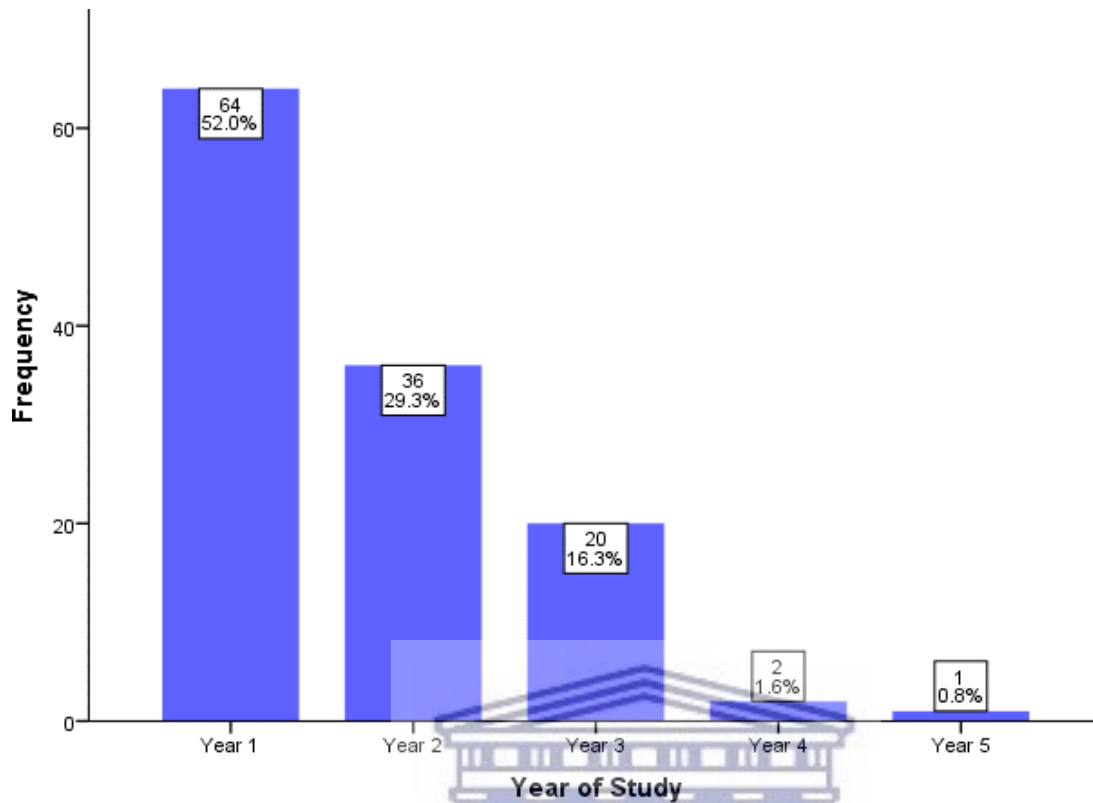
The majority of the respondents (32.5%) were within the age group of 36-40, followed by age group 31-35 (24.4%). Respectively there were sixteen and fourteen doctoral students aged 26-30 and 46-50. Only a few older doctoral students 41-45 (9.8%), 51-55 (6.5%) and 56-60 (2.4%) were enrolled. The rest of the age groups did not draw any respondents.

5.1.1.5 Year of study

Question 5 was asked to establish the year of study reached by the doctoral students as the years enrolled will usually reflect the research stage of the student (e.g. proposal writing, literature review, data analysis or article writing). A summary of Wilson's 1981 model by Robson and Robinson (2013:178) also indicates that a particular need leads a user into information-seeking activities in various forms.

Respondents had to choose from the given list of years or the other option. Figure 5.5 is a presentation of the responses showing that the majority (52%) of the doctoral students were in year 1. Thirty-six (29.3%) doctoral students were in year 2, while year 3 had 20 (16.3%), year 4 had 2 (1.6%) and year 5 had 1 (0.8%) respondents. There were no respondents for years 6 and 7 indicating that most students complete doctoral degrees within 5 years.





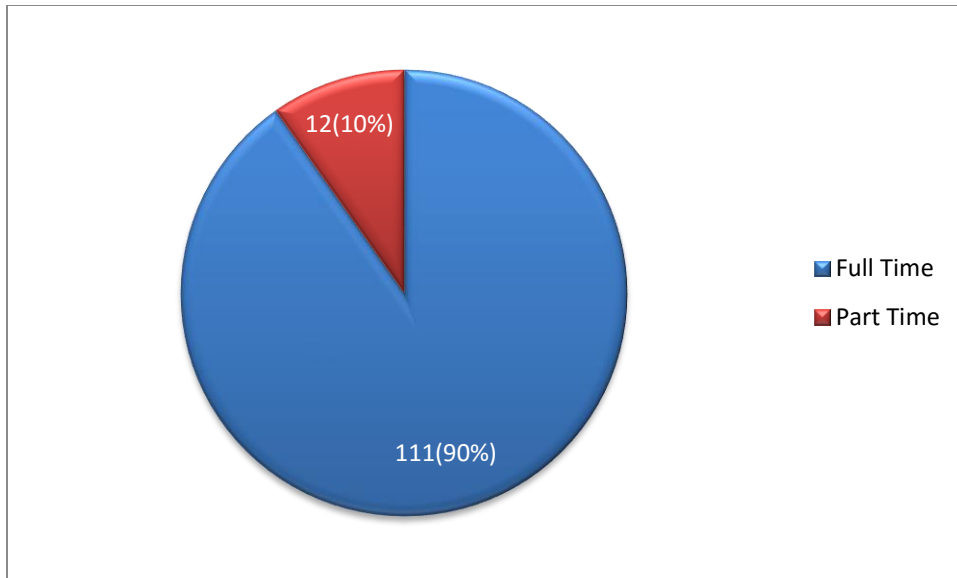
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Figure 5.5 Year of study of doctoral students

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5.1.1.6 Mode of study

The mode of study, either full time or part-time, was determined in question 6. The responses showed that the overwhelming majority of doctoral students (90%) were full time students.



N=123 **Figure 5.6 Mode of study of doctoral students**

5.1.1.7 Year of study versus mode of study

Table 5.1 is a cross-tabulation of questions 5 and 6. In order to establish the type of scholarly communication guidance that will be suitable for most doctoral students, their year of study against their mode of study was ascertained. Their year of study and mode of study would largely determine the type and format of scholarly communication guidance to be developed by the academic library to meet their research and scholarly communication needs.

N=123 **Table 5.1 Year of study versus mode of study**

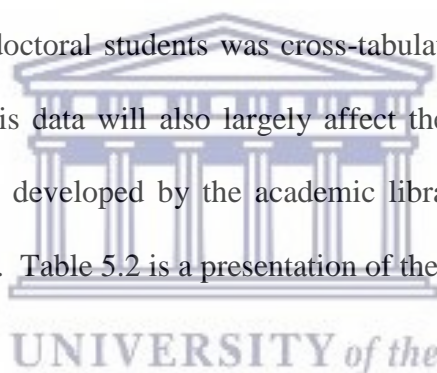
		Mode of study		Total	
		Full Time	Part-Time		
Year of study	1	Count	58	6	64
		%	90.6%	9.4%	100.0%
	2	Count	34	2	36
		%	94.4%	5.6%	100.0%
	3	Count	17	3	20
		%	85.0%	15.0%	100.0%
	4	Count	1	1	2
		%	50.0%	50.0%	100.0%

	5	Count	1	0	1
		%	100.0%	0.0%	100.0%
Total		Count	111	12	123
		%	90.2%	9.8%	100.0%

Table 5.1 shows a higher percentage of full time students in all the years of study of the respondents. This will serve as a guide to the academic library to provide scholarly communication guidance that would effectively meet the research and scholarly communication needs of both full-time and part-time students.

5.1.1.8 Year of study versus age of doctoral students

The year of study and age of doctoral students was cross-tabulated to determine the age range within each year of study. This data will also largely affect the type and format of scholarly communication guidance to be developed by the academic library to meet their research and scholarly communication needs. Table 5.2 is a presentation of the data.



N=123 **Table 5.2 Year of study versus age of doctoral students**

			Age range							Total
			26-30	31-35	36-40	41-45	46-50	51-55	56-60	
Year of study	1	Count	12	14	21	7	7	2	1	64
		%	18.9%	21.9%	32.8%	10.9%	10.9%	3.1%	1.6%	100%
	2	Count	2	10	12	2	6	4	0	36
		%	5.6%	27.8%	33.3%	5.6%	16.7%	11.1%	0.0%	100%
	3	Count	2	5	6	3	1	1	2	20
		%	10.0%	25.0%	30.0%	15.0%	5.0%	5.0%	10.0%	100%
	4	Count	0	1	0	0	0	1	0	2
		%	0.0%	50.0%	0.0%	0.0%	0.0%	50.0%	0.0%	100%
	5	Count	0	0	1	0	0	0	0	1
		%	0.0%	0.0%	100	0.0%	0.0%	0.0%	0.0%	100%
Total	Count	16	30	40	12	14	8	3	123	
	%	13.0	24.4%	32.5%	9.8%	11.4%	6.5%	2.4%	100	

Table 5.2 shows that only year 4 had majority of respondents in age group 31-35 (50%) and age group 51-55 (50%). All the other years of study had majority of respondents in age group 36-40.

5.1.1.9 Year of study versus College of doctoral students

The year of study and College of doctoral students was cross-tabulated to determine the number of each year of study within each college. This data will help determine subject oriented scholarly communication guidance to be developed by the academic library to meet their research and scholarly communication needs. Table 5.3 is a presentation of the data.

N=123

Table 5.3 Year of study versus Colleges of doctoral students

		Year of study					Total
		1	2	3	4	5	
College of Agriculture and Natural Resources	Count	12	7	3	0	0	22
	%	54.5%	31.8%	13.6%	0.0%	0.0%	100.0%
College of Art and Built Environment	Count	11	6	2	1	1	21
	%	52.4%	28.6%	9.5%	4.8%	4.8%	100.0%
College of Engineering	Count	8	5	9	0	0	22
	%	36.4%	22.7%	40.9%	0.0%	0.0%	100.0%
College of Health Sciences	Count	10	5	4	0	0	19
	%	52.6%	26.3%	21.1%	0.0%	0.0%	100.0%
College of Humanities and Social Sciences	Count	9	4	0	1	0	14
	%	64.3%	28.6%	0.0%	7.1%	0.0%	100.0%
College of Science	Count	14	9	2	0	0	25
	%	56.0%	36.0%	8.0%	0.0%	0.0%	100.0%
Total	Count	64	36	20	2	1	123
	%	52.0%	29.3%	16.3%	1.6%	0.8%	100.0%

Table 5.3 shows a higher percentage of Year 1 students in all the six colleges of respondents but in the original data of registered doctoral students whom the questionnaires were emailed to, College of Engineering and College of Science had majority of doctoral students in Year 2.

5.1.2 Section B: Research and scholarly communication needs and skills of doctoral students

This section contains information on the research skills and abilities, knowledge and usage of the institutional repository, level of knowledge on scholarly communication issues and perception of doctoral students on some scholarly communication avenues – all aspects that should be taken into account when formulating a guidance plan to address the information and research needs of doctoral students. The data was solicited from questions 7 to 12.

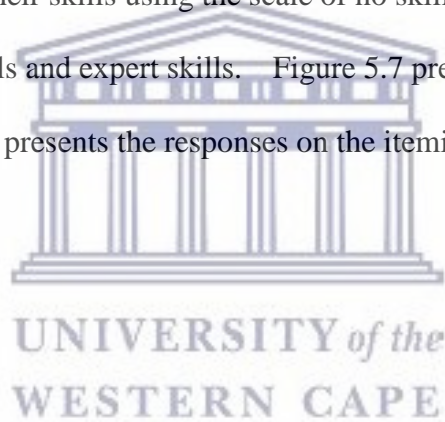
5.1.2.1 Level of skills for research and scholarly communication

Question 7 presented thirteen statements related to the research skills of doctoral students for effective research and scholarly communication. These statements, collated from the literature were:

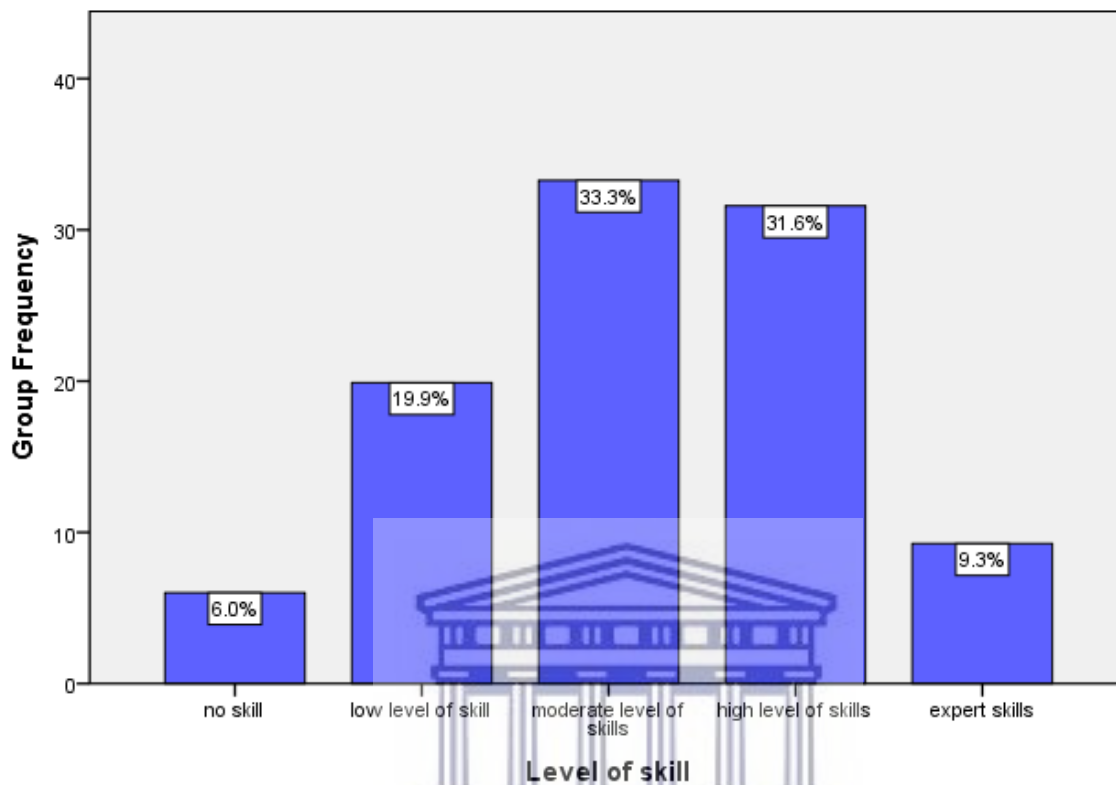
- *Knowledge to access funding possibilities/grants for your research/doctoral studies*
- *Ability to access electronic resources available on the University library website*
- *Ability to access full text articles from the university library online databases*
- *Ability to use different referencing styles like Harvard or APA*
- *Knowledge to identify the right research design and methodology to address your research problem and answer your research questions*

- *Ability to use reference management tools such as Mendeley, Zotero, Refworks*
- *Ability to use data management software like SPSS, Excel, AtlasTi*
- *Ability to summarise your final thesis into a power point slide presentation*
- *Knowledge of preparing a manuscript for publication in a peer-reviewed journal*
- *Knowledge of preparing a manuscript for conference presentation*
- *Knowledge to determine where to publish your final research results*
- *Knowledge on how to negotiate your right as an author*
- *Knowledge on how to determine journal impact factor*

Students were asked to assess their skills using the scale of no skills, low level of skills, moderate level of skills, high level of skills and expert skills. Figure 5.7 presents the total group responses for each scale, while Figure 5.8 presents the responses on the itemised statements.



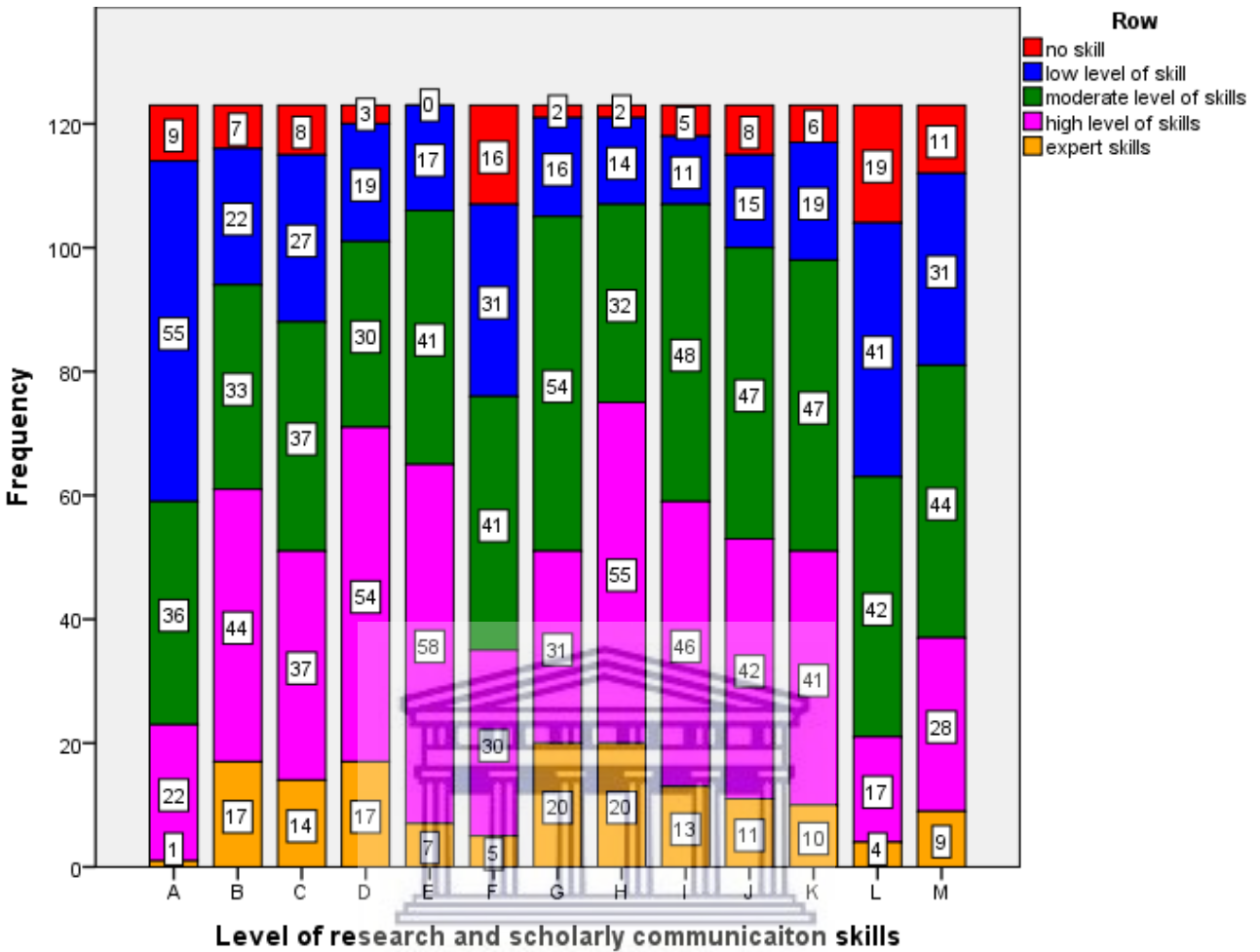
N=123



N=123

Figure 5.7 Level of research skills of doctoral students

Figure 5.7 shows that doctoral students in general regarded themselves as having moderate levels of skills for effective research and scholarly communication. A third of doctoral students (33.3%) indicated that they had moderate levels of skills, while 31.6% indicated high levels of skills, 19.9% low levels of skills, 9.3% expert skills and 6% no skills. The fact that 59.2% of students indicated no, low or moderate levels of skills is clearly a pointer to the need for the academic library to establish a scholarly communication guidance programme to effectively guide them.



N = 123

Figure 5.8 Research skills of doctoral students

A = Knowledge to access funding possibilities/grants for your research/doctoral studies

B = Ability to access electronic resources available on the University library website

C = Ability to access full text articles from the university library online databases

D = Ability to use different referencing styles such as APA, Harvard, MLA, Chicago

E = Knowledge to identify the right research design and methodology to address your research problem and answer your research questions

F = Ability to use reference management tools such as Mendeley, Zotero, Refworks

G = Ability to use data management software like SPSS, Excel, AtlasTi

H = Ability to summarise your final thesis into a 15 power point slide presentation

I = Knowledge of preparing a manuscript for publication in a peer-reviewed journal

J = Knowledge of preparing a manuscript for conference presentation

K = Knowledge to determine where to publish your final research results

L = Knowledge on how to negotiate your right as an author

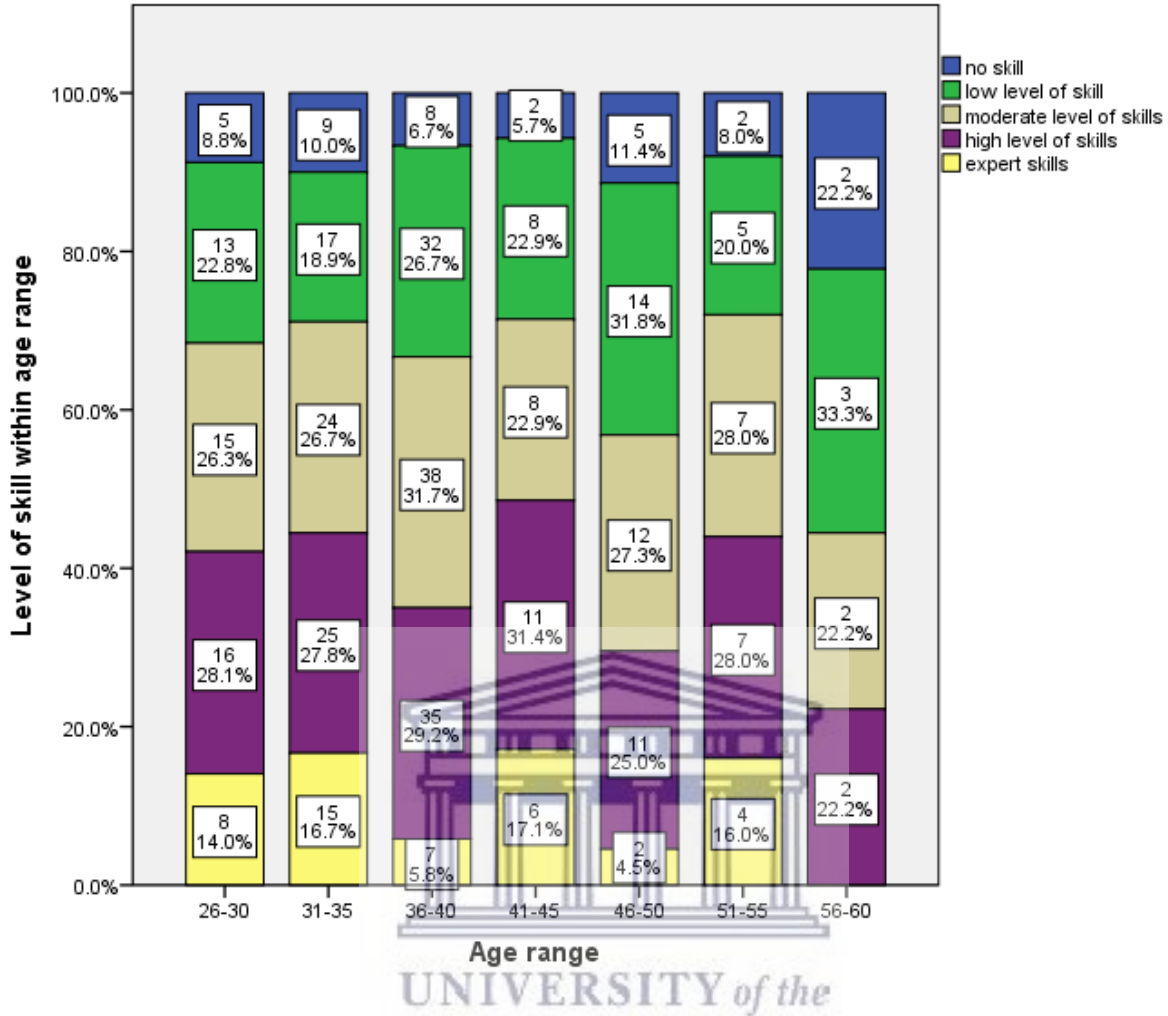
M = Knowledge on how to determine journal impact factor

The data in Figure 5.8 is a confirmation that respondents have moderate level of skills. This is shown in seven out of the thirteen listed activities. They are: *Ability to use reference management tools such as Mendeley, Zotero, Refworks; Ability to use data management software like SPSS, Excel, AtlasTi; Knowledge of preparing a manuscript for publication in a peer-reviewed journal; Knowledge of preparing a manuscript for conference presentation; Knowledge to determine where to publish your final research results; Knowledge on how to negotiate your right as an author; and Knowledge on how to determine journal impact factor.* Respondents also had low levels of skills in the activity *Knowledge to access funding possibilities/grants for your research/doctoral studies.*

5.1.2.1a Level of skills for research and scholarly communication versus age group

The level of skills and the age group of respondents were cross-tabulated to determine the level of skills for each age group category. Figure 5.9 is a presentation of the findings.



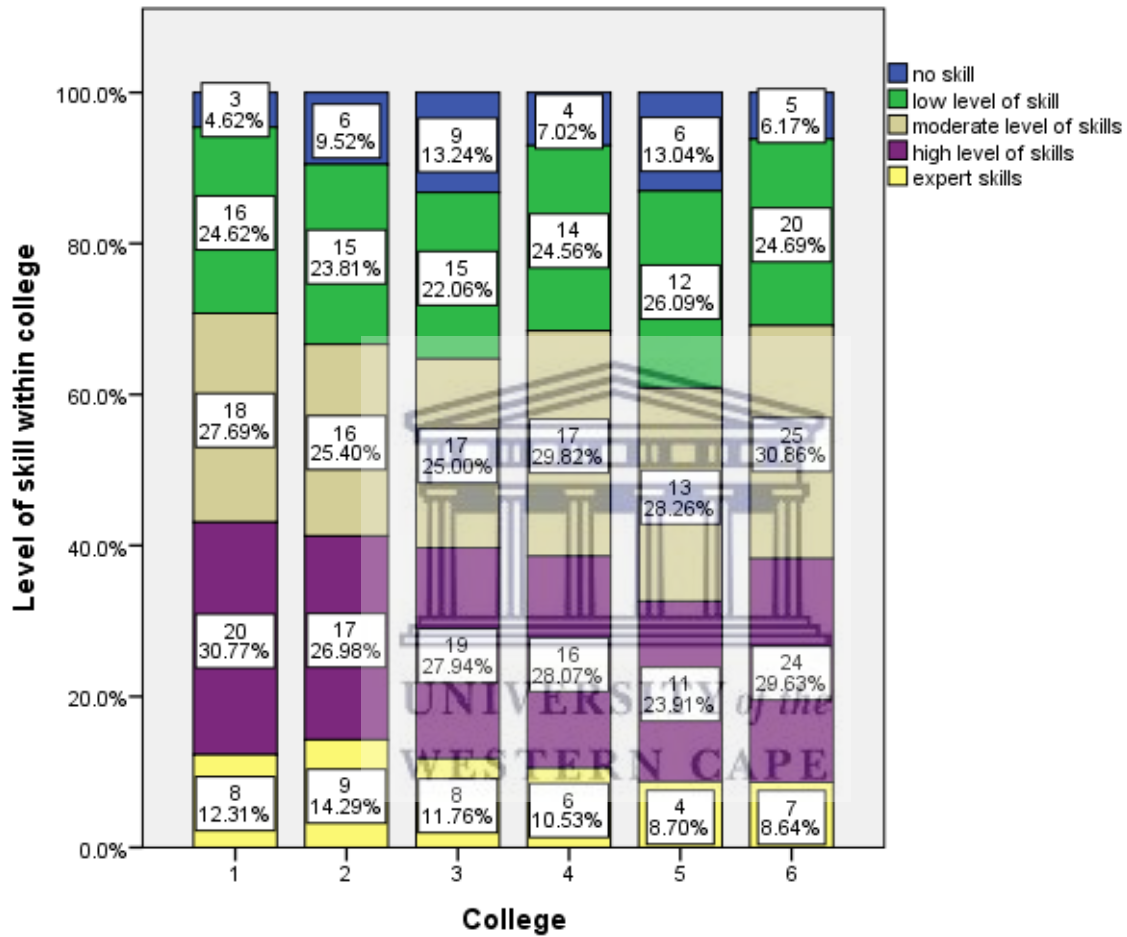


N = 123 **Figure 5.9 Level of skills and age range of doctoral students**
 NB: Based on Multiple Responses

Age groups 46-50 and 56-60 had low level of skills, age group 36-40 had moderate level of skill, age group 51-55 had both moderate and high level off skill and age groups 26-30, 31-35 and 41-45 had high level of skill in research and scholarly communication. The data indicates that not all age groups have high level or expert skill and for that matter need guidance for effective research and scholarly communication.

5.1.2.1.b Level of skills for research and scholarly communication versus Colleges

The level of skills and the colleges of respondents were cross-tabulated to determine the level of skills within each college. Figure 5.10 is a presentation of the findings.



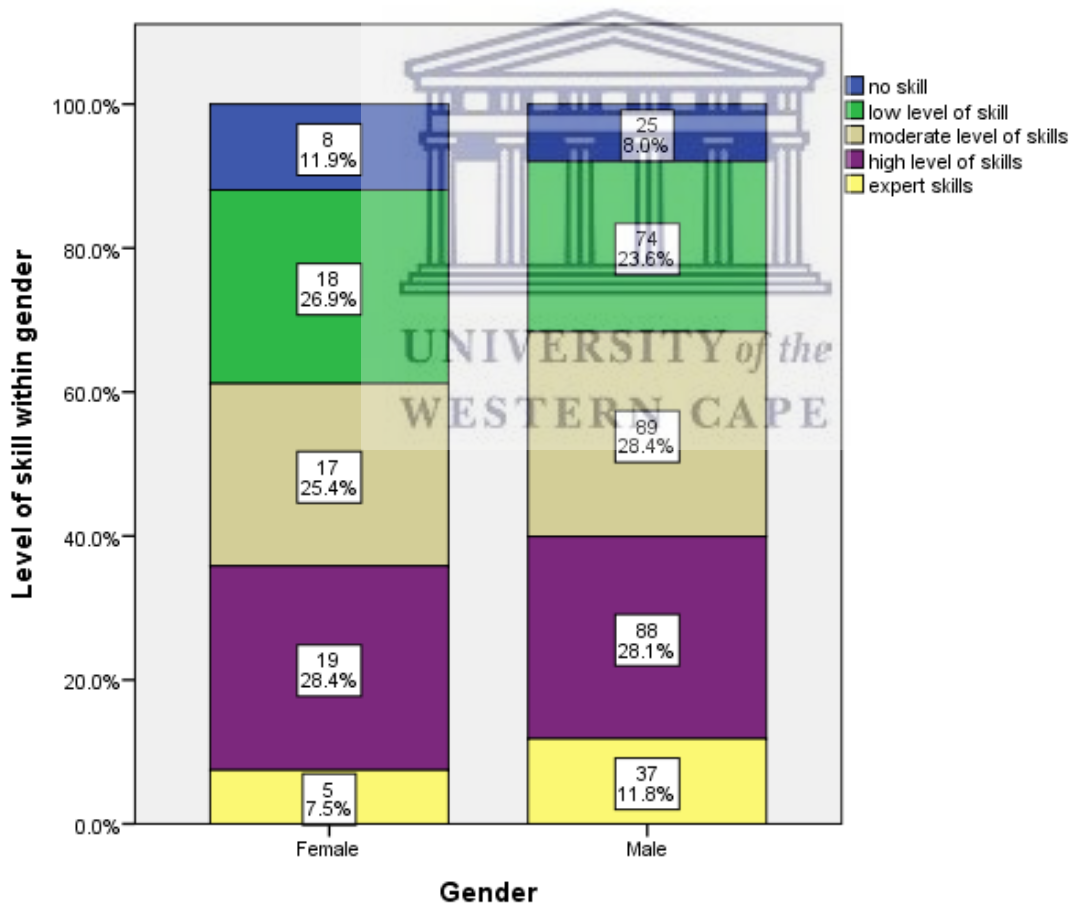
N = 123 **Figure 5.10 Level of skills and colleges of doctoral students**
 NB: Based on Multiple Responses

- 1 = College of Agriculture and Natural Resources
- 2 = College of Art and Built Environment
- 3 = College of Engineering
- 4 = College of Health Sciences
- 5 = College of Humanities and Social Sciences
- 6 = College of Science

Doctoral students in College of Agriculture and Natural Resources, College of Art and Built Environment and College of Engineering had high level of skills and those in College of Health Sciences, College of Humanities and Social Sciences and College of Science had moderate level of skill. The data indicates that not all colleges have high level or expert skill and for that matter need specific guidance for effective research and scholarly communication.

5.1.2.1c Level of skills for research and scholarly communication versus gender

The level of skills and gender of doctoral students were also cross-tabulated to ascertain the level of skills for males and females. Figure 5.11 is a presentation of the data.



N = 123

Figure 5.11 Level of skills and gender of doctoral students

NB: Based on Multiple Responses

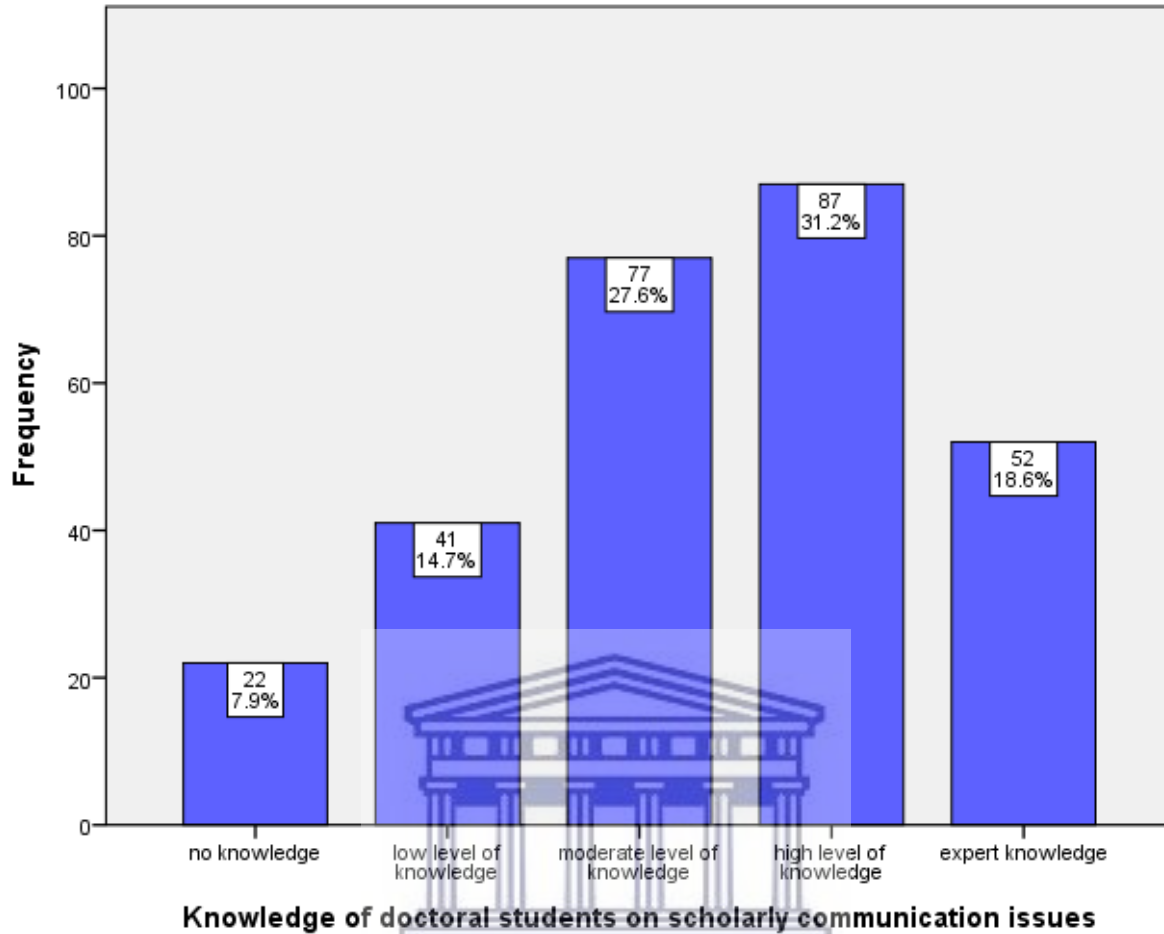
The data indicates that only 7.5% females and 11.8% males had high level of skill but a total of 28.4% females and 28.1 males had high level of skill. Meanwhile 26.9 females as against 23.6% had low level of skill. Therefore, both males and females need some form of guidance for effective research and scholarly communication.

5.1.2.2 Level of knowledge on scholarly communication issues

Question 8 was asked to ascertain the level of knowledge doctoral students have on some scholarly communications issues. Doctoral students were asked to rate their knowledge of the following statements:

- *Open access is defined as free online access to scholarly works*
- *An open access journal is a scholarly journal that a reader can access online*
- *Open access literature of all types is digital, online, free of charge and free of most copyright restrictions*
- *Plagiarism - the act of falsely owning someone else's ideas or intellectual efforts*
- *Creative Commons licences set out the re-use conditions for someone making use of another's material*

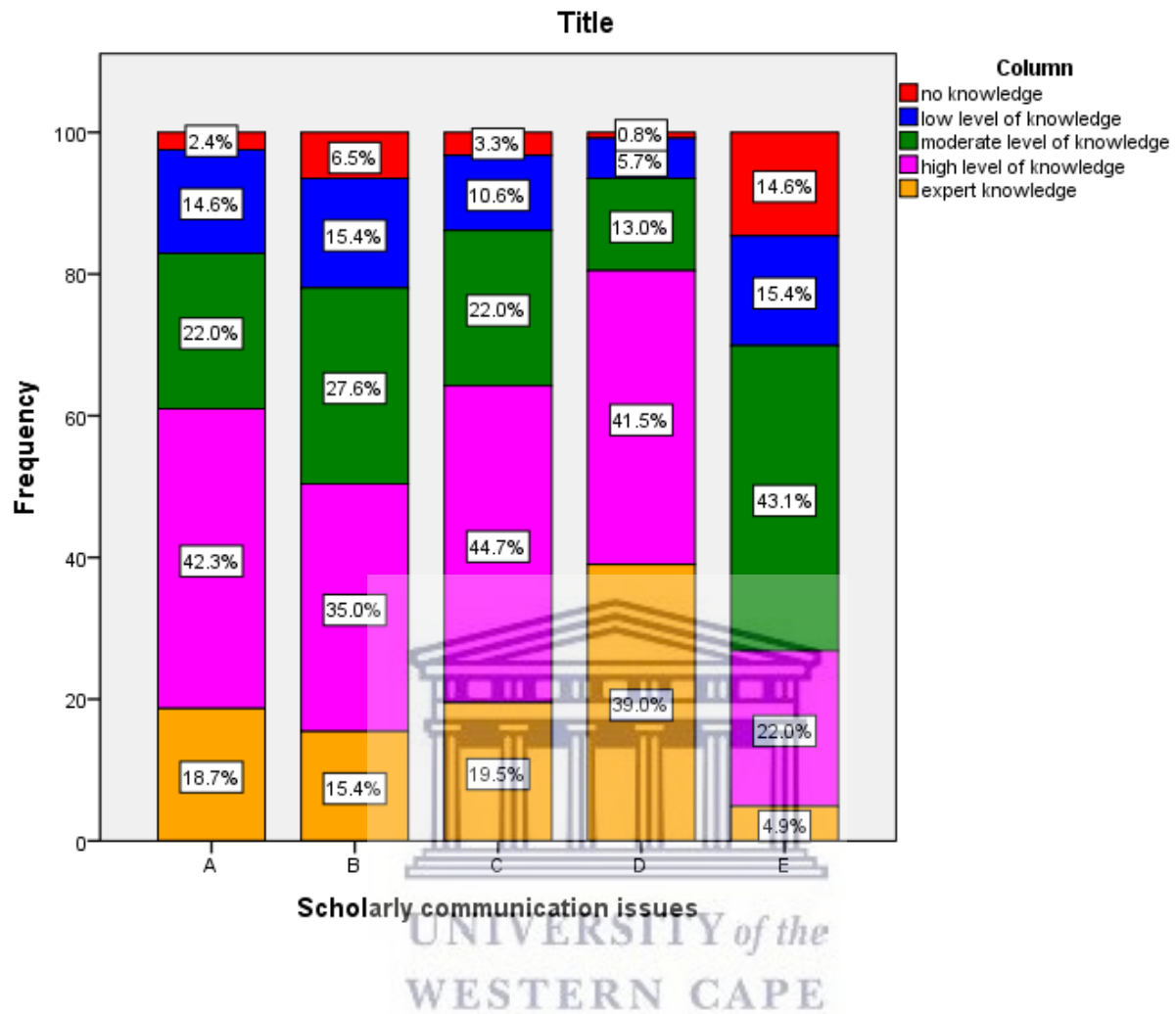
The scale for assessment was as follows: 1 = no knowledge, 2 = low level of knowledge, 3 = Moderate level of knowledge, 4 = High level of knowledge, 5 = expert knowledge. Figure 5.10 is a presentation of the total group responses for each scale while Figure 5.12 is a presentation of the responses on the itemised statements.



N = 123

Figure 5.12 Knowledge on scholarly communications issues

Figure 5.12 shows that 37.1% and 19.5% of doctoral students regarded themselves to have high or expert knowledge on scholarly communication issues. In total 43.4% of students indicated either moderate (25.5%), low (12.4%) or no (5.5%) levels of knowledge on scholarly communication issues. This implies that they require some form of guidance and education on scholarly communication issues for effective research dissemination.



N = 123 **Figure 5.13 Knowledge on scholarly communications issues**

A = Open access is defined as free online access to scholarly works

B = An open access journal is a scholarly journal that a reader can access online

C = Open access literature of all types is digital, online, free of charge and free of most copyright restrictions

D = Plagiarism - the act of falsely owning someone else's ideas or intellectual efforts

E = Creative Commons licences set out the re-use conditions for someone making use of another's material

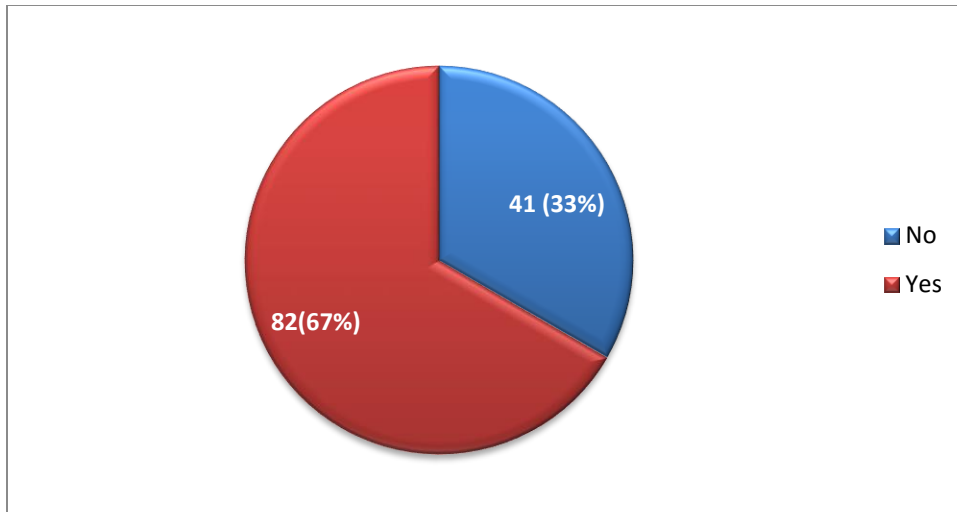
In Figure 5.13, the majority of students (61%) rated themselves as having high levels of knowledge (42.3%) or expert knowledge (18.7%) regarding the statement *Open access is defined as free online access to scholarly works*. To a lesser extent, the statement *An open access journal is a*

scholarly journal that a reader can access online drew 35.0% and 15.4% of respondents respectively indicating high level of knowledge and expert knowledge. Most respondents (64.2%) regarded themselves as knowledgeable about *Open access literature of all types is digital, online, free of charge and free of most copyright restrictions*. Most respondents (73.5%) rated themselves positively by indicating that they have high levels of knowledge (41.5%) or expert knowledge (39%) on the plagiarism statement *Plagiarism - the act of falsely owning someone else's ideas or intellectual efforts*. On the other hand, the majority of students rated themselves as having only moderate (43.1%), low level (15.4%) or no level of knowledge on the statement *Creative Commons licences set out the re-use conditions for someone making use of another's material*.

5.1.2.3 Knowledge of the institutional repository by doctoral students

Question 9 was asked to ascertain the number of doctoral students who had knowledge of the presence of the institutional repository of the university. An institutional repository is an alternative scholarly communication channel and, for that matter, should be known by all doctoral students because their research findings have to be communicated to academia and the general public.

Figure 5.14 reflects that of the 123 respondents, a total of 41 (33%) had no knowledge of the institutional repository. Although more than half of the respondents had heard about the institutional repository, it is still very important for the rest of the students get to know how to use it.

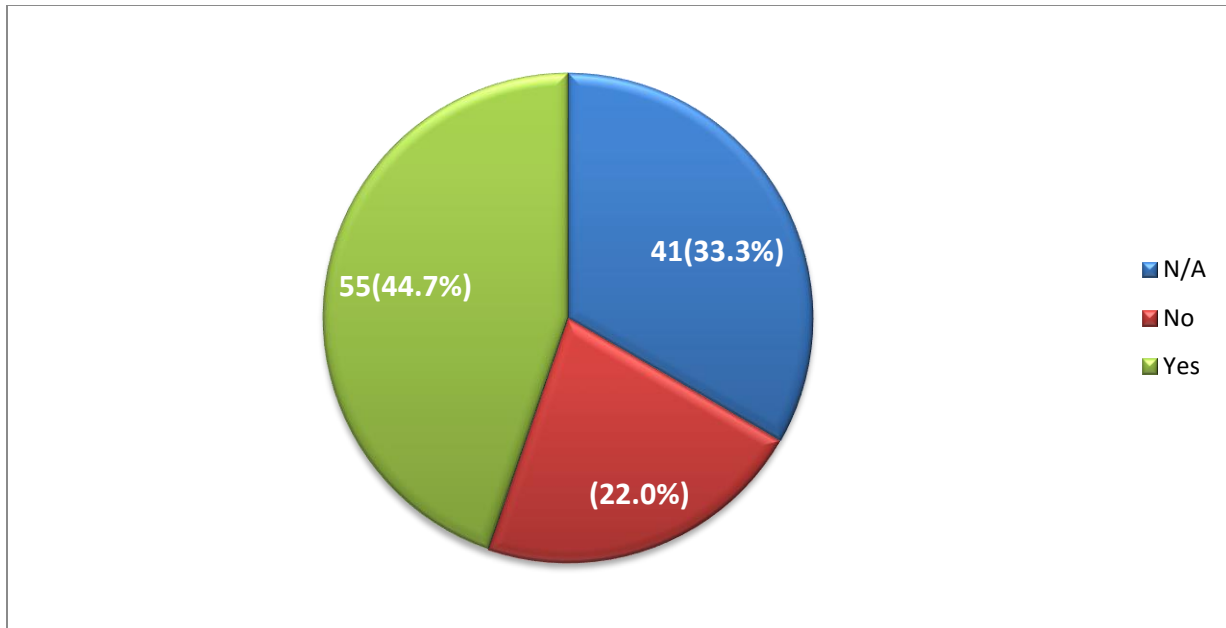


N = 123 **Figure 5.14 Knowledge of the institutional repository by doctoral students**

5.1.2.4 Accessing information from the institutional repository

As a follow-up question, respondents who had heard about the KNUSTSpace, were requested to indicate whether they access material or documents from it. The question sought to determine whether students just knew about the institutional repository or whether they actually used it.

The correct number of respondents was ascertained by first cleaning the data using SPSS. Another option “N/A” meaning not applicable was therefore added to make the data complete. An analysis of the responses showed that although some respondents said no (thus, they have not heard about the institution repository, they still answered question 10 and for that matter the data needed to be cleaned. The responses are shown in Figure 5.15.

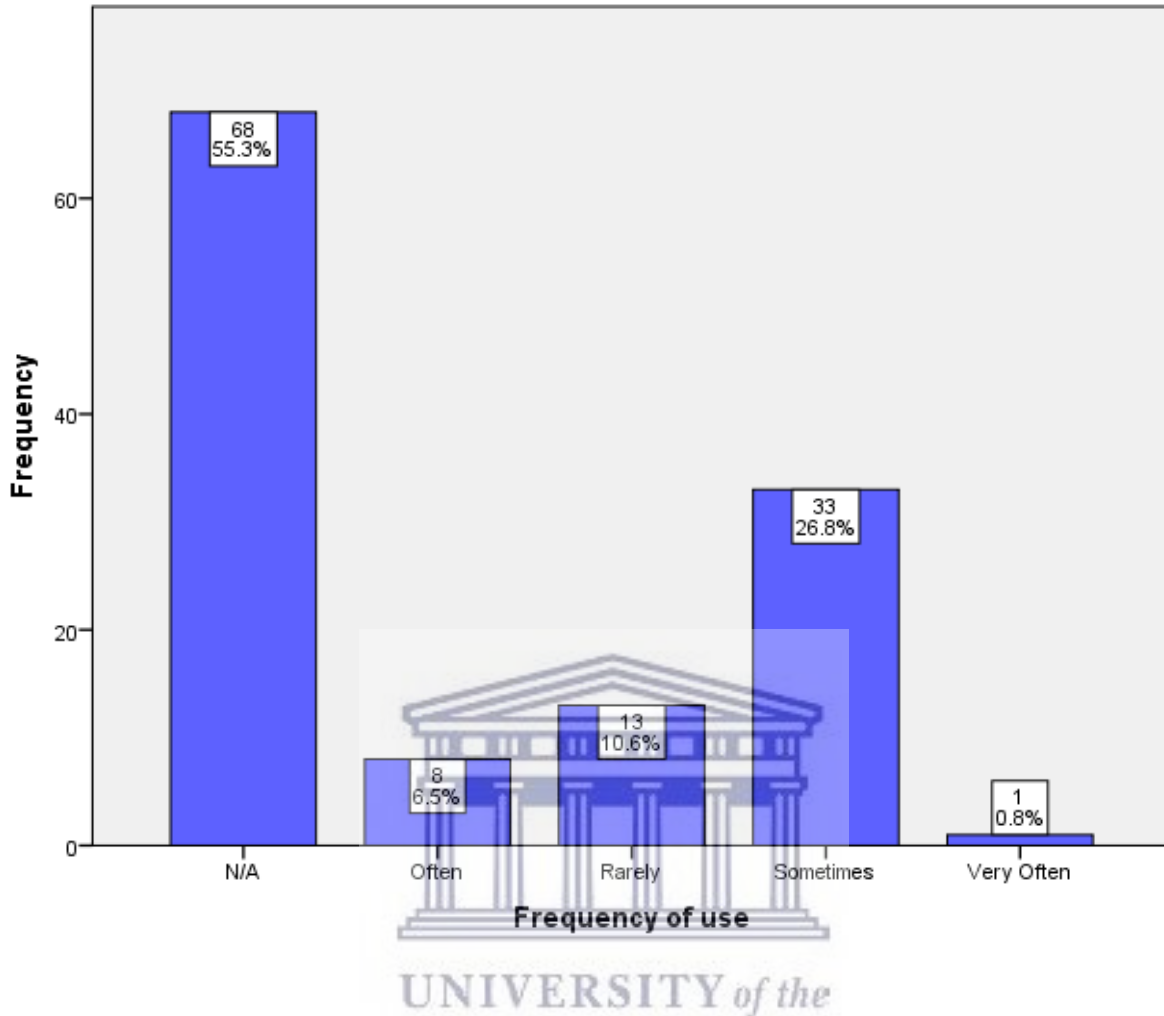


N = 123 **Figure 5.15 Accessing materials from the institutional repository**

Figure 5.15 shows that only 55 (44.7%) of students accessed materials from the institutional repository. The 22% of students who responded negatively might be because they may have heard about the institutional repository but have never bothered to check its content to know what can be found in their subject areas. Responses from 41 respondents (33.3%) were not applicable.

5.1.2.5 Frequency of visiting the institutional repository

Question 11 requested the 55 respondents who acknowledged accessing materials from the institutional repository to indicate how often they did so to determine the rate at which doctoral students visited or accessed materials from the institutional repository. Figure 5.16 presents the responses.



N = 123

Figure 5.16 Usage of the institutional repository

Figure 5.16 shows that only 0.8% of doctoral students used the institutional repository very often, 6.5% often, 26.8% sometimes and 10.6% rarely showing that the rate at which doctoral students visited and accessed materials from the institutional repository was very poor. A total of 55.3% responses were not applicable to this question because some respondents who did not indicate in question 10 (Figure 5.11) that they accessed materials from the institutional repository still answered making their responses invalid for data analysis.

A further analysis was done to ascertain the rate at which each year of study used the institutional repository. The data is presented in Table 5.4

N = 123 **Table 5.4 Year of study and use of the institutional repository**

								Total	
			N/A	Rarely	Sometimes	Often	Very Often		
Year of study	1	Count	39	5	16	3	1	64	
		%	60.9%	7.8%	25.0%	4.7%	1.6%	100.0%	
	2	Count	21	4	7	4	0	36	
		%	58.3%	11.1%	19.4%	11.1%	0.0%	100.0%	
	3	Count	8	4	8	0	0	20	
		%	40.0%	20.0%	40.0%	0.0%	0.0%	100.0%	
	4	Count	0	0	1	1	0	2	
		%	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%	
	5	Count	0	0	1	0	0	1	
		%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	
	Total		Count	68	13	33	8	1	123
			%	55.3%	10.6%	26.8%	6.5%	0.8%	100.0%

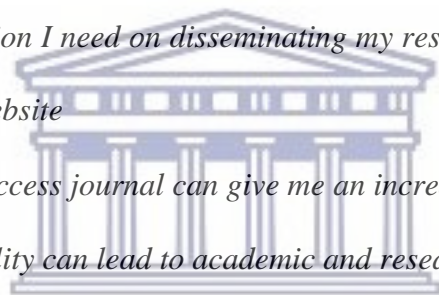
Table 5.4 is a reflection of the poor rate at which doctoral students visited and accessed materials from the institutional repository. Only one respondent in his/her first year of enrolment used the institutional repository very often. Interesting is that year 1 students also had the highest number of students (16) using the repository sometimes, while three used it often.

5.1.2.6 Perception of doctoral students on scholarly communication channels

Question 12 asked respondents to indicate their agreement with some statements pertaining to scholarly communication. The statements are definitions and perception on open access, institutional repositories and academic library websites generated from literature. These were

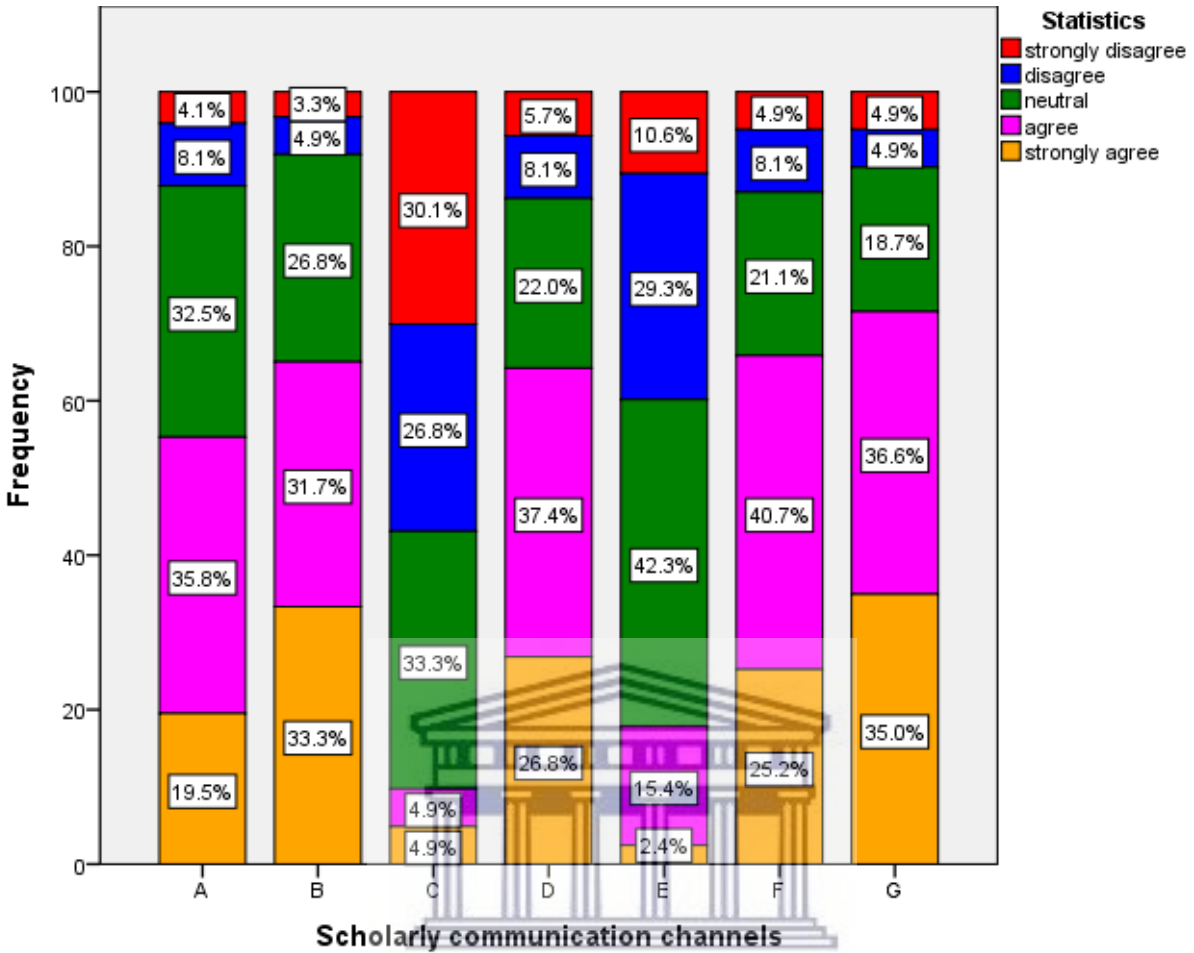
asked to ascertain how doctoral students perceived an institutional repository and open access as well as an academic library website for guidance on scholarly communication. Statements provided were:

- *The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings*
- *Depositing my research findings in an open access institutional repository can make my work highly visible*
- *Institutional Repositories contain published material of inferior quality*
- *An increase in the visibility would lead to more citations of my work*
- *Every piece of information I need on disseminating my research findings can be found on the university library website*
- *Publishing in an open access journal can give me an increased web visibility*
- *An increased web visibility can lead to academic and research collaborations*



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A Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree was given for respondents to choose from. The responses are presented in Figure 5.17.



N = 123

Figure 5.17 Perception of doctoral students on scholarly communication channels

A = The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings

B = Depositing my research findings in an open access institutional repository can make my work highly visible

C = Institutional Repositories contain published material of inferior quality

D = An increase in the visibility would lead to more citations of my work

E = Every piece of information I need on disseminating my research findings can be found on the university library website

F = Publishing in an open access journal can give me an increased web visibility

G = An increased web visibility can lead to academic and research collaborations

Statement A (*The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings*) is a true indicator of an institutional repository.A

total of 35.8% of respondents agreed and 19.5% agreed strongly, thus indicating that more than half (55.3%) of the respondents had a quite good perception about the contents of an institutional repository.

The fact that 31.7% and 33.3% of students agreed and strongly agreed respectively to the statement *Depositing my research findings in an open access institutional repository can make my work highly visible* is testimonial that respondents had good perceptions about open access.

Responses to the statement *Institutional Repositories contain published material of inferior quality* indicated that most students either disagreed (30.1%) or strongly disagreed (26.8%). Misperception of open access is reflected in the 4.9% of respondents agreeing and 4.9% strongly agreeing.

A similar pattern is seen with the statement *An increase in the visibility would lead to more citations of my work* with 37.4% of students agreeing and 26.8% strongly agreeing. This indicates that respondents perceive that depositing their work in an institutional repository and thus enhancing international visibility would lead to more citations of their work.

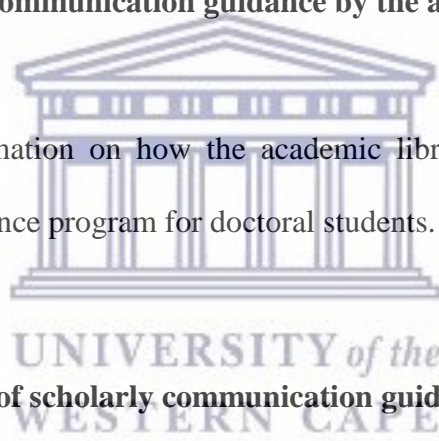
In reaction to the statement E that *Every piece of information I need on disseminating my research findings can be found on the university library website*, 39.9% of students either strongly disagreed (10.6%) or disagreed (39.9%) Interesting is that a large percentage of students (42.3%) were neutral reflecting uncertainty. These results call for attention from the KNUST academic library as students perceived the website not supplying guidelines and supplied justification for the development of a research portal as part of the academic library's scholarly communication guidance.

A total of 40.7% and 25.2% agreed and strongly agreed with the statement *Publishing in an open access journal can give me an increased web visibility*. This is a further indication of the good perception students have about their works being highly visible through open access channels.

Students agreed (36.6%) and agreed strongly (35%) with the statement *An increased web visibility can lead to academic and research collaborations* indicating that other academics and scholars might have interest in their research areas or specialisation and might want to collaborate with them.

5.1.3 Section C: Scholarly communication guidance by the academic library

This section sought for information on how the academic library can establish an effective scholarly communication guidance program for doctoral students.

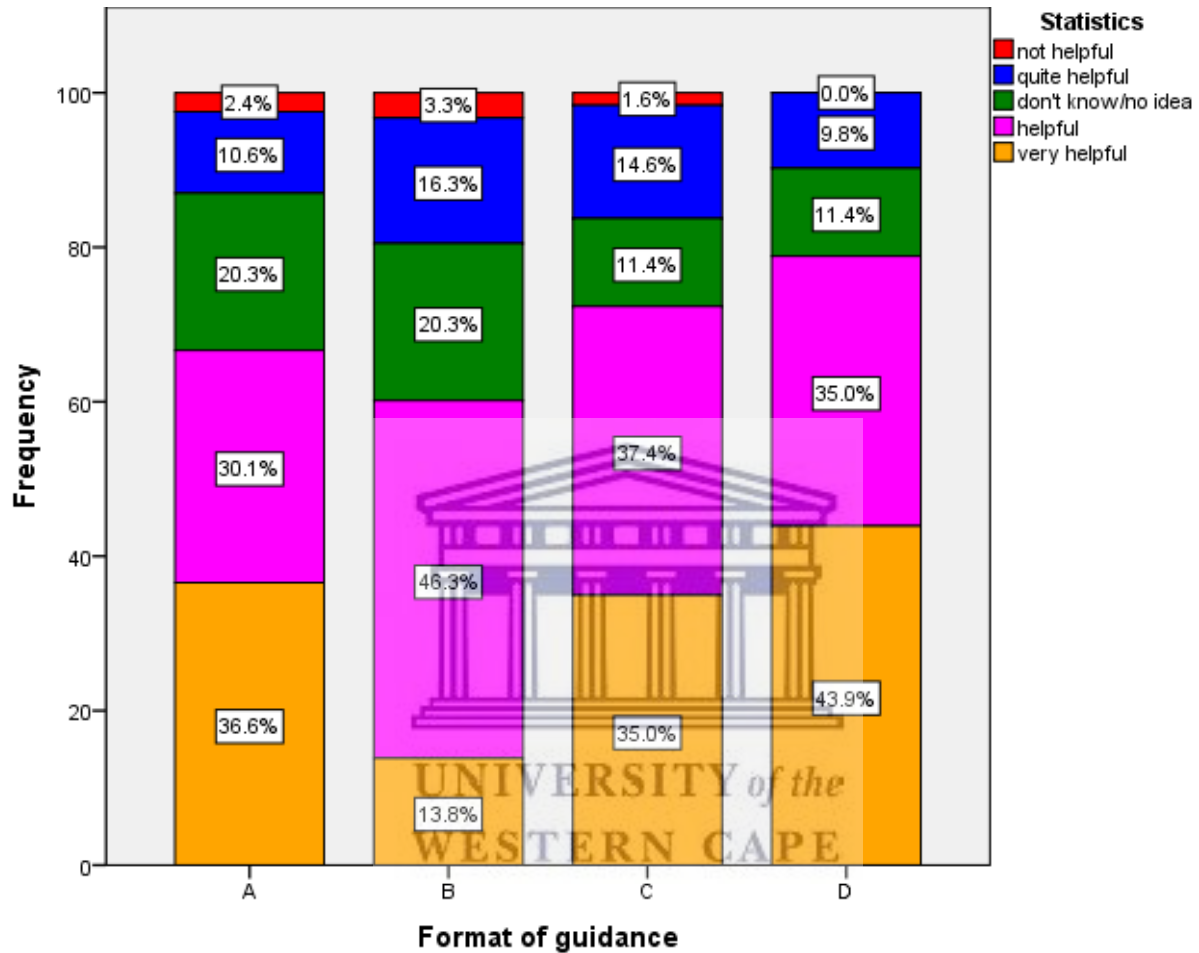


5.1.3.1 General interventions of scholarly communication guidance by the academic library

In question 13, doctoral students were asked to rate how helpful some general interventions of scholarly communication guidance would be to them. The statements were:

- *Face-to-face guidance with a Professional Librarian*
- *Online guidance on the academic library website*
- *Information Literacy Workshops*
- *The establishment of a Research Portal as part of the academic library website*

This question was asked to establish an effective way to administer scholarly communication guidance to doctoral students by the academic library. The findings are presented in Figure 5.18.



N = 123 **Figure 5.18** General initiatives of scholarly communication guidance by the academic library

A = Face-to-face guidance with a professional librarian

B = Online guidance on the academic library website

C = Information literacy workshops

D = The establishment of a research portal as part of the academic library website

Face-to-face guidance with a professional librarian was indicated as very helpful by 36.6% and helpful by 30.1% of the respondents.

Although 13.8% respondents saw *Online guidance on the academic library website* as very helpful, quite a high number of students (46.3%) indicated helpful. These figures may mean that although the website is helpful, they prefer other ways of scholarly communication guidance.

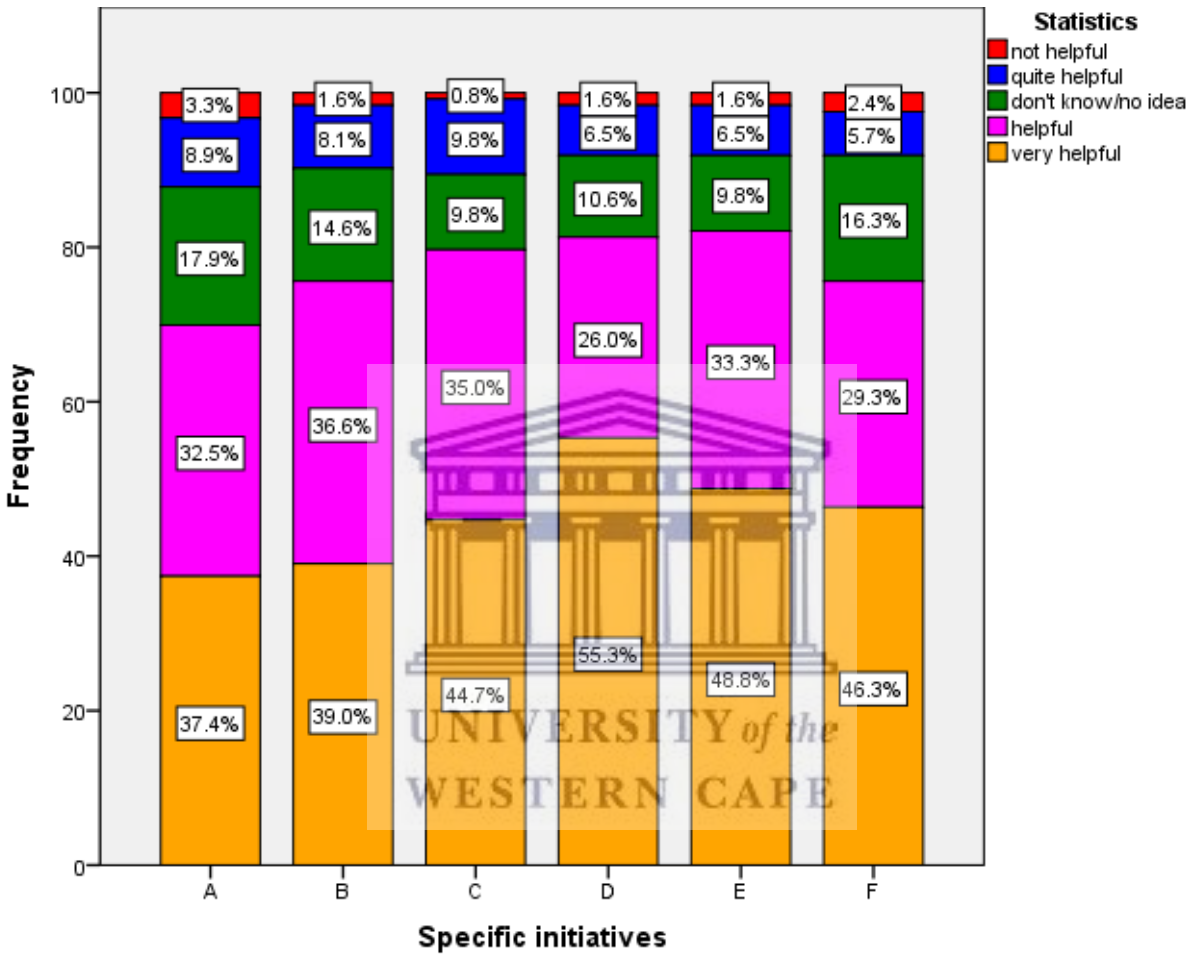
Information literacy workshops was seen as very helpful and helpful by 35% and 37.4% students respectively. It is an indication that students perceived workshops to be an efficient form of scholarly communication guidance.

The establishment of a research portal as part of the academic library website had 43.9% and 35% of respondents rating it as very helpful and helpful. This number supports the need for the academic library to establish a research portal for scholarly communication guidance.

5.1.3.2 Specific interventions of scholarly communication guidance by the academic library

Question 14 also sought to identify specific interventions of scholarly communication guidance that doctoral students anticipated to be helpful to them. The question asked doctoral students to rate these communication options and initiatives identified from literature. The statements were: *a scholarly communication website, workshops on open access publishing, workshops on copyright, plagiarism and fair use, sourcing for research grants and funding, training on referencing and citation and information literacy workshops*. Findings presented in Figure 5.19 shows that 55.3% of respondents indicated *Sourcing for research grants and funding* as very helpful. *Training on referencing and citation* was also regarded by 48.8% as very helpful. The rest of the initiatives were rated as very helpful as follows: *Information literacy workshops* (46.3%),

workshops on copyright, plagiarism and fair use (44.7%), workshops on open access publishing (39.0%) and scholarly communication website (37.4%).



N = 123 **Figure 5.19 Specific initiatives of scholarly communication guidance**

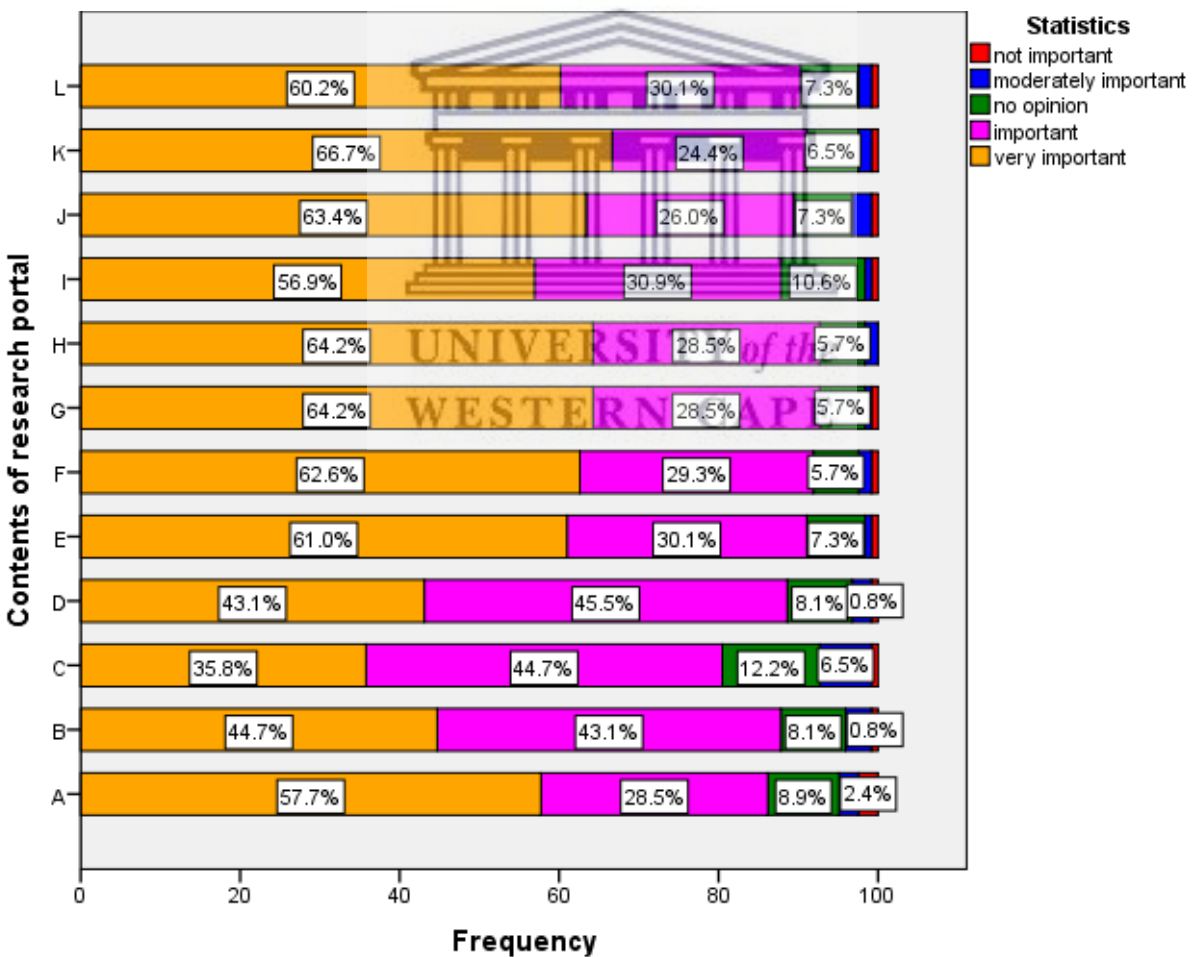
- A = Scholarly communication website
- B = Workshops on open access publishing
- C = Workshops on copyright, plagiarism and fair use
- D = Sourcing for research grants and funding
- E = Training on referencing and citation
- F = Information literacy workshops

5.1.3.3 Development of a research portal as part of the academic library website

Information was sought from doctoral students about the use of a research portal as part of the academic library website for scholarly communication guidance.

5.1.3.3a Contents of a research portal for scholarly communication guidance

Question 15 was asked to establish the content requirements of a research portal for scholarly communication guidance. Respondents indicated the level of importance on the list provided. The responses are presented in Figure 5.20.



N = 123

Figure 5.20 Contents requirements of a research portal for scholarly communication guidance

- A = Provision of online links to grants and funding*
- B = Information on research and innovation*
- C = Link to graduate school website*
- D = Link to online library services*
- E = Thesis writing guides*
- F = Citation and reference management software*
- G = Training on copyright, plagiarism and fair use*
- H = Proposal writing guides*
- I = Training on open access publishing*
- J = Off campus access to electronic resources*
- K = Training on research methods*
- L = Training on how to do proper referencing and citation*

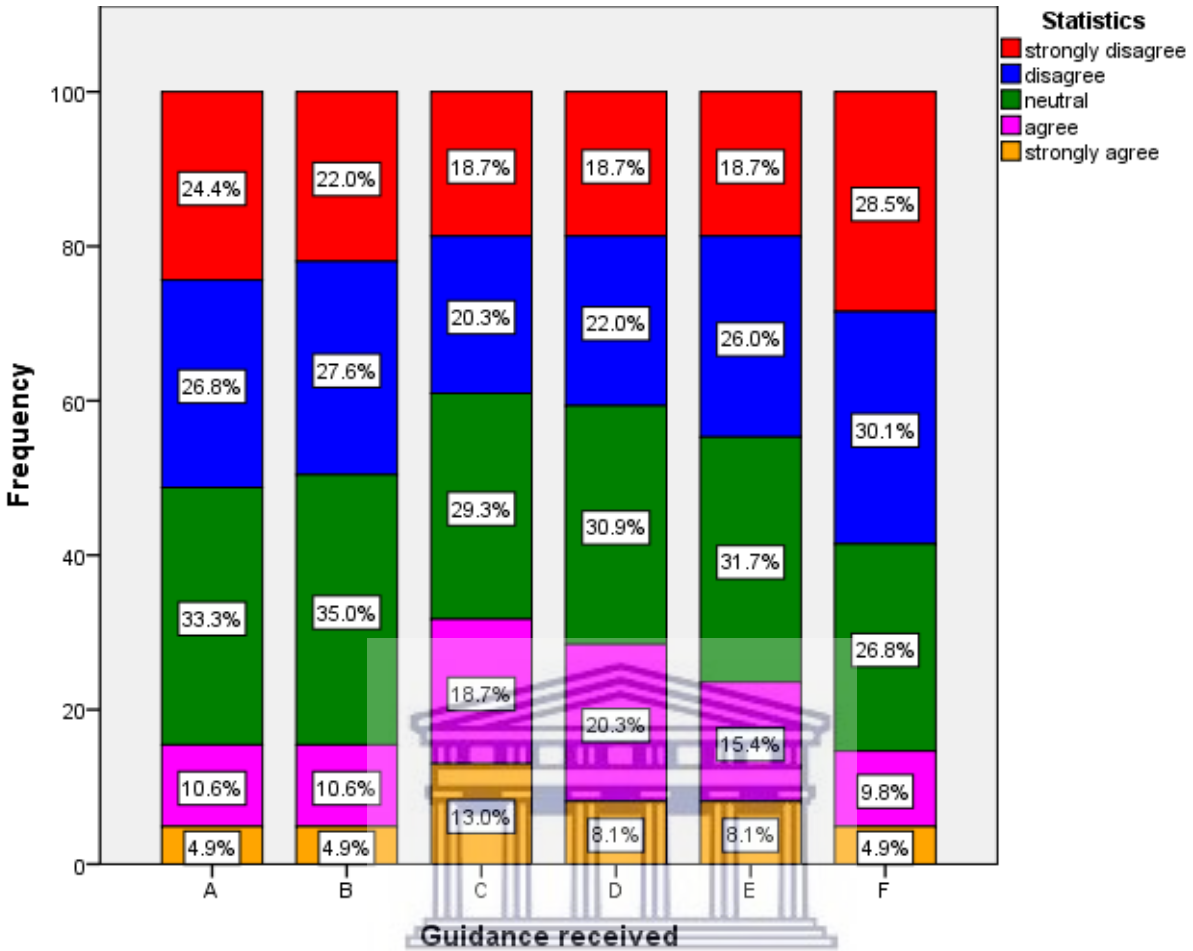
Training on research methods (66.7%) was regarded as very important content of a research portal, followed by *Training on copyright, plagiarism and fair use* (64.2%) and *Proposal writing guides* (64.2%). Only 35.8% regarded *Link to graduate school website* as very important. Perhaps the students did not realize how the activities of the graduate school can inform them.

5.1.4 Section D: Scholarly communication guidance by supervisors of doctoral students

Literature has shown that for doctoral students to be equipped with the necessary skills for scholarly communication, effective guidance by the supervisors plays an important role.

5.1.4.1 Level of scholarly communication guidance received from supervisor

Question 16 was asked to ascertain the level of guidance doctoral students had received and were still receiving from their supervisors. Figure 5.21 is a presentation of the responses.



N = 123 **Figure 5.21 Level of scholarly communication guidance received from supervisor**

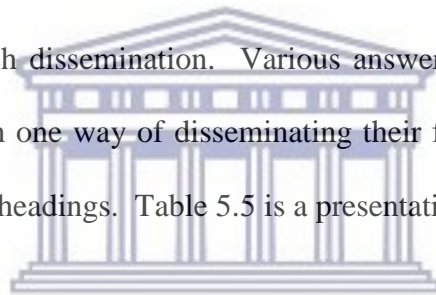
- A = I have received training on how to access library resources by my supervisor
- B = My supervisor has directed me to academic librarians for training on library resources
- C = My supervisor has trained me to prepare manuscripts for publication from my research
- D = My supervisor has shown me the various ways of disseminating research findings
- E = My supervisor has trained me to access full text articles from online databases
- F = My supervisor has given me guidance on how to access funding for my doctoral research

Figure 5.21 reflects that in general the majority of the students strongly disagreed or disagreed with all the statement. The highest responds (58.6%) for strongly disagreed and disagreed was prompted by the fact that they have not received guidance on how to access funding for their doctoral research. Only *My supervisor has trained me to prepare manuscripts for publication from*

my research and *My supervisor has shown me the various ways of disseminating research findings* received some positive (31.7% and 28.4% respectively) feedback. All the statements had relatively high percentages (26.8% - 35%) for the neutral option. This is perhaps an indication of the reluctance of respondents in answering the question in order not to reflect supervisors in a negative light.

5.1.4.2 Disseminating research findings by doctoral students

Question 17, an open-ended question asked respondents to state how they intend to disseminate their research findings. The question was asked to ascertain the knowledge doctoral students have on the various ways of research dissemination. Various answers were given and some of the statements contained more than one way of disseminating their findings. These responses were collated and grouped under ten headings. Table 5.5 is a presentation of the responses.



N = 123

Table 5.5 Research dissemination by doctoral students

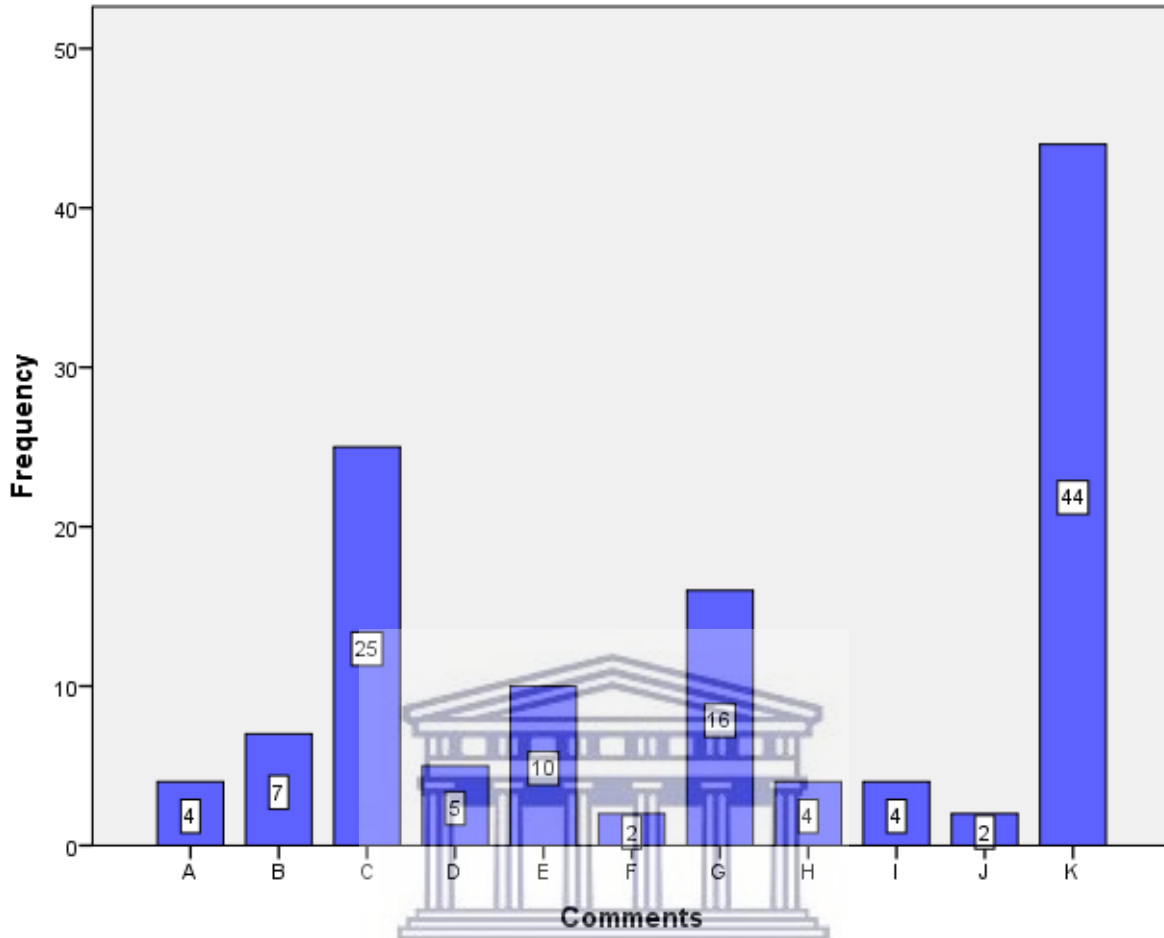
Research dissemination	Frequency	Responses
Publication in journals	117	<i>journal article, article publication, publication, journal, publishing my work, publish, peer-reviewed journal, peer-reviewed article, academic journals, scientific publications, paper, scholarly journals, scientific publications, articles, and others</i>
Presentation at conferences	26	<i>conference(s), attending conference, conference proceedings, presentation at conferences, and conference papers</i>
Seminars/workshops	10	<i>research seminars, research fora, seminars, workshop presentations and public lectures</i>

Mass media	5	<i>television talk show, news articles, dailies and print media.</i>
Library deposit of thesis	5	<i>thesis form, thesis and faculty library.</i>
Institutional repositories	4	<i>Research repository and university's portal</i>
Stakeholder meetings and reports	3	<i>stakeholders, reports to stakeholders and stakeholder meetings</i>
Policy briefs	3	<i>Policy briefs</i>
Community engagements	2	<i>meeting district assemblies and community engagements.</i>
Not applicable	1	
Total	176	

A total of 176 itemised responses were received. One response did not relate to scholarly communication and therefore was classified as not applicable. Publication in journals with the highest response (117 suggestions) followed by conference presentations (26 suggestions). Research seminars and workshops (10 suggestions), mass media (5 suggestions) and the traditional thesis (5 suggestions) seemed popular forms of disseminating research.

5.1.4.3 Other comments on scholarly communication guidance by the academic library

The final question invited respondents to state any other comment they had on scholarly communication guidance. Responses such as nil, no, not applicable, N/A, neutral, none, not now and no idea were grouped under 'not applicable'. The other comments were categorised and grouped under ten main headings developed from the proposed scholarly communication guidance model. These responses are presented in Figure 5.22.



N = 123

Figure 5.22 Other comment on scholarly communication guidance by doctoral students

- A = Taught and compulsory courses*
- B = Hands-on-trainings*
- C = Research portals for students*
- D = Face-to-face contacts with academic librarians*
- E = Research seminars/workshops*
- F = Train the trainer programs*
- G = Effective communication channels*
- H = Effective guidance by supervisors*
- I = Specific research needs to be met*
- J = Provision of data analysis software*
- K = Not applicable*

Research portals for students was the highest response (25 submissions) followed by effective communication channels (16 submissions), then research seminars and workshops (10

submissions), hands-on-trainings (7 submissions) and face-to-face contacts with academic librarians (5 submissions). They were followed by taught and compulsory courses, effective guidance by supervisors and specific research needs to be met having four submissions each. The least submissions were train the trainer workshops and provision of data analysis software with two submissions each.

5.2 QUESTIONNAIRE FOR SUPERVISORS OF DOCTORAL STUDENTS

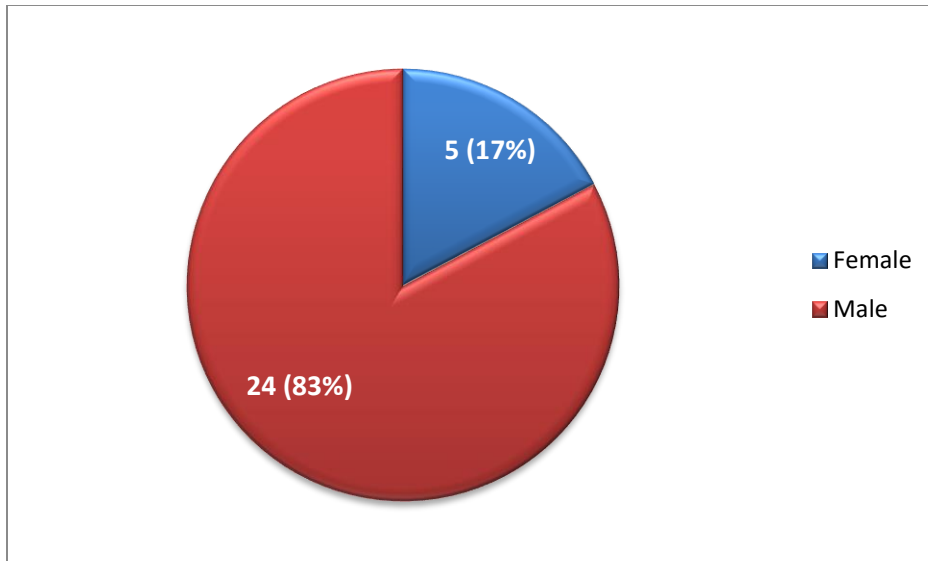
Data from the questionnaires completed by supervisors of doctoral students is presented in the order of the questions in the questionnaires. Some cross tabulation are shown.

5.2.1 Section A: Biographical data of supervisors

This section provides biographical data of supervisors of doctoral students. The information sought from the supervisors were gender, college, faculty, current position, number of years of doctoral supervision, number of doctoral students graduated, number of the doctoral graduates who published peer-reviewed articles, number of doctoral students currently supervising and their level of knowledge on some scholarly communication issues.

5.2.1.1 Gender of supervisors

Question 1 was asked to determine the gender of the supervisors. The data is presented in Figure 5.23.



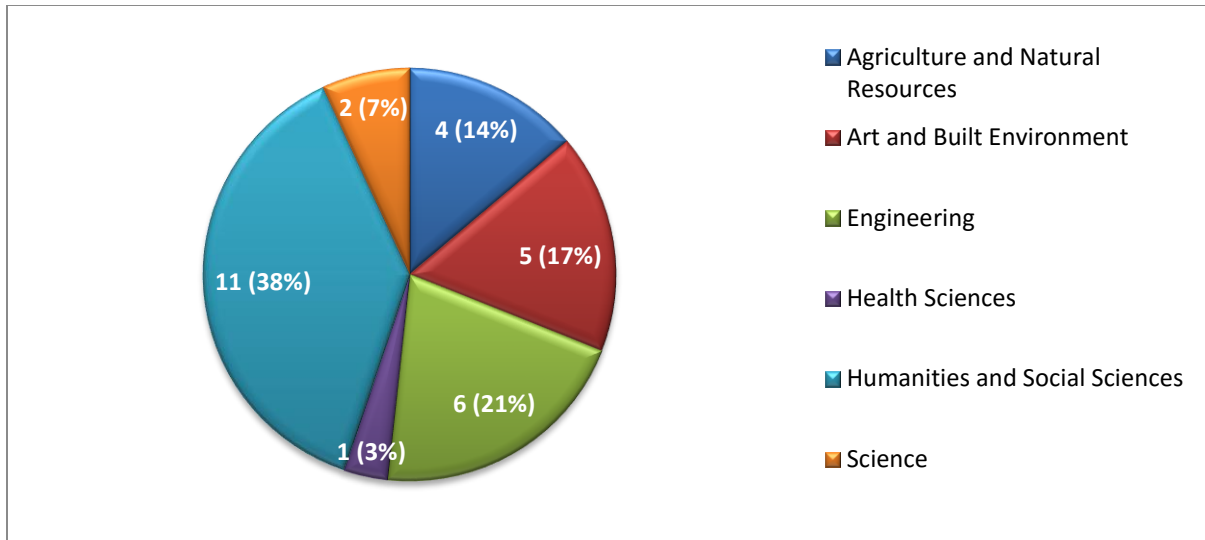
N=29 **Figure 5.23 Gender of supervisors**

The responses showed that 24 (83%) were males and five (17%) were females. This data correlates with the statistics for lecturers, 901(85.1%) males and 158 (14.9%) females for the 2017/2018 academic year as reported in the Basic Statistics of KNUST (2018:33).

The responses showed that 24 (83%) were males and five (17%) were females. This data correlates with the statistics for lecturers, 901(85.1%) males and 158 (14.9%) females for the 2017/2018 academic year as reported in the Basic Statistics of KNUST (2018:33).

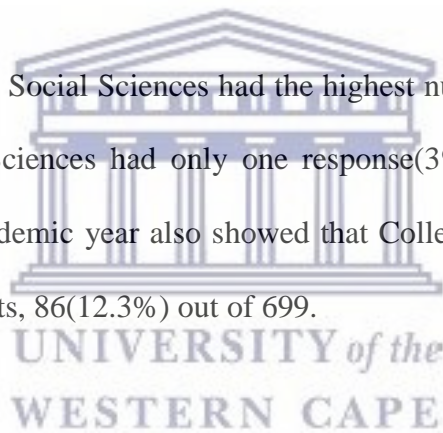
5.2.1.2 College of supervisors

Question 2 sought to establish the colleges of the doctoral supervisors. The findings are presented in Figure 5.24.



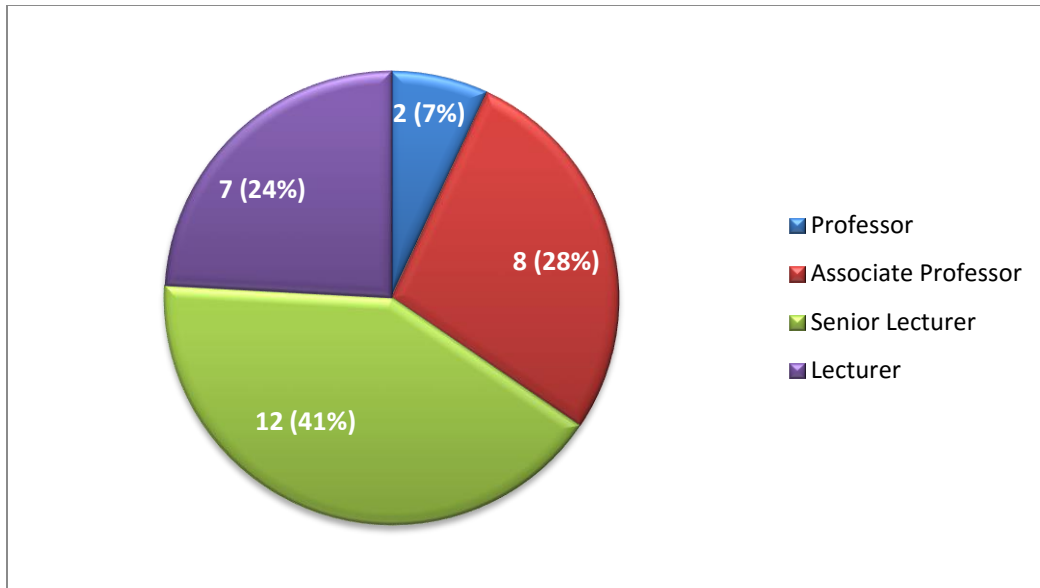
N=29 **Figure 5.24 College of supervisors of doctoral students**

The College of Humanities and Social Sciences had the highest number of respondents 11(38%) while the College of Health Sciences had only one response(3%).The statistics of registered students for the 2017/2018 academic year also showed that College of Health Sciences had the least number of doctoral students, 86(12.3%) out of 699.



5.2.1.3 Academic rank

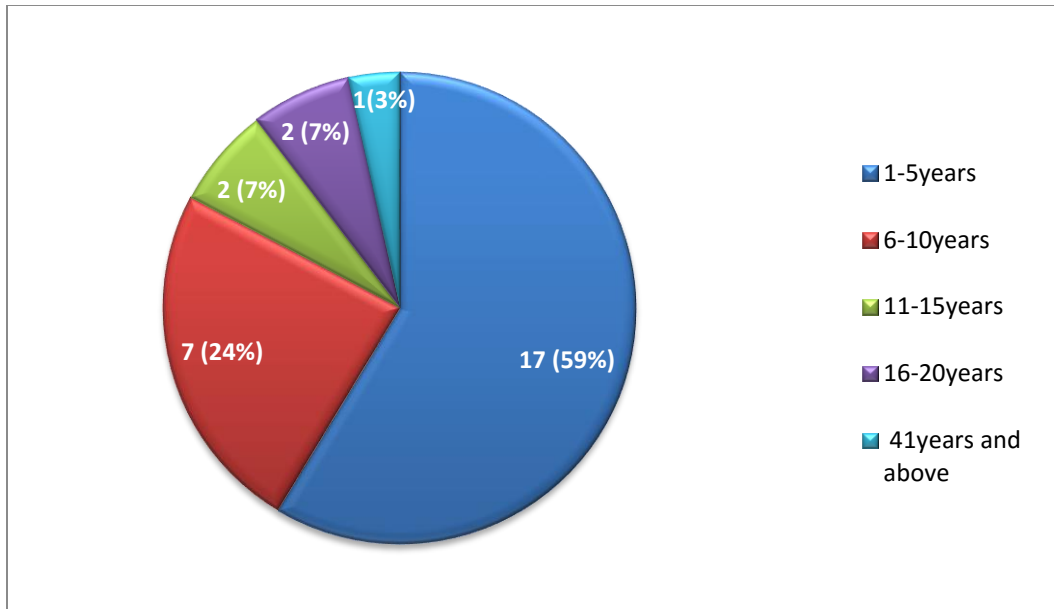
Question 3 sought to establish the current academic rank of supervisors. Figure 5.25 reflects that the majority of the respondents (41%) were ranked senior lecturer. This was followed by associate professors (28%), lecturers (24%) and full professors (7%).



N=29 **Figure 5.25 Academic rank of supervisor**

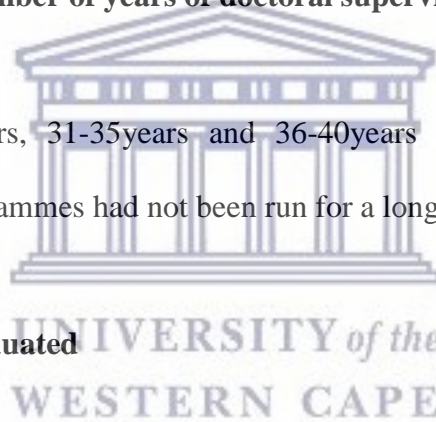
5.2.1.4 Years of supervision experience

Question 4 was asked to establish the number of years supervisors had supervised doctoral students. Respondents had to choose one of the year ranges provided. Figure 5.26 reflects that the majority of supervisors had 1 – 5 years of experience, followed by 6 – 10 years (24%). Only two supervisors had respectively 11 – 15 years and 16 – 20 years of experience. This corresponds with the facts that academics start supervising doctoral students only after obtaining doctoral degrees.



N=29 **Figure 5.26 Number of years of doctoral supervision**

Ranges 21-25years, 26-30years, 31-35years and 36-40years had no responses. In some departments, the doctoral programmes had not been run for a long time in the university.



5.2.1.5 Doctoral students graduated

Question 5 sought to establish the number of doctoral students supervisors had graduated. This information would help the study to have a fair idea of doctoral thesis to be expected in the institutional repository during the bibliometric survey. Their responses are indicated in Table 5.6.

N=29 **Table 5.6 Number of doctoral students graduated**

Number of doctoral graduates by supervisors	Frequency	Percentage (%)
0	10	34.7%
1	8	27.6%
2	3	10.3%

3	2	6.9%
5	2	6.9%
7	1	3.4%
11	1	3.4%
14	1	3.4%
Does not remember	1	3.4%
Total	29	100.0%

Most of the supervisors (10) had not been in doctoral supervision long to graduate students. One supervisor (3.4%) had graduated fourteen students, while another graduated eleven. It can be deduced that majority of these supervisors relatively had limited experience.

5.2.1.6 Doctoral graduates who published peer-reviewed journal articles

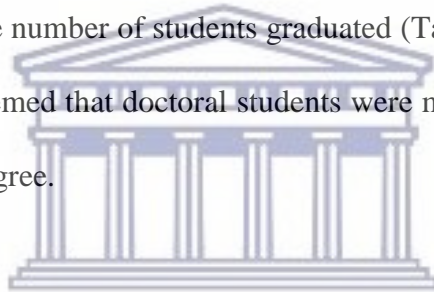
In order to determine whether research findings were disseminated, supervisors were asked in question 6 to state the number of their doctoral graduates who were able to publish peer-reviewed articles from their theses. Their responses are presented in Table 5.7.

N=29 Table 5.7 Number of doctoral graduates who published peer-reviewed journal articles

Number of doctoral graduates who published from their thesis	Frequency	Percentage (%)
0	5	17.2%
1	8	27.6%
2	5	17.2%
3	1	3.4%
3 (yet to graduate but have published)	1	3.4%
5	1	3.4%
7	1	3.4%

10	1	3.4%
11	1	3.4%
No Response	5	17.2%
Total	29	100.0%

One respondent indicated that three of his students had published from their theses although they had not graduated yet. A total of 5 (17.2%) did not have doctoral graduates with publications from their thesis. These supervisors may be those who had not graduated any doctoral student. Eight supervisors (27.6%) had one student each who published. The five (17.2%) supervisors with no responses might have meant that their doctoral graduates did not published yet or they just decided not to answer. Compared to the number of students graduated (Table 5.5) almost all the students who graduated published. It seemed that doctoral students were motivated and guided to publish while pursuing the doctoral degree.



5.2.1.7 Number of doctoral students supervising

Question 7 solicited for the number of doctoral students supervisors had at the time of the study. Their responses are presented in Table 5.8.

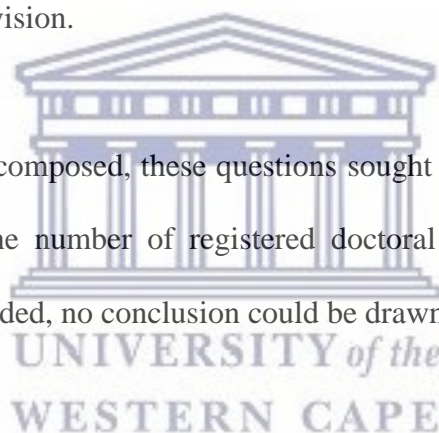
N=29

Table 5.8 Number of doctoral students supervising

Number of doctoral students under supervision	Frequency	Percentage (%)
1	9	31.0%
2	6	20.7%
3	3	10.3%
4	1	3.4%

5		1	3.4%
8		1	3.4%
No response		1	3.4%
Nil		6	17.2%
Total		29	100%

The majority of supervisors (31%) were supervising one student each. Others indicated two students (20.7%), three students (10.3%), four students (3.4%) or five students (3.4%). The most students supervised by one supervisor, was eight doctoral students. Six supervisors (17.2%) indicated nil meaning that although they did not have students as at the time of the study, they had previously done doctoral supervision.



When the questionnaires were composed, these questions sought to correspond with the number of students supervised with the number of registered doctoral students, but because not all supervisors and students responded, no conclusion could be drawn.

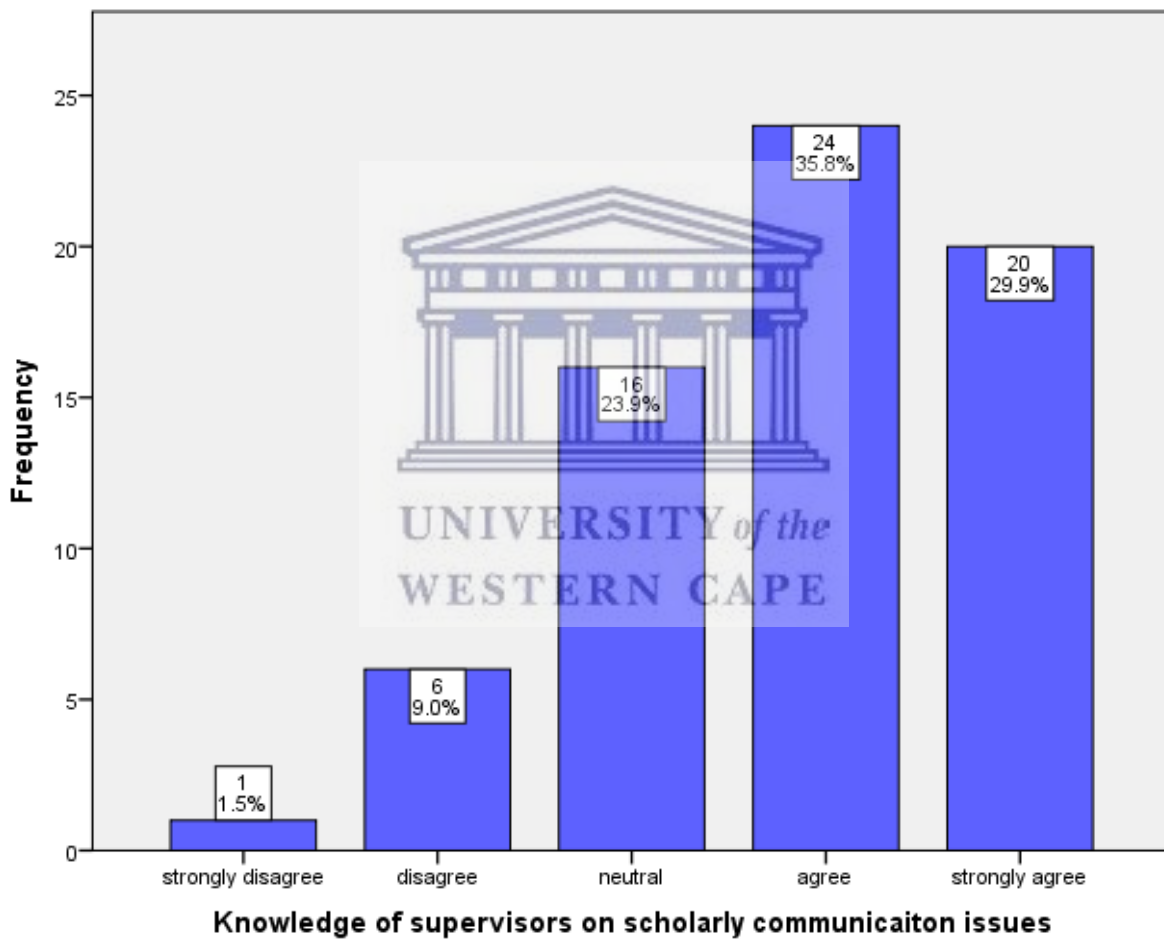
5.2.1.8 Knowledge of supervisors on some scholarly communication issues

Question 8 was asked to establish the knowledge doctoral supervisors had on some selected scholarly communication issues. They were requested to indicate their agreement on facts about scholarly communication issues identified in the literature using the likert scale: strongly disagree, disagree, neutral, agree and strongly agree. These facts are:

- *Open access gives free online access to scholarly works*
- *An open access journal is a scholarly journal that a reader can access online*
- *Open access literature of all types is digital, online, free of charge and free of most copyright restrictions*

- *Plagiarism is act of falsely owning someone else’s ideas or intellectual efforts*
- *Creative Commons licences set out the re-use conditions for someone making use of another’s material*

Figure 5.27 presents the total group responses for each scale, while Figure 5.28 presents the responses on the itemised statements.



N=29 Figure 5.27 Supervisors rating of knowledge on scholarly communication issues

In Figure 5.27, the knowledge of doctoral supervisors on scholarly communication issues is indicated as measured by their level of agreement of all the statements listed. A total of 41.4%

agreed, 33.1% strongly agreed, 19.3% were neutral, 4.8% disagreed and 1.4% strongly disagreed to the statements. It can be deduced that most (74.5%) doctoral supervisors have knowledge on scholarly communication issues. It behoves on those supervisors opting for being neutral (and possibly uncertain) or disagreeing to collaborate with the academic library to offer scholarly communication guidance to their doctoral students.

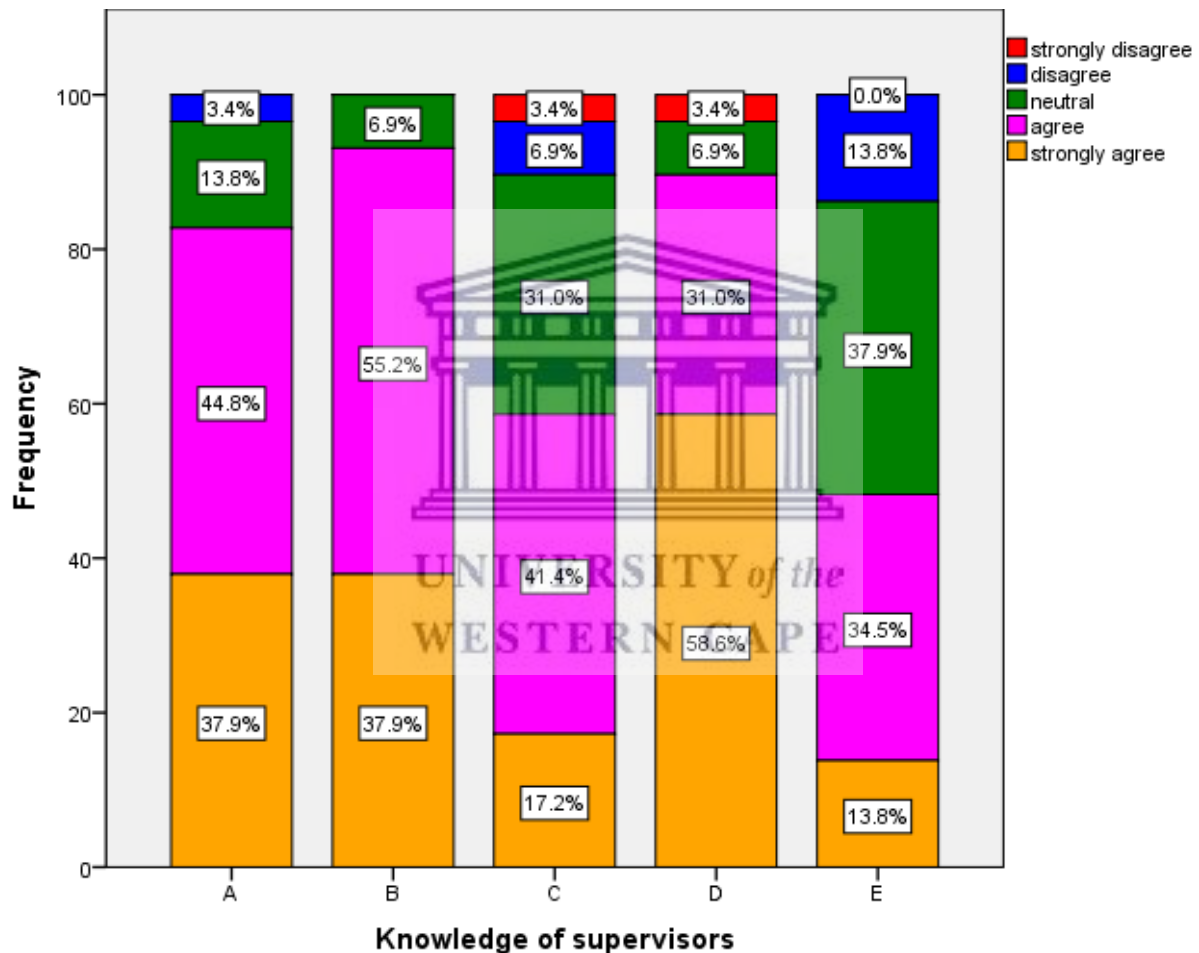


Figure 5.28 Supervisors knowledge of scholarly communication issues

A-Open access gives free online access to scholarly works

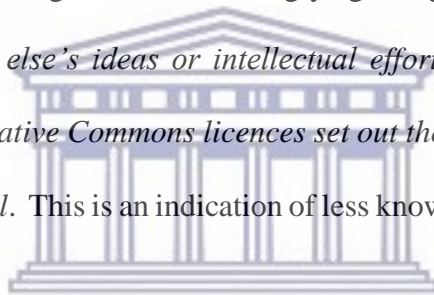
B-An open access journal is a scholarly journal that a reader can access online

C-Open access literature of all types is digital, online, free of charge and free of most copyright restrictions

D-Plagiarism is act of falsely owning someone else's ideas or intellectual efforts

E-Creative Commons licences set out the re-use conditions for someone making use of another's material

A total of 44.8% agreed and 37.9% strongly agreed to the fact that *Open access gives free online access to scholarly work*. This is a strong indication of supervisors' good knowledge on open access. A further indication of good knowledge is found in those who agreed (37.9%) and strongly agreed (55.28%) that *An open access journal is a scholarly journal that a reader can access online*. Although 41.4% respondents agreed and 17.2% strongly agreed that *Open access literature of all types is digital, online, free of charge and free of most copyright restrictions*, 31% were neutral indicating perhaps uncertainty about this aspect of open access. Another indication of good knowledge is found in 31% agreeing and 58.6% strongly agreeing to the statement *Plagiarism is act of falsely owning someone else's ideas or intellectual efforts*. Respondents (37.9%) were neutral on the statement for *Creative Commons licences set out the re-use conditions for someone making use of another's material*. This is an indication of less knowledge about creative commons.



5.2.2 Section B Scholarly communication guidance by supervisors

5.2.2.1 Level of skill of their doctoral students for research and scholarly communication

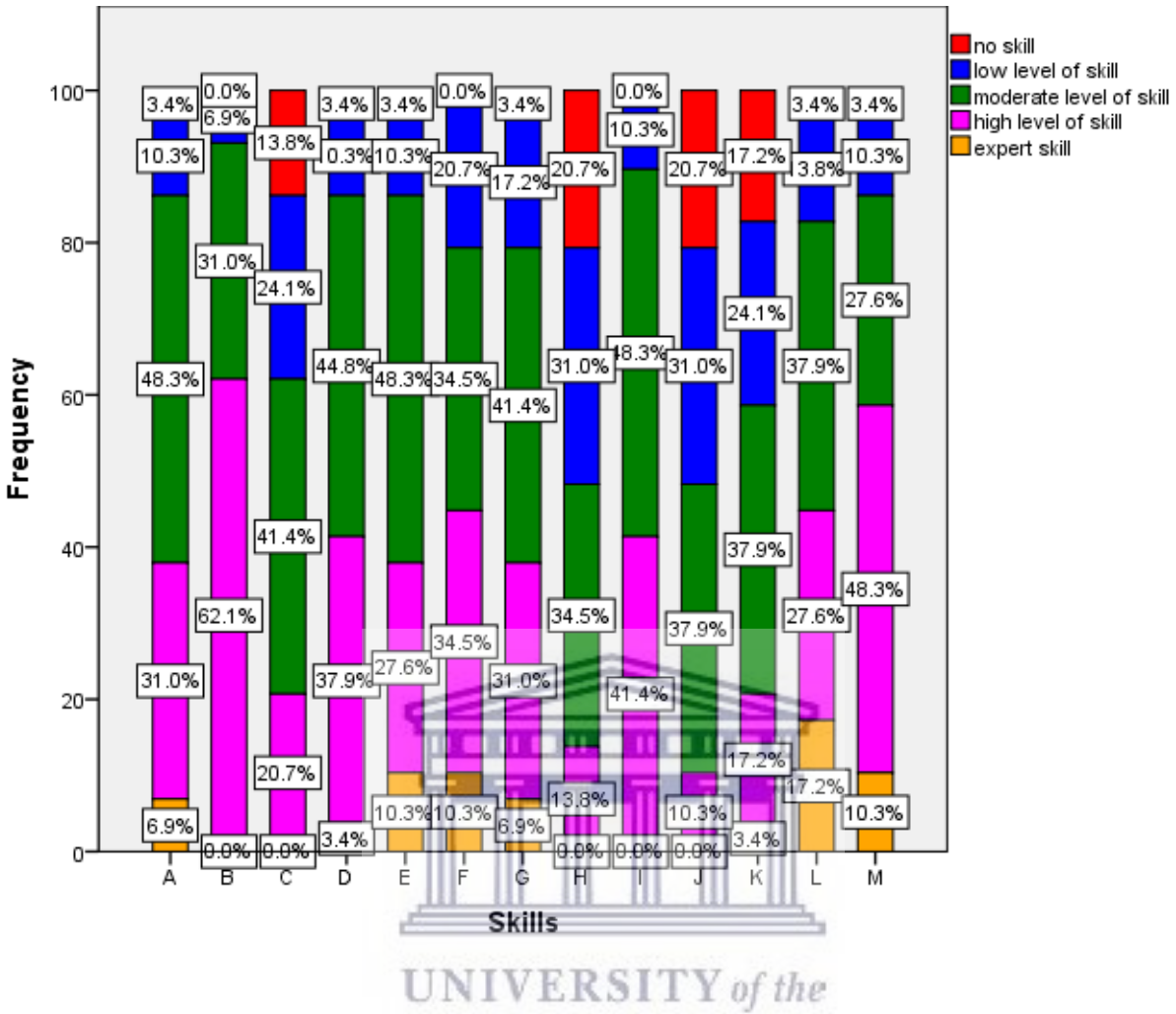
Question 9 sought to establish how supervisors rated the research skills and abilities of the doctoral students they are supervising or have supervised before. This will enable the academic library to collaborate with faculty to design effective scholarly communication guidance for doctoral students. The statements are:

- *How to access full text articles from the university library online databases*
- *How to use different referencing styles required for their research.*
- *How to use reference management tools such as Mendeley, Zotero, Refworks*
- *How to access all the electronic resources available on the library website*

- *How to prepare a manuscript for publication in a peer-reviewed journal*
- *How to prepare a manuscript for a conference presentation*
- *How to determine where to publish their final research results*
- *How to access funding for their research or doctoral studies*
- *How to summarise the final thesis into a 15 power point slides for presentation*
- *How to negotiate one's right as an author*
- *How to determine journal impact factor*
- *How to use data management software like SPSS, Excel, AtlasTi or others*
- *How to identify the right research method to be used to answer the research questions*

The responses are presented in Figure 5.29.

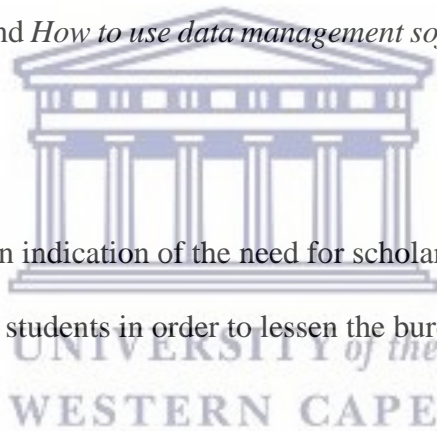




N=29 Figure 5.29 Level of skill for research and scholarly communication by doctoral students

- A=How to access full text articles from the university library online databases*
- B=How to use different referencing styles required for their research.*
- C=How to use reference management tools such as Mendeley, Zotero, Refworks*
- D=How to access all the electronic resources available on the library website*
- E=How to prepare a manuscript for publication in a peer-reviewed journal*
- F=How to prepare a manuscript for a conference presentation*
- G=How to determine where to publish their final research results*
- H=How to access funding for their research or doctoral studies*
- I=How to summarise the final thesis into a 15 power point slides for presentation*
- J=How to negotiate one's right as an author*
- K=How to determine journal impact factor*
- L=How to use data management software like SPSS, Excel, AtlasTi or others*
- M=How to identify the right research method to be used to answer the research questions*

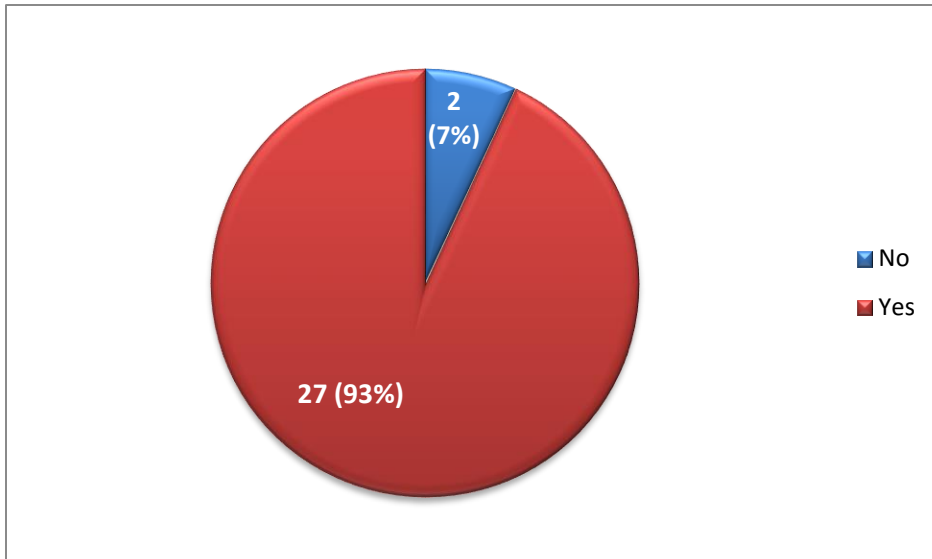
This data indicates that doctoral supervisors rated their students as having moderate level of skills in research and scholarly communication. This is evident in the percentages for moderate level of skills in the following activities: *How to access full text articles from the university library online databases* (48.3%), *How to use reference management tools such as Mendeley, Zotero, Refworks* (41.4%), *How to access all the electronic resources available on the library website* (44.8%), *How to prepare a manuscript for publication in a peer-reviewed journal* (48.3%), *How to determine where to publish their final research results*(41.4%), *How to access funding for their research or doctoral studies* (34.5%), *How to summarise the final thesis into a 15 power point slides for presentation* (48.3%), *How to negotiate one's right as an author*(37.9%), *How to determine journal impact factor* (37.9%) and *How to use data management software like SPSS, Excel, AtlasTi or others* 37.9%).



The moderate level of skills is an indication of the need for scholarly communication guidance by the academic library to doctoral students in order to lessen the burden on supervisors.

5.2.2.2 Knowledge of the institutional repository by supervisors

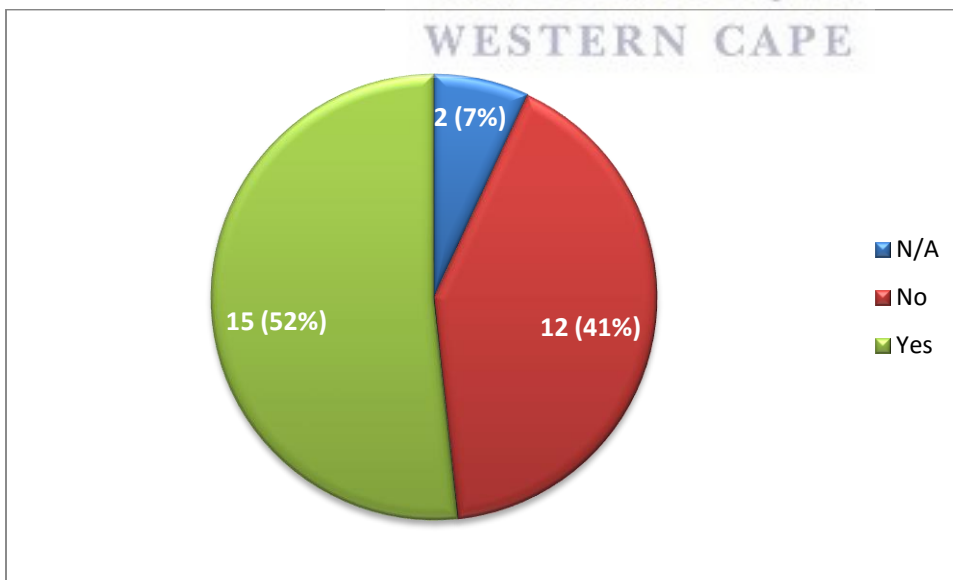
Question 10 was asked to ascertain whether the supervisors themselves had any knowledge about the existence of the institutional repository. Supervisors usually transfer knowledge and experience to their students. The institutional repository is regarded as an alternative channel for scholarly communication and therefore important for supervisors to know about and to advise students to make use of it. Figure 5.30 shows that almost all (93%) of supervisors acknowledged to being aware of the existence of the institutional repository and its uses.



N=29 **Figure 5.30 Knowledge of the institutional repository by supervisors**

5.2.2.3 Accessing materials from the Institutional repository by doctoral supervisors.

A follow-up question was asked to ascertain if supervisors accessed materials or documents from the institutional repository and as such recognizing its worth and directing students to do the same. The responses are presented in Figure 5.31.

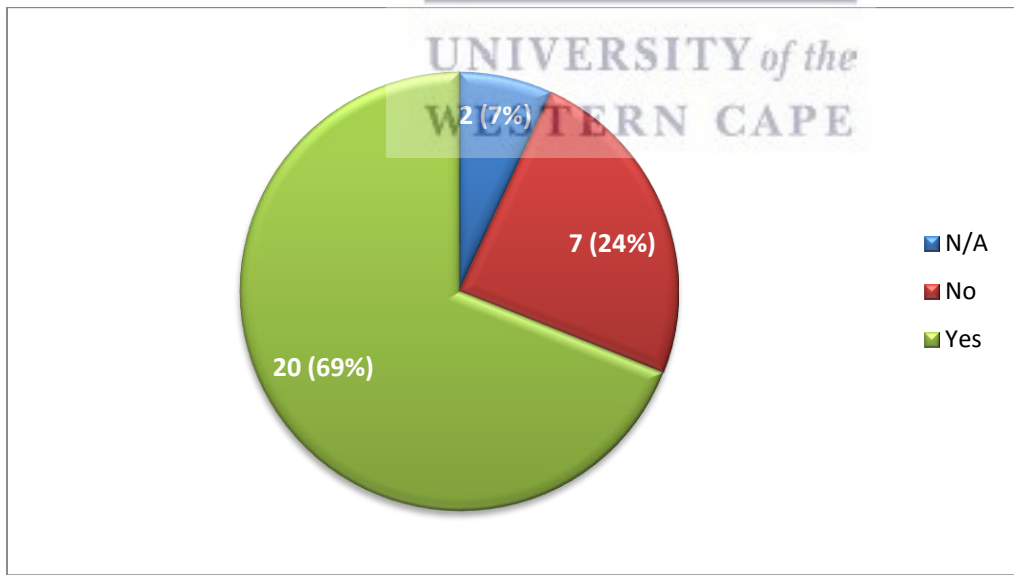


N=29 **Figure 5.31 Supervisors accessing materials from the institutional repository**

The correct number of respondents was ascertained by first cleaning the data using SPSS. The option not applicable “N/A” was added to accommodate the two respondents who had not heard about the institutional repository and therefore would not access materials from it, but still indicated usage. Fifteen respondents (52%) acknowledge to accessing material from the KNUST repository. Alarming from the academic library’s point of view is that twelve (41%) respondents indicated not accessing the institutional repository.

5.2.2.4 Supervisors directing doctoral students to access the institutional repository

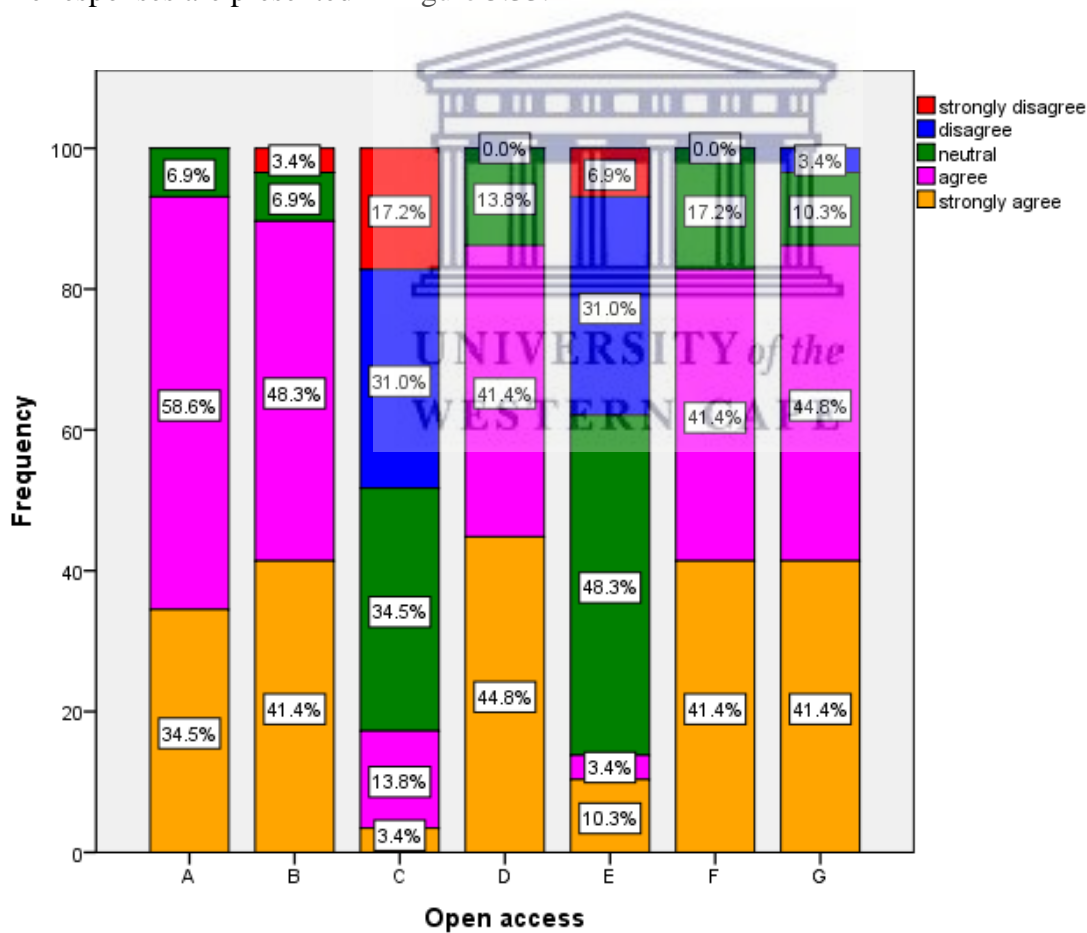
Another follow-up question was asked to establish if supervisors were directing their doctoral students to access material from the KNUST repository. Their responses presented in Figure 5.32 reflects that the majority of respondents (69%) directed their doctoral students to access materials from the institutional repository. Two responses were not applicable.



N=29 Figure 5.32 Directing doctoral students to access materials from the institutional repository

5.2.2.5 Perception of supervisors on open access, academic website and institutional repository

Question 13 asked respondents to indicate their agreement with some statements solicited from the literature pertaining to scholarly communication and an institutional repository. This was asked to ascertain how the supervisors perceived the usefulness of an institutional repository, open access and an academic library website for scholarly communication. Their perceptions would reflect upon the guidance they give to their doctoral students. A Likert scale (strongly disagree, disagree, neutral, agree and strongly agree) was provided from which respondents had to choose. The responses are presented in Figure 5.33.



N=29

Figure 5.33 Perception of supervisors on the usefulness of open access, academic website and institutional repository for scholarly communication

A - The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings

B - Depositing research findings in an open access institutional repository can make one's work highly visible

C - Institutional Repositories contain published material of inferior quality

D - An increase in the visibility would lead to more citations of one's research findings

E - Every information needed on disseminating research findings can be found on the university library website

F - Publishing in an open access journal can give one an increased web visibility

G - An increased web visibility can lead to academic and research collaborations

The perceptions of doctoral supervisors on the usefulness of open access, academic website and institutional repository for scholarly communication according to Figure 5.33 were as follows:

Statement A (*The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings*) a true fact drew 58.6% of respondents agreeing and 34.5% strongly agreeing totalling 93.1%. This is an indication of a good perception on the contents of the institutional repository.

The majority of supervisors also either agreed (48.3%) or strongly agreed (41.4%) with statement B (*Depositing research findings in an open access institutional repository can make one's work highly visible*). Respondents therefore had a good perception about this benefit of an open access institutional repository.

Statement C (*Institutional Repositories contain published material of inferior quality*) drew more mixed responses. The minority agreed (13.8%) or strongly agreed (3.4%) and an alarming 34.5% of respondents were neutral indicating uncertainty about the statement.

In coherence with statement B, the majority of supervisors agreed (41.4%) or strongly agreed (44.8%) with statement D (*An increase in the visibility would lead to more citations of my work*). The academic library should therefore be able to collaborate with them to guide doctoral students to make themselves visible through open access and institutional repositories.

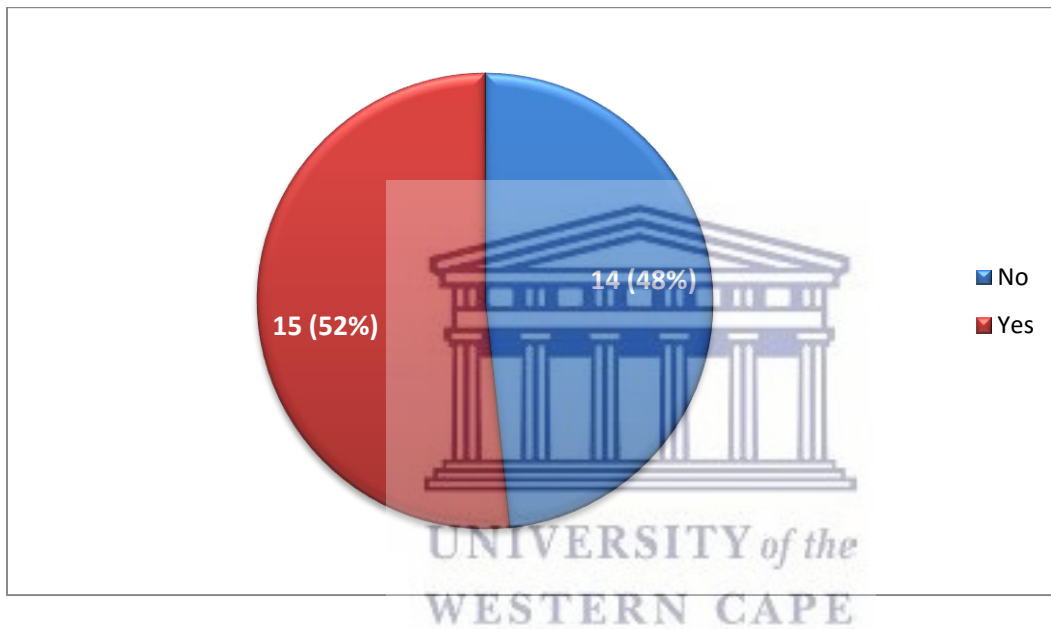
The fact that the majority of supervisors was either neutral (38.3%) or disagreed (31%) or strongly disagreed (6.9%) with statement E (*Every information needed on disseminating research findings can be found on the university library website*) is an indication that the KNUST academic library website did not contain all the needed information about dissemination research findings. This data justifies the need for the KNUST academic library to develop their website further and by creating a research portal as part of the academic library for scholarly communication guidance.

Statement F (*Publishing in an open access journal can give one an increased web visibility*) also had the majority of supervisors (41.4%) agreeing and the same number strongly agreeing, indicating the good perception they have about the fact that open access is making doctoral works highly visible.

Another indication of good perception about open access is found in 44.8% of supervisors agreeing and 41.4% strongly agreeing to Statement G (*An increased web visibility can lead to academic and research collaborations*).

5.2.2.6 Policies on scholarly communication by doctoral students

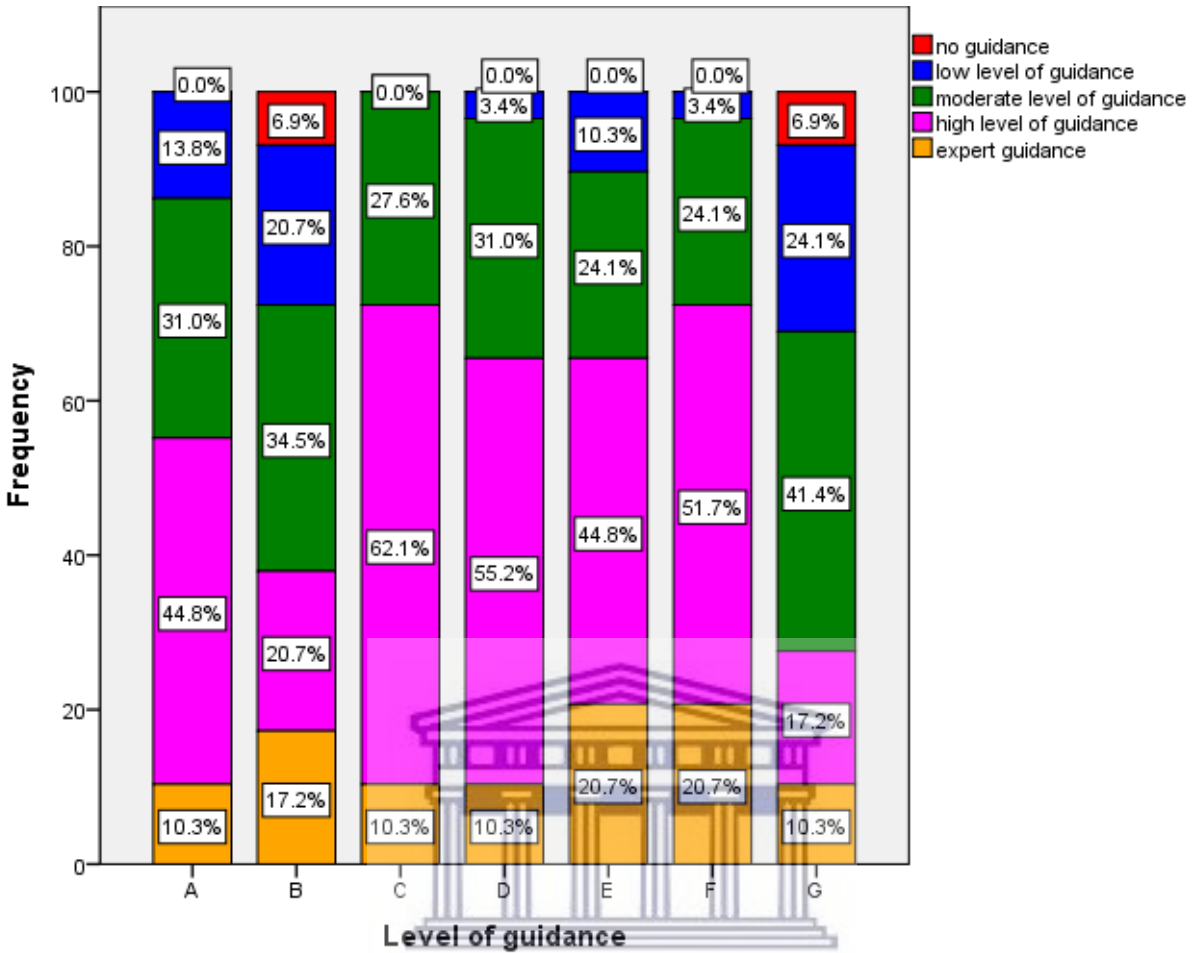
Question 14 requested respondents to acknowledge whether there is a policy on scholarly communication for doctoral students in their college, faculty or department. As can be seen from Figure 5.34, almost half (48%) of the supervisors acknowledge to not having policies on scholarly communication. Policies are needed in every organisation for smooth running and accountability.



N=29 **Figure 5.34 Scholarly communication policies**

5.2.2.7 Level of scholarly communication guidance provided by supervisors

Question 15 was asked to establish the level of guidance supervisors had provided on accessing library resources, various ways of disseminating research findings, accessing full text articles from online databases, preparing manuscripts for conference presentations and journal publications and lastly directing students to academic librarians for training on library resources. Figure 5.35 is a presentation of the data.



N=29

Figure 5.35 Level of scholarly communication guidance provided by supervisors of doctoral students

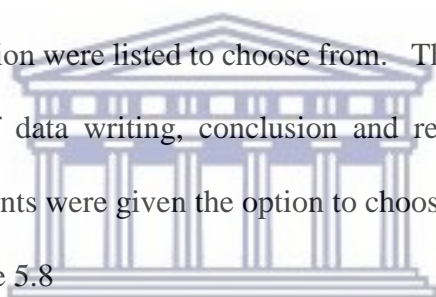
- A - Guidance on how to access library resources
- B - Directing doctoral students to academic librarians for training on library resources
- C - Guidance on how to prepare manuscripts for publication from their research findings
- D - Guidance on the various ways of disseminating research findings
- E - Guidance on how to access full text articles from online databases
- F - Guidance on how to prepare a manuscript for presentation at a conference
- G - Guidance on how to access funding for doctoral research

Figure 5.35 reflects that supervisors had provided high level of guidance in *Guidance on how to access library resources* (44.8%), *Guidance on how to prepare manuscripts for publication from their research findings* (62.1%), *Guidance on the various ways of disseminating research findings*

(55.2%) and *Guidance on how to access full text articles from online databases* (44.8%). However, they had only provided moderate levels of guidance in *Directing doctoral students to academic librarians for training on library resources* (34.5%) and *Guidance on how to access funding for doctoral research* (41.4%). This is an indication that some guidance is provided but the role of the academic library in this regard has not yet been appreciated by the supervisors.

5.2.2.8 Preparation for conference presentation by doctoral students

In response to the next question, supervisors were to indicate when they would advise their doctoral students to prepare manuscripts for conference presentations. A list of the various stages in thesis writing as well as an ‘other’ option were listed to choose from. The stages are: Literature review, data gathering, presentation of data writing, conclusion and recommendation and after final submission of thesis. Respondents were given the option to choose more than one answer. Their responses are presented in Table 5.8



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N=29 **Table 5.9** Stage of presentations at conferences

Stage of presentation at conferences	Frequency	Percentage
Literature Review stage	15	51.7%
Data gathering stage	11	37.9%
Presentation of data writing stage	19	65.5%
Conclusion and recommendation stage	13	44.8%
After final submission of thesis	17	58.6%

Note: Data is based on multiple responses

The majority of supervisors (65.5%) indicated that they would only advise their students to make conference presentations during the *presentation of data writing stage* of their doctoral studies. However, 58.6% of supervisors preferred *after final submission of thesis*. More than half (51.7%) of supervisors also value the literate review to such an extent that they would advise students to present their data at a conference.

5.2.2.9 Preparation for publication in peer-reviewed journals

Supervisors were asked in question 18 to indicate when they would advise their doctoral students to prepare manuscripts for publication in peer-reviewed journals. The stages listed, being before graduation, proposal writing, literature review, data gathering, presentation of data writing, conclusion and recommendation and after final submission of thesis. Respondents were given the option to choose more than one answer. Their responses are presented in Table 5.10.

N=29 **Table 5.10 Stage of preparing manuscripts for publication in a journal**

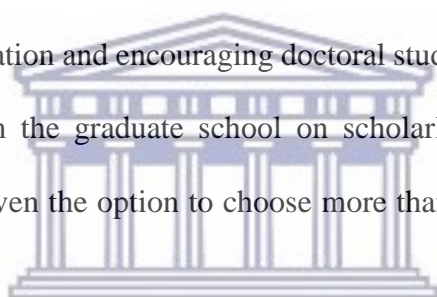
Stage of publishing a journal article	Frequency	Percentage
Done before graduation	1	3.4%
Proposal writing stage	2	6.9%
Literature review stage	10	34.5%
Data gathering stage	9	31.0%
Presentation of data writing stage	17	58.6%
Conclusion and recommendation stage	16	55.2%
After final submission of thesis	19	65.5%

Note: Data is based on multiple responses

The majority of supervisors (65.5%) wanted their students to prepare manuscripts for publication in peer-reviewed journals *After final submission of thesis*. The reason may be that, at that stage, examination and reviews needed to verify the facts in the thesis have been done preventing students wasting time in compiling the information for the journal article. Many supervisors (58.6% and 55.2% respectively) also indicated that the *Presentation of data writing stage* and *Conclusion and Recommendation Stage* are used to prepare for journal articles.

5.2.2.10 Promotion of scholarly communication by the graduate school

The views of supervisors were solicited in question 18 so as to know how the graduate school is promoting scholarly communication and encouraging doctoral students to do so. This includes but not limited to any policy from the graduate school on scholarly communication by doctoral students. Respondents were given the option to choose more than one answer. Their responses are outlined in Table 5.11.



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N=29 **Table 5.11 Promotion of scholarly communication by graduate school**

Promotion of scholarly communication by graduate school	Frequency	Percentage
Compulsory deposit of thesis in the Institutional Repository	18	62.1%
Guidelines on publishing with supervisors	14	48.3%
Presentation at postgraduate seminars	15	51.7%
The graduate school collaborates with the University Library for such guidance	6	20.7%
Nothing is done by the graduate school	2	6.9%
Have no idea	6	20.7%

Other - Peer-review publication is a pre-requisite for graduation	1	3.4%
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Note: Data is based on multiple responses

Compulsory deposit of thesis in the institutional repository had the highest response 18 (62.1%), followed by guidelines on publishing with supervisors 14 (48.3%). Peer-review publication is a pre-requisite for graduation was indicated by one respondent as one way the graduate school is promoting scholarly communication by doctoral students.

5.2.2.11 Promotion of scholarly communication by academic faculties

In question 19, the views of supervisors were again solicited as to how their faculties are promoting scholarly communication by doctoral students. Respondents were given the option to choose more than one answer. Their responses are outlined in Table 5.12.

N=29 **Table 5.12 Promotion of scholarly communication by faculty**

Promotion of scholarly communication by faculty	Frequency	Responses
Compulsory deposit of thesis in the institutional repository	15	51.7%
Guidelines on publishing with supervisors	15	51.7%
Presentation at postgraduate seminars	22	75.9%
The faculty collaborates with the university library for such guidance	8	27.6%
No idea	2	6.9%
No response	1	3.4%

Note: Data is based on multiple responses

Presentation at postgraduate seminars had the highest response 22 (75.9%), followed by Compulsory deposit of thesis in the Institutional Repository and Guidelines on publishing with supervisors, both having 15 (51.7%) responses each.

5.2.2.12 Publication of peer-reviewed journal articles before graduation

Question 20 required the opinion of supervisors as to whether they agreed with a policy of doctoral students submitting two peer-reviewed journal articles before graduation. Figure 5.36 reflects that a total of 26 (90%) agreed, while 3 (10%) disagreed.



N=29 **Figure 5.36 Publication of peer-reviewed journal**

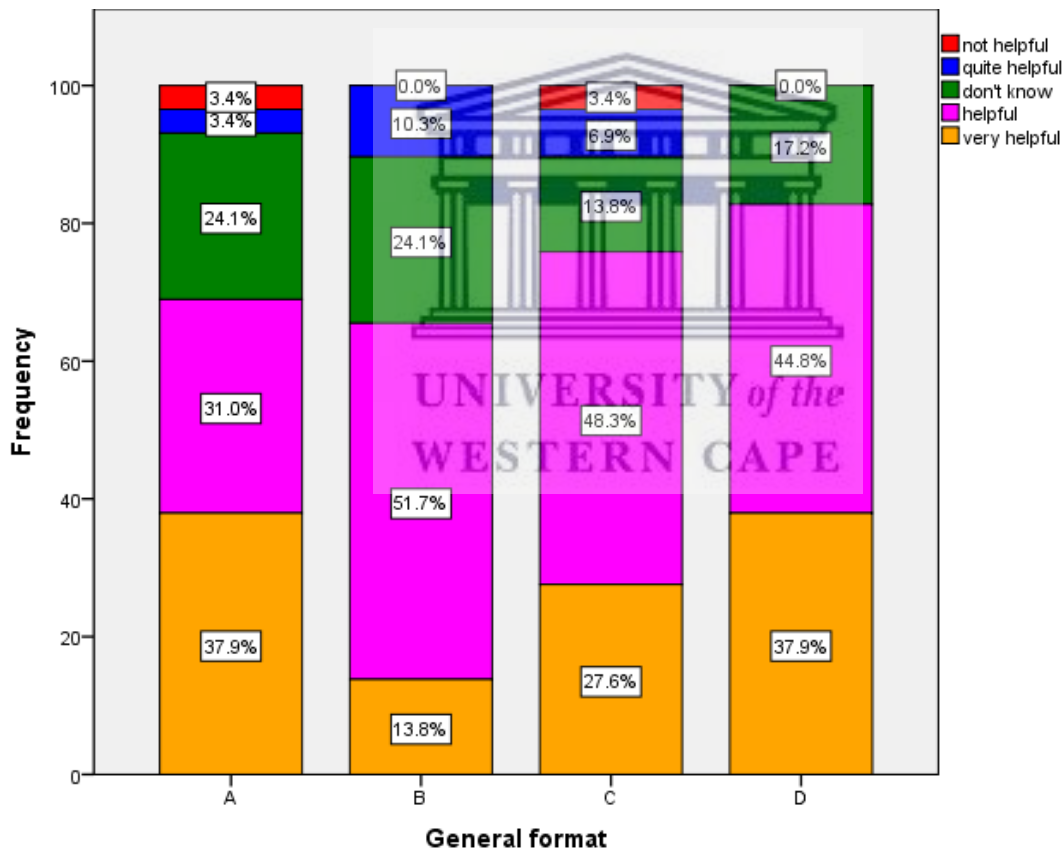
5.2.3 Section C: Scholarly communication guidance by the academic library

This section sought information from doctoral supervisors on how the academic library can establish an effective scholarly communication guidance program for doctoral students.

5.2.3.1 General format of scholarly communication guidance

Supervisors of doctoral students were asked to rate a list of general formats to offer scholarly communication guidance. The options are:

- *Face-to-face guidance with a professional librarian*
- *Online guidance on the academic library website*
- *Information literacy workshops*
- *The establishment of a research portal as part of the academic library website*



N=29

Figure 5.37 General format of scholarly communication guidance

A = Face-to-face guidance with a professional librarian

B = Online guidance on the academic library website

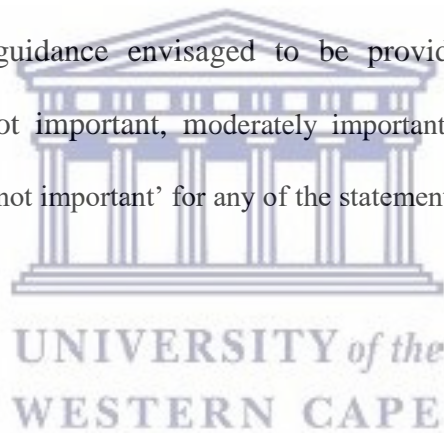
C = Information literacy workshops

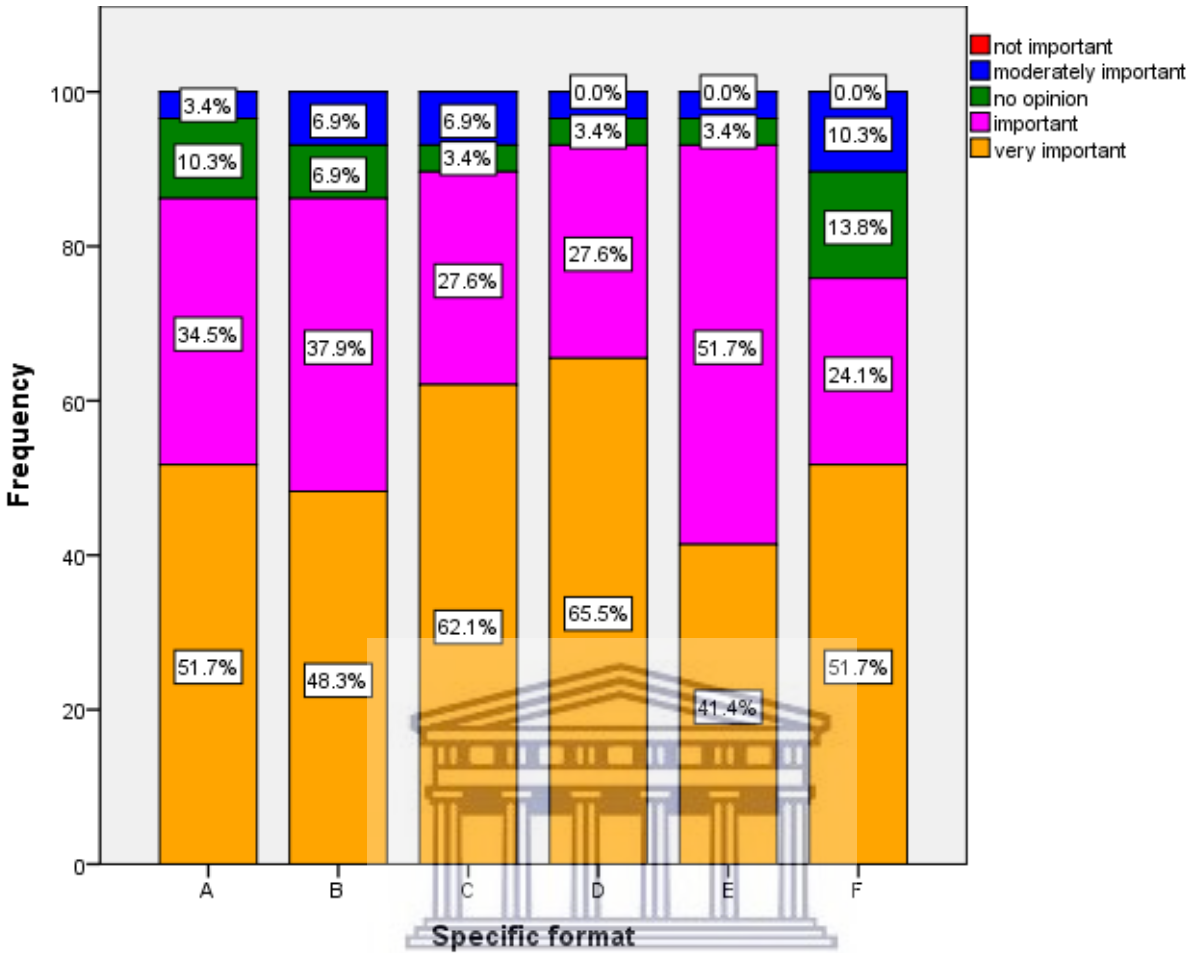
D = The establishment of a research portal as part of the academic library website

The findings presented in Figure 5.37 indicate that doctoral supervisors found all the formats of scholarly communication by the academic library helpful, but especially face-to-face guidance with a professional librarian (37.9%) as well as a research portal (37.9%) were regarded as very helpful. The research portal as format for providing guidance were rated by the majority (82.7%) of supervisors as either helpful or very helpful.

5.2.3.2 Specific format of scholarly communication guidance

Question 22 asked doctoral supervisors to rate according to importance, a list of specific formats of scholarly communication guidance envisaged to be provided by the academic library. Respondents had to choose not important, moderately important, no opinion, important or very important. No respondent chose 'not important' for any of the statements. The other data are presented in Figure 5.38.





N=29

Figure 5.38 Specific formats of scholarly communication guidance

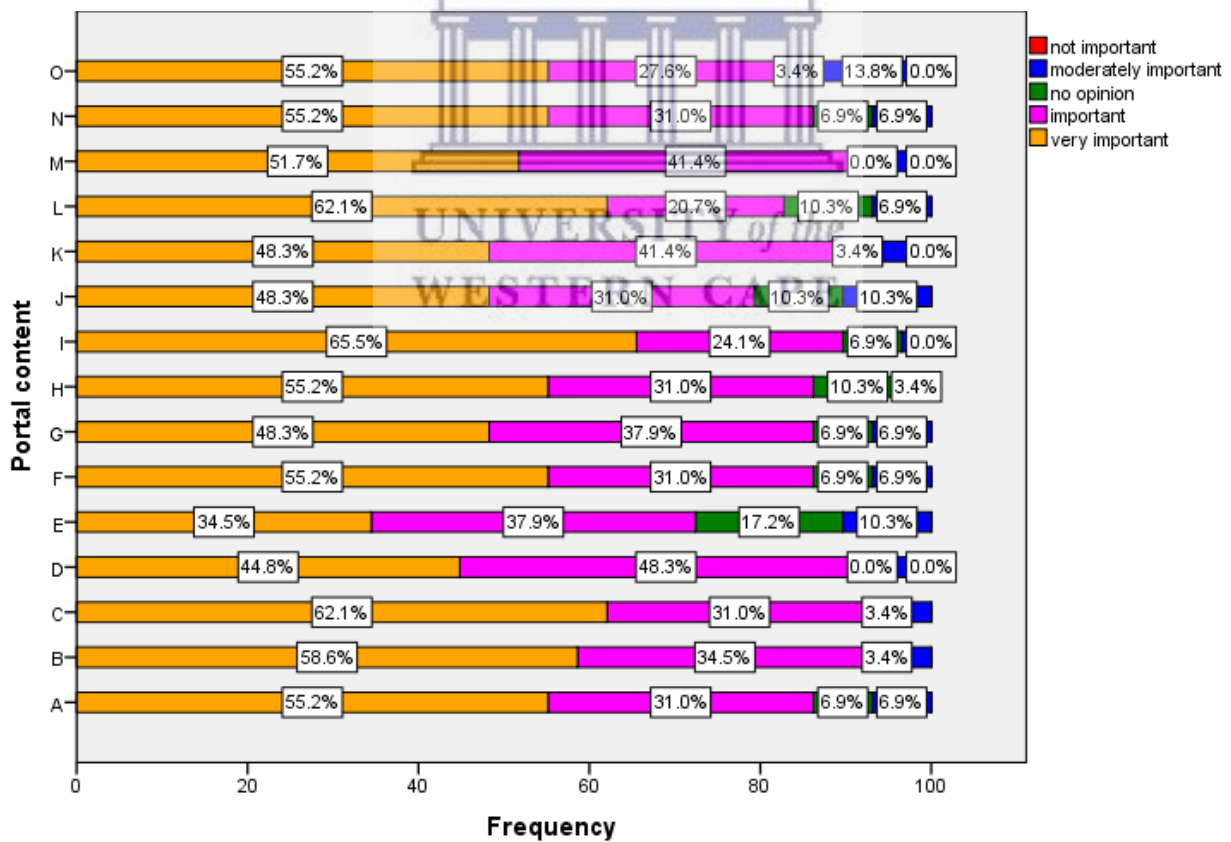
- A - Scholarly communication website
- B - Workshops on open access publishing
- C - Workshops on copyright, plagiarism and fair use
- D - Sourcing for research grants and funding
- E - Training on referencing and citation
- F - Information literacy workshops

In Figure 5.38, only E (*Training on Referencing and Citation*) was rated important by 51.7% respondents. All the others were rated as very important. Statements A (*Scholarly Communication Website*) had 51.7%, B (*Workshops on Open Access Publishing*) had 48.3%, C (*Workshops on Copyright, Plagiarism and Fair Use*) had 62.1%, D (*Sourcing for Research Grants and Funding*) had 65.5% and F (*Information Literacy Workshops*) had 51.7% responses. The academic library

would therefore have to take into consideration all these formats in the establishment of a scholarly communication guidance program.

5.2.3.3 Features of a research portal

Question 23 was asked to determine the content supervisors would like to be included in the envisaged research portal for scholarly communication guidance. The provided list of contents was generated from what pertains in literature and visits to some academic library websites. The scales for rating were not important, moderately important, no opinion, important and very important. No respondent chose 'not important' for any of the statements. The other data are presented in Figure 5.39.



N=29

Figure 5.39 Contents for envisaged research portal

- A - Online links to grants and funding*
- B - Training on disseminating research findings*
- C - Training on the preparation of manuscripts for publication*
- D - Information on research and innovation at KNUST*
- E - Link to Graduate School website*
- F - Link to online library services*
- G - Thesis writing guides*
- H - Citation and reference management software*
- I - Training on copyright, plagiarism and fair use*
- J - Proposal writing guides*
- K - Training on open access publishing*
- L - Off campus access to electronic resources*
- M - Training on referencing and citing*
- N - Training on intellectual property*
- O - Training on author's rights*

Apart from *Information on research and innovation at KNUST* (48.3%) and *Link to Graduate School website* (37.9%) rated by supervisors as important, all the others, were rated as very important. Thus, the contents supervisors want in a research portal for scholarly communication guidance are *Online links to grants and funding* (55.2%), *Training on disseminating research findings* (58.6%), *Training on the preparation of manuscripts for publication* (62.1%), *Link to online library services* (55.2%), *Thesis writing guides* (48.3%), *Citation and reference management software* (55.2%), *Training on copyright, plagiarism and fair use* (65.5%), *Proposal writing guides* (48.3%), *Training on open access publishing* (48.3%), *Off campus access to electronic resources* (62.1%), *Training on referencing and citing* (51.7%), *Training on intellectual property* (55.2%) and *Training on author's rights* (55.2%).

5.2.3.4 Data management software needed

Literature has shown that most academic libraries in conjunction with the university's information services department subscribe to data management software as students find it difficult financially to pay for or subscribe to it. The goal of the open-ended question 24 was to determine which

software supervisors regarded as needed by doctoral students. Responses are presented in Table 5.13.

Table 5.13 Data management software needed by doctoral students

Data Management Software	Frequency
Stata	3
MATLAB	3
R	2
EViews	2
ArcGIS	2
@RISKk	1
ANSYS	1
AutoCAD	1
Building Simulation Softwares	1
Design-Expert	1
Excel	1
Fortran	1
Genstat	1
GIS	1
GraphPad Prism	1
Minitab	1
NVivo	1
Origin Software	1
SAS	1
Web based search programmes	1
None	1
No response	12

There was no response from twelve supervisors. Supervisors listed a number of software, but Stata and MATLAB were listed most (3). The academic library would have to decide on which ones to subscribe to and provide guidance on its use through workshops and the research portal.

5.2.3.5 Dissemination of research findings by doctoral students

Supervisors were requested by question 25 to indicate the various ways doctoral students in their departments disseminate research findings. Respondents had to choose from a given list or use the ‘other’ option. The given list was: *Publishing articles in peer-reviewed journals, Conference presentations, Publication of book(s), Publication in the institutional repository, Publication in the dailies, Through policy briefs and Presentation at seminars*. Their responses are presented in Table 5.14.

N=29 **Table 5.14 Dissemination of research findings by doctoral students**

Dissemination of research findings	Frequency	Percentage
Publishing articles in peer-reviewed journals	28	96.6%
Conference presentations	28	96.6%
Publication of book(s)	8	27.6%
Publication in the institutional repository	15	51.7%
Publication in the dailies	2	6.9%
Through policy briefs	6	20.7%
Presentation at seminars	28	96.6%
Others (Community-based programmes)	1	3.4%

Note: Data is based on multiple responses

Note: Dailies represent newspaper publications

Supervisors reported that publishing articles in peer-reviewed journals (96.6%), conference presentations (96.6%) and presentation at seminars (96.6%) were used the most by doctoral students to disseminate research findings. Publication in the institutional repository (51.7%) seemed less popular, while publishing books (27.6%), policy briefs (20.7%) and in the dailies (6.9%) were the minority. One supervisor indicated as another option *Community-based programmes* as a way of research dissemination.

5.2.3.6 Liaising with academic librarians

Respondents were to indicate in question 26 how they can liaise with academic librarians to offer scholarly communication guidance to doctoral students. A list collated from literature was given as choice. The given statements were:

- *Directing students to attend scholarly communication guidance workshops organised by the library*
- *Directing students to access resources on the academic library website*
- *Directing students to academic librarians for training*
- *Participating in scholarly communication guidance*
- *Participating in scholarly communication guidance workshops in order to train doctoral students*
- *Inviting academic librarians to offer seminars to doctoral students*
- *Inviting academic librarians to offer seminars to doctoral students*
- *Providing academic librarians with subject specific information for the development of a research portal*
- *By dropping published articles in the institutional repository for easy access by students*

The responses are presented in Table 5.15.

N=29

Table 5.15 Liaising with academic librarians

Liaising for scholarly communication guidance	Frequency	Percentage
Directing students to attend scholarly communication guidance workshops organised by the library	28	96.6%

Directing students to access resources on the academic library website	23	79.3%
Directing students to academic librarians for training	20	69.0%
Participating in scholarly communication guidance workshops in order to train doctoral students	20	69.0%
Inviting academic librarians to offer seminars to doctoral students	20	69.0%
Providing academic librarians with subject specific information for the development of a research portal	20	69.0%
By dropping published articles in the institutional repository for easy access by students	20	69.0%
Others	3	10.3%

Note: Data is based on multiple responses

Supervisors expressed readiness in collaborating with the academic library for scholarly communication. This is evident in the responses for the following statements: *directing students to attend scholarly communication guidance workshops organised by the library* (96.6%) and *directing students to access resources on the academic library website* (79.3%).

Supervisors indicated the following other ways of collaboration:

- Academic librarians should keep faculty informed through e-mails
- Lecturers should leave copies of their published articles to be displayed in the library
- The graduate school would have to enforce such measures.

5.2.3.7 Increase in publications and web visibility

The goal of question 27 was to establish ways scholarly communication guidance could increase publications and web visibility of the university as a whole. Respondents were to choose from:

- *Through the effective deposit of published articles by faculty in the institutional repository*
- *Promoting widespread awareness and use of open access resources*

- *Promotion of open access publishing avenues/options for authors, researchers, and graduate students*
- *Treating “publishing and publications” as a coursework for doctoral students*

Respondents could also provide other information not listed. The response are presented in Table 5.16.

N=29 **Table 5.16 Increase in publications and web visibility**

Increase in publications and web visibility	Frequency	Percentage
Through the effective deposit of published articles by faculty in the institutional repository	25	86.2%
Promoting widespread awareness and use of open access resources	26	89.7%
Promotion of open access publishing avenues/options for authors, researchers, and graduate students	24	82.8%
Treating “publishing and publications” as a coursework for doctoral students	16	55.2%
Others - Course on scientific writing	1	3.4%

Note: Data is based on multiple responses

Supervisors established that for scholarly communication guidance to increase publications and web visibility of the university as a whole, there should be promotion of widespread awareness and use of open access resources (89.7%), effective deposit of published articles by faculty in the institutional repository (86.2%) and promotion of open access publishing avenues/options for authors, researchers, and graduate students (82.8%).

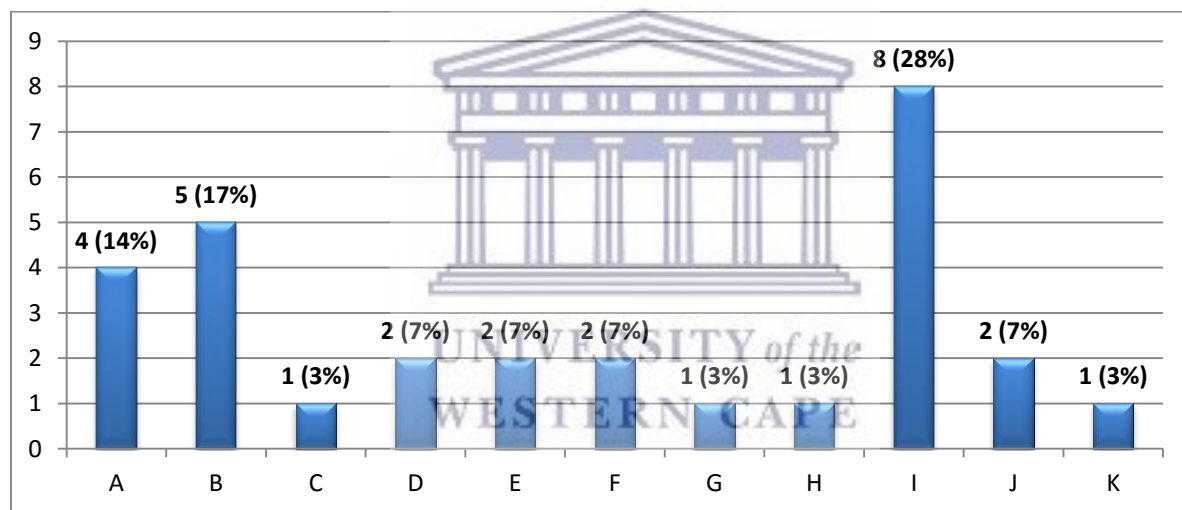
Treating “publishing and publications” as a coursework for doctoral students received the least responses (55.2%). Supervisors may not be interested in such a coursework to be facilitated by

the academic library. Another way to increase publications as indicated by one supervisor was *Course on scientific writing*.

5.2.3.8 Motivating doctoral students to publish

Question 28 was an open-ended question requesting supervisors to state how they motivate their doctoral students to publish – especially in peer-reviewed journals or conference presentations.

The responses were categorised and grouped under ten main headings and reflected in Figure 5.40.



N=29 **Figure 5.40 Doctoral supervisors motivating doctoral students to publish**

- A = Guidance in manuscript preparation for conferences and journal publications*
- B = Awareness of the benefits of publishing*
- C = No motivation*
- D = How to handle reviewer's comments*
- E = Guidelines in selecting credible journals*
- F = Co-authoring*
- G = Directing them to 'call for papers'*
- H = Sponsoring them for conferences*
- I = Advise and encouragement*
- J = Making them aware that publishing is a requirement for graduation*
- K = No response*

The majority of supervisors indicated *Advise and encouragement* (28%) as their way of motivating students to publish. This was followed by creating *Awareness of the benefits of publishing* (17%) and *Guidance in manuscript preparation for conferences and journal publications* (14%). The rest of the statements drew low responses indicating opportunities for the academic library to step into those roles.

5.2.3.9 Other comments

The final open-ended question requested respondents to provide any other comment on scholarly communication guidance. The nine responses received were:

- *It is a step in the right direction to have a collaboration between the library and scholarly research*
- *The library has a responsibility. It should be up and coming*
- *Research without communication is a futile endeavour. It is through the communication that its purpose manifest and lead to positive transformation. If research is taken as mere academic exercise, it wastes everybody's time and other resources.*
- *Skill need to be developed in the area of research dissemination*
- *Scholarly communication guidance is very useful to doctoral students*
- *Doctoral candidates must be exposed to a lot of conferences to witness how scholars do their presentations to learn from them*
- *Do all you can to get this thing scholarly communication guidance through*
- *Supervisors must aid doctoral students to publish before they defend their thesis. This is a great motivation for them to continue publishing when they finish their studies*
- *This research needs to be practicalised after the theory has been disseminated*

5.3 CONCLUDING SUMMARY

Chapter five presents the data that was elicited from the different questionnaires distributed to the doctoral students and the supervisors of doctoral students.

5.3.1 Summary for questionnaire for doctoral students

The data for the doctoral students indicated that more males had enrolled in doctoral programmes than females. Most respondents were in their first year of study and enrolled for full time study. Respondents had moderate levels of skill in research and scholarly communication activities. The establishment of a research portal as part of the academic library website was selected as very helpful for scholarly communication guidance. Doctoral students were reluctant in reporting the level of scholarly communication guidance they had received from their supervisors. Publication in journals, presentation at conferences and presentation at seminars/workshops, were the various ways through which doctoral students intended to disseminate their research findings.

5.3.2 Summary for questionnaire for supervisors of doctoral students

The majority of supervisors were senior lecturers in their 1st to 5th year of supervision. Although three of the doctoral students of one respondent had not graduated, they have published in peer-reviewed journals. It also seems that most of the doctoral graduates had published from their theses. Although supervisors indicated that they had provided high level of guidance, they still rated their students as having moderate levels of skills in research and scholarly communication activities. The majority of supervisors had knowledge of the institutional repository but only a few directed their students to access materials from it. They also indicated that there were policies

in their faculties and colleges on scholarly communication by doctoral students. The supervisors indicated that they would advise their students to make presentations at conferences only during the presentation of data writing stage of their thesis. The establishment of a research portal as part of the academic library website was established as very helpful for scholarly communication guidance by the academic library. To collaborate effectively with the academic library for scholarly communication guidance, supervisors indicated that they would direct their students to attend workshops organised by the library. An effective scholarly communication guidance can help increase publications and web visibility of the university. This according to the supervisors can be achieved through the effective deposit of published articles by faculty in the institutional repository, promotion of widespread awareness and use of open access resources and promotion of open access publishing avenues/options for authors, researchers and graduate students. Creating awareness of the benefits of publishing as well as advice and encouragement were indicated by supervisors as the ways through which they motivate their doctoral students to publish.

The next chapter presents data and findings of qualitative data.

CHAPTER SIX

PRESENTATION OF QUALITATIVE DATA

6. INTRODUCTION

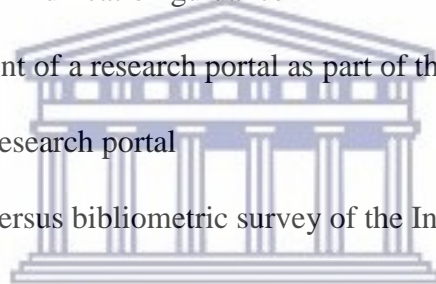
Chapter five presented and analysed the data elicited from the different questionnaires distributed to the doctoral students and the supervisors of doctoral students at KNUST. Chapter six presents and analyses the qualitative data gathered for this study. The data were obtained through a face-to-face interview with the Dean of the School of Graduate Studies, KNUST, face-to-face interview with the two Deputy Librarians (representing the University Librarian of KNUST), written interview with ten professional librarians in the university library system and a face-to-face interview with the Senior ICT Assistant of the university library system. To ensure anonymity and confidentiality, the respondents were labelled with PL (professional librarian). They are PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10. The two Deputy Librarians were labelled with Deputy A and Deputy B. Dean was used to label the Dean of the School of Graduate Studies and Senior ICT Assistant for the Senior ICT Assistant of the university library system. Similar questions were put to the various respondents. Responses were analysed and categorized according to identified themes.

Other qualitative data were obtained through document analysis. The documents analysed were the KNUST library strategic plan, basic statistics of KNUST, graduation list brochures from year 2010 to 2017, draft policy on publications and guide for higher degree research supervision. A bibliometric survey of the KNUST institutional repository to ascertain research findings

dissemination of doctoral graduates, as reflected in the deposit of doctoral theses between 2010 and 2017 is also reported in this chapter.

Chapter 6 is organized as follows:

- Research and scholarly communication needs of doctoral students
- Research and scholarly communication skills of doctoral students
- Scholarly communication by doctoral students at KNUST
- Scholarly communication guidance by the academic library
- Reaching out to doctoral students
- Benefits of scholarly communication guidance
- Stages in the development of a research portal as part of the academic library website
- Cost of developing the research portal
- Documentary analysis versus bibliometric survey of the Institutional Repository



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6.1 RESEARCH AND SCHOLARLY COMMUNICATION NEEDS OF DOCTORAL STUDENTS

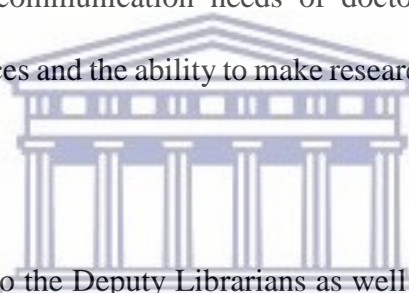
A question was put to the Dean of the School of Graduate Studies and to the two Deputy Librarians to determine what they thought the research and scholarly needs of doctoral students were. The responses were categorized according to themes identified and presented in Table 6.1.

Table 6.1 Research and scholarly communication needs of doctoral students

Research and scholarly communication needs of doctoral students		
Theme	Interviewee	Responses
Access to Databases	Deputy A	<i>How to have access to the local contents that are deposited in the KNUST institutional repository.</i>

	Dean	<i>Doctoral students need research in a particular field of interest because we realise that most of the students prefer to use google and others instead of accessing scientific writings so for us they need top most journals.</i> <i>Materials that are genuine to whatever they are doing. Credible journals instead of materials from dubious sources.</i>
Access to Internet	Deputy A	<i>Getting access to internet services wherever they are on campus</i>
Visibility of research findings	Deputy A	<i>How to make what they have found locally available to the global audience to access.</i>

In Table 6.1, access to credible journals and databases were identified by Deputy A and the Dean as the research and scholarly communication needs of doctoral students. Deputy A further indicated access to internet services and the ability to make research findings accessible and visible to the global audience.



A subsequent question was put to the Deputy Librarians as well as the professional librarians on how the academic library can identify research and scholarly communication needs of doctoral students. The responses were categorized according to themes identified and presented in Table 6.2.

Table 6.2 Identification of research and scholarly communication needs of doctoral students

Ways of identifying research and scholarly communication needs of doctoral students		
Theme	Interviewee	Responses
Orientation	PL1, PL4, PL5, PL6, PL7	Through library orientation programmes
	PL4	<i>The academic library should draw programmes that would be of interest to doctoral students and inviting</i>

		<i>them to attend. By so doing, their research and scholarly communication needs can be identified.</i>
	Deputy B	<i>There seem to be a gap between the academic librarians and the faculty when it comes to the introduction of courses, making it difficult to know the needs of these students.</i> <i>However, faculty members are approached each semester by academic librarians to implore upon them to submit the materials their students would need for their studies and research.</i>
Face-to-face Interaction	PL1, PL2, PL3, PL4, PL5, PL6, PL8, PL9 and PL10	Face-to-face interaction in the course of service provision can help identify the needs
	PL5	<i>The library should set up a special desk or department to attend to the needs of doctoral students.</i>
Need assessment survey	PL2, PL3, PL5, PL6, PL7, PL8, PL9 and PL10	Seeking for the profile of doctoral students in their first year of study
	PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10	Conducting need assessment survey/interview intermittently
E-mails & social media	PL1, PL2, PL3, PL4, PL5, PL6, PL8, PL9 and PL10	Communicating with doctoral students through their emails as well as through social media such as whatsapp, and facebook..



Table 6.2 indicates that for the academic library to identify the research and scholarly communication needs of doctoral students, the following must be done: Needs assessment survey seeking for the profile of doctoral students; communication with doctoral students through emails and social media; face-to-face interactions with doctoral students and; drawing of orientation programmes that would be of interest to doctoral students.

6.2 RESEARCH AND SCHOLARLY COMMUNICATION SKILLS NEEDED BY DOCTORAL STUDENTS

The two deputy librarians and the professional librarians were asked to indicate the needed skills to be possessed by doctoral students for effective conduct of research and scholarly communication. This information was sought in order to determine how scholarly communication guidance can be designed for doctoral students with the necessary tools. The responses are presented in Table 6.3.

Table 6.3 Research and scholarly communication skills needed by doctoral students

Research and scholarly communication skills of doctoral students		
Theme	Interviewee	Responses
Information literacy skill	Deputy A	<i>Doctoral students need to acquire information literacy skill</i> <i>They should be able to identify an information need, why the information is needed, and be able to search among the lot for the needed information as well as making maximum use of the information.</i>
	PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10	How to evaluate and utilise credible information
	PL4 and PL5	How to do proper citation and avoid plagiarism
Computer or Information Technology (IT) Skill	Deputy A	<i>Doctoral students should also be well versed in information technology. They should be able to use it to their advantage</i>
Effective communication Skills	Deputy A	<i>The doctoral student should have effective communication skills to be able to clarify his problem. Even when the research is done, he /she should be able to communicate the findings effectively.</i>
Dissemination channels	PL1, PL2, PL3, PL4, PL5, PL6 and PL7	They should be able to determine predatory journals
	PL1, PL4, PL5, PL6 and PL8	They should have the ability to determine where to publish their final research results

	PL5	How to respond to reviewer's comments
Data analysis Software	PL1, PL2, PL3, PL4, PL5, PL6, PL8 and PL9	Doctoral student should be able to use software for data analysis
	Deputy B	<i>Sometimes the supervisors as well as academic librarians assume that the students know but that may not be the case.</i>

In Table 6.3, *information literacy skills* was indicated by Deputy A and the professional librarians. *How to do proper citation and avoid plagiarism* was listed by PL4 and PL5 and *How to evaluate and utilise credible information* was indicated by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10 as part of the information literacy skills.

Deputy A added *computer or information technology skills* and *effective communication skills*. Ability to determine where to publish, ability to determine predatory journals and the skills to handle reviewer's comments were listed by some of the professional librarians (PL1, PL2, PL3, PL4, PL5, PL6, PL7 and PL8). Skills in using data analysis software were listed by Deputy B and PL1, PL2, PL3, PL4, PL5, PL6, PL8 and PL9.

6.3 SCHOLARLY COMMUNICATION BY DOCTORAL STUDENTS AT KNUST

This section presents responses on scholarly communication by doctoral students. Two questions were posed to the Dean of the School of Graduate Studies, the two Deputy Librarians and the Professional librarians. The first question required the respondents to comment on the existing policies regarding scholarly communication by doctoral students. Responses were categorized and presented in Table 6.4.

Table 6.4 Policies regarding scholarly communication by doctoral students at KNUST

Scholarly communication by doctoral students at KNUST		
Theme	Interviewee	Responses
Policies	PL10, PL3	I don't know if there are policies
	PL6, PL7, PL8, PL2, PL1	No, there is no policy
	Deputy A	<i>Yes, school of graduate studies has instituted a policy that, every doctoral student should publish at least two peer-reviewed journal articles before they will be allowed to graduate. It is therefore a policy that binds all departments in the university</i>
	Deputy B	<i>Yes, the policy of two peer-reviewed journal articles before graduation is not a bad idea.</i>
	Dean	<i>There a policy that they should have two publications before they defend their thesis</i>
Promotion of doctoral students' scholarly communication	Deputy A	<i>Yes. We make sure that the student has access to research conducted globally. We also make sure that their works are also made discoverable. We provide for them the ability to avoid plagiarism by providing Turnitin.</i> <i>If doctoral students can access over 50 databases subscribed to by the academic library for their research, then scholarly communication is being promoted through the availability and access to such databases and information from other scholars</i>
	Deputy B	<i>As part of graduation requirement, doctoral students are required to deposit a copy of their final thesis in institutional repository through the assistance of Electronic Library professionals. This mandatory requirement is a way to promote scholarly communication by doctoral students.</i> <i>A plagiarism software has also been provided by the academic library for doctoral students to do a plagiarism test. This is one way of promoting scholarly communication by doctoral students.</i>
	PL4	<i>There should be an attractive and inviting atmosphere in the library for doctoral students. Specialised rooms (Space) devoid of traditional library rules.</i>

In Table 6.4, five professional librarians (PL6, PL7, PL8, PL2, PL1) indicated that there are no policies and two (PL10, PL3) had no idea if there were any policies. The two deputies and the dean reported that there is a policy requesting doctoral students to publish at least two peer-reviewed journal articles before they will be allowed to graduate. The deputies also reported that the presence of a plagiarism software known as Turnitin was an indication that scholarly communication by doctoral students is promoted by the academic library. This study is of the view that because plagiarism software enhances originality and quality of research output, doctoral students should be guided in the proper usage thereof for maximum benefit.

The subsequent question required the respondents to identify ways of dissemination of research findings from doctoral theses. Responses were categorized and presented in Table 6.5.

Table 6.5 Ways of disseminating research findings from thesis

Ways of disseminating research findings from thesis		
Theme	Interviewee	Responses
Publishing in peer-reviewed journal articles	Dean	<i>These days there is a policy that they should have two publications before they defend their thesis but beyond that some students meet stakeholders like the Ministries..</i> <i>If it is a funded project, then the project would fund the publications. But some journals don't charge.</i>
	PL3, PL10, PL4, PL5, PL6, PL7, PL8, PL9, PL2, PL1	Publication of journal articles
	Deputy A	<i>They are also supposed to publish two journal papers before graduation. A mainstream journal in their area. It could be open access or a subscription journal.</i>
Conference presentations	Dean	<i>Conferences. For proposal stage of their thesis, they might not have much. For literature review stage, it depends on the type of conference but they have to seek permission and if it is outside Ghana, permission is sought from the Vice-Chancellor.</i>

		<i>Sponsorship normally comes from conference organisers not the university.</i>
	PL3, PL4, PL5, PL6, PL8, PL9, PL1	Through conferences
	Deputy A	<i>Conferences and seminars</i>
Institutional Repositories	PL3, PL10, PL4, PL5, PL6, PL8, PL9, PL2, PL1	Deposit in the institutional repository
	Deputy A	<i>Deposit of the thesis in the repository. Once it is available to the library, the staff involved makes sure that they are deposited in the institutional repository. No timeline but it depends on the volumes we have because of large student numbers but there is no need to delay because information delayed is information denied.</i>
	Deputy B	<i>Through the institutional repository</i>
Presentation at Seminars	PL3, PL10, PL4, PL5, PL6, PL7, PL8, PL9, PL2, PL1	Through seminar presentations of findings
	Dean	<i>Seminars</i>
Poster Presentations	PL3, PL10, PL4, PL5, PL6, PL7, PL9	Poster presentations
Book Publications	PL3, PL4, PL5, PL9, PL1	Publication of books in some departments
Publication in dailies	PL1	Through the dailies
Library deposit	Dean	<i>The thesis itself.</i>
Online Profile platforms and social media	PL3, PL10, PL4, PL5, PL6, PL9, PL2, PL1	Platforms such as ResearchGate, Academia.edu
	Deputy A	<i>Social media offers mostly primary information which needs to be verified before it can be used. But when it comes to the discovery of one's publications, social media plays a very important role.</i> <i>A researcher may decide to link the DOI of a publication to all the social media platforms that he subscribes to. This makes it discoverable but the user has to verify the information.</i>

All the professional librarians (PL3, PL10, PL4, PL5, PL6, PL7, PL8, PL9, PL2, PL1), deputy A and the Dean outlined publishing in peer-reviewed journal articles. Seven professional librarians

(PL3, PL4, PL5, PL6, PL8, PL9, PL1), Deputy A and the Dean indicated conference presentations. Presentation at seminars was indicated by the Dean and all the professional librarians (PL3, PL10, PL4, PL5, PL6, PL7, PL8, PL9, PL2, PL1). Poster presentations was listed by all the professional librarians (PL3, PL10, PL4, PL5, PL6, PL7, PL8, PL9, PL2, PL1). The researcher found out that the professional librarians have recently been trained on poster presentations as part of the building stronger universities programme (BSU). Publication of books was listed by PL3, PL4, PL5, PL9, PL1 and publication in the dailies by PL1. Library deposit of the thesis itself was indicated by the Dean.

6.4 SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY

The Dean of the School of Graduate Studies, Deputy Librarians, professional librarians and the Senior ICT Assistant were probed with several questions on scholarly communication guidance by the academic library. This section is presented under the following sub-headings.

- Skills and expertise of an academic librarian for scholarly communication guidance
- Ways of providing scholarly communication guidance by the academic library to doctoral students
- Contents of scholarly communication guidance
- Research portal as part of the academic library website
- Collaborators of scholarly communication guidance

6.4.1 Skills and expertise of academic librarians

In this section, The Dean, Deputy Librarians, professional librarians and the Senior ICT Assistant were asked to indicate the skills to be possessed by an academic librarian in order to provide expert scholarly communication guidance. The responses are presented in Table 6.6

Table 6.6 Skills and expertise of academic librarians

Skills and expertise required of an academic librarian in order to provide expert scholarly communication guidance		
Theme	Interviewee	Responses
Subject Librarianship	Deputy B	<p><i>If you are a librarian you must be abreast with your collection. Unfortunately, KNUST Library has not adopted this subject specialisation. That is the best way to deal with scholarly communication guidance.</i></p> <p><i>For example, if you are in a medical science library and have to give the best guidance to somebody who is doing the PhD in medicine, you must be conversant with the collection. If we practice effective subject librarianship, there must be a librarian responsible for every subject area in the university. Then there will be effective scholarly communication guidance</i></p>
Information literacy	Deputy A	<i>The role of the librarian in this era has changed. It has moved from the practice of librarianship to being an information manager</i>
	Senior ICT Assistant	<i>The academic librarian now, should be the person who can help users to fetch knowledge from all the different sources. It could be direction to websites, newspapers or even to government agencies somewhere. Whether he can quickly learn or find out something and relay that information to the user</i>
Scholarly communication issues	Deputy A	<i>The librarian should be able to understand the evolving models in scholarly communication. We used to have only print media now we have open access. The librarian should be able to communicate these models to doctoral students for effective scholarly communication guidance.</i>

		<i>Should also be able to manage intellectual property issues</i>
	PL 2	<i>Academic librarians need to be very knowledgeable in scholarly communication issues in order to offer the necessary guidance</i>
	PL8	<i>Academic librarians need to be proactive in such matters.</i>
	Senior ICT Assistant	<i>Should be able to guide students as to where to publish. They should be able to determine predatory and good peer-reviewed journals.</i>
	PL1, PL3, PL4, PL5, PL6, PL7, PL9 and PL10	The ability to determine predatory journals Skills in identifying where to publish in each subject area in the university
Skills in academic writing	Deputy A	<i>The academic librarian should be skillful in academic writing</i>
Information Technology Skills	Deputy A	<i>Information technology skills and skills in the use of data management as well as reference management software is necessary</i>
Web 2.0 Technologies	Deputy A	<i>Skills in web 2.0 technologies</i>
	Deputy B	<i>There have been workshops and training for staff recently in this areas because of the Building stronger universities (BSU) programme</i>

The practice of *subject librarianship* was identified by Deputy B as way of making academic librarians experts and skilful for scholarly communication guidance. *Information literacy skill* was identified by Deputy A and the Senior ICT Assistant. Being knowledgeable in *scholarly communication issues* was indicated by Deputy A, Senior ICT Assistant and all the professional librarians (PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL1). Deputy A further identified *skills in academic writing* and *information technology skills*. Deputy A and Deputy B again indicated *Skills in Web 2.0 technologies*.

The Deputy Librarians were further asked to indicate whether the academic librarians possessed the required skills for scholarly communication guidance. The question was asked to determine

their ability to guide doctoral students on scholarly communication issues. The responses are presented in Table 6.7.

Table 6.7 Capacity of academic librarians for scholarly communication guidance

Capacity of academic librarians for scholarly communication guidance		
Theme	Interviewee	Responses
Capacity of academic librarians	Deputy A	<p><i>Formally by the training, librarians were supposed to be curators, thus, people who take care of information and make them available. Because of that most of the librarians you may meet today, may not be part of the google generation so they need training to move with the change.</i></p> <p><i>Where they don't have the capacity, they are supposed to go through continuous professional training (CPDs) in order to ensure that they have the skills to meet the demands.</i></p>
	Deputy B	<p><i>It is the responsibility of every librarian to at least know the databases that the library has subscribed to, as well as the collections of the library.</i></p> <p><i>For web 2.0 tools, academic staff were recently trained so I believe they would be able to apply it.</i></p>

The responses in Table 6.7 shows that the academic librarians would need further training to be abreast with current trends in scholarly communication issues to be able to provide expert scholarly communication guidance.

As part of the capacity of academic librarians for scholarly communication guidance, the professional librarians were asked a closed ended question to indicate their level of ability/skill to train doctoral students on some scholarly communication issues. The responses are presented in Table 6.8. The rates were *no skill (scale of 1), low level of skill (scale of 2), moderate level of skill*

(scale of 3), high level of skill (scale of 4) and expert skill (scale of 5). They rated themselves on the following issues:

- *Copyright issues*
- *Open access publishing*
- *Digitisation of documents*
- *Plagiarism*
- *Creative common licences*
- *How to determine journal impact factor*
- *How to use different referencing styles required for research and publication*
- *How to use reference management tools such as Mendeley, Zotero and Refworks*
- *How to use data management software like SPSS, Excel, AtlasTi*

Table 6.8 Capacity of professional librarians for scholarly communication guidance

Capacity of professional librarians for scholarly communication guidance					
Scholarly communication issue	Respondents				
	No skill	Low level of skill	Moderate level of skill	High level of skill	Expert skill
Copyright issues		PL9, PL7	PL5, PL4	PL1, PL6, PL3, PL2	PL8, PL10
Open access publishing	PL9	PL7	PL8, PL5, PL3	PL1, PL6, PL2, PL10	PL4
Digitisation of documents	PL9, PL8	PL5	PL7, PL3, PL10	PL1, PL6, PL2	PL4
Plagiarism		PL5	PL9	PL7, PL6, PL3, PL2	PL1, PL8, PL4, PL10
Creative common licences	PL9, PL8, PL3, PL2	PL5	PL1, PL6	PL10	PL4
How to determine journal impact factor	PL8, PL3	PL1, PL9, PL7, PL2	PL4	PL6, PL10	

How to use different referencing styles required for research and publication			PL1	PL7, PL8, PL5, PL6, PL3, PL2, PL10	PL4
How to use reference management tools such as Mendeley, Zotero and Refworks		PL1, PL9, PL6		PL7, PL8, PL5, PL3, PL10	PL4
How to use data management software like SPSS, Excel, AtlasTi	PL5, PL3	PL9, PL8, PL6, PL2	PL7, PL10		PL4

For copyright issues, 4 respondents (PL1, PL6, PL3 and PL2) had high level of skill and 2 respondents (PL8 and PL10) had expert skill. This shows that they are quite skilful in guiding doctoral students on copyright issues but there still has to be some form of training for the other professionals. This is because 2 respondents (PL9 and PL7) had low level of skill and 2 respondents (PL5 and PL4) had moderate level of skill.

Although 4 respondents (PL1, PL6, PL2 and PL10) had high level of skill for open access publishing, only 1 respondent (PL4) had expert skill. This requires for training for the professional librarians because open access publishing is a critical issue in scholarly communication guidance.

Digitisation of documents had only 1 respondent (PL4) for expert skill and 3 respondents (PL1, PL6 and PL2) for high level of skill. This shows that there should be training to equip them in the digitisation of documents.

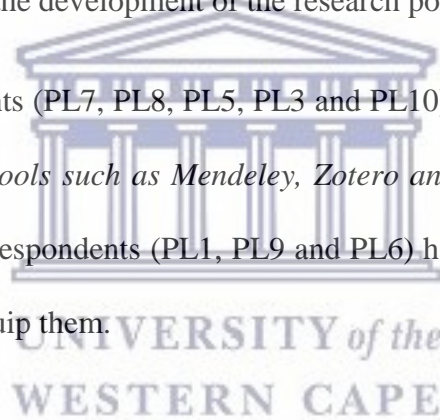
High level of skill and expert level of skill had 4 respondents each for Plagiarism. They are PL7, PL6, PL3, PL2 and PL1, PL8, PL4, PL10 respectively. This is an indication that the professional librarians have the skill to guide students on plagiarism.

Creative common licences had 4 respondents (PL9, PL8, PL3, PL2) for no skill. This calls for extra training to equip them to guide doctoral students.

How to determine journal impact factor had 2 respondents (PL8 and PL3) for no skill and 4 respondents (PL1, PL9, PL7 and PL2) for low level of skill. This is an indication of low skill and for that matter, calls for training in this regard.

Majority of respondents (PL7, PL8, PL5, PL6, PL3, PL2 and PL10) had high level of skill in *How to use different referencing styles required for research and publication*. This is a good indication that they can guide doctoral students to do proper referencing as well as be able to supply information on referencing for the development of the research portal.

Although a total of 5 respondents (PL7, PL8, PL5, PL3 and PL10) had high level of skill in *How to use reference management tools such as Mendeley, Zotero and Refworks*, only 1 respondent (PL4) had expert skill. Three respondents (PL1, PL9 and PL6) had low level of skill. This calls for extra training in order to equip them.



6.4.2 Providing scholarly communication guidance

The Dean of the School of Graduate Studies, Deputy Librarians, professional librarians and the Senior ICT Assistant were asked to outline the various ways through which the academic library could provide scholarly communication guidance. The responses are presented in Table 6.9.

Table 6.9 Ways of providing scholarly communication guidance

Ways of providing scholarly communication guidance by the academic library to doctoral students		
Theme	Interviewee	Responses
Face-to-face	Deputy B	<p><i>Face-to-face could be taken up by the College Librarians. College librarians could liaise with the coordinators of the doctoral programmes.</i></p> <p><i>Every college has a board in charge of postgraduate programmes. The college librarian should be a member, so that negotiations could start from that level. Negotiations would be in the form of allocating a time on the time-table or in the seminars for academic librarians to interact with postgraduate students.</i></p>
Workshops and seminars	PL9	<i>Introduce seminars on how to communicate research findings</i>
	PL7, PL8, PL6, PL10	<i>Workshops, seminars and postgraduate presentations on how and where to publish</i>
Research portal	PL4	<i>Research portal would be very effective if enough outreach and education is done among doctoral student.</i>
	Deputy A	<i>A portal is a gateway and leads. A research portal gives users the opportunity to interact with the research community. although a portal may come in so many forms like an institutional repository, users cannot interact with the institutional repository.</i>
	Deputy B	<i>The databases are there. The eazy proxy is also there for remote access to the databases. The institutional repository is also there.</i>
	Dean	<i>Many doctoral students compared to the undergraduates are mostly not conversant with online things because most of them have advanced in age and have limited knowledge and skills for online related facilities.</i>
	Senior ICT	<i>A research portal for scholarly communication guidance is a one-stop shop.</i>
Academic library website	Deputy A	<p><i>Currently the university library website does not have scholarly communication content. issues on scholarly communication are discussed during the short courses and orientation organised by the library</i></p> <p><i>Doctoral students can also visit some of the academic library's social media platforms like facebook, twitter, Instagram.</i></p>

	Deputy B	<i>We can have them on the website but the effective one is the one-on-one contact</i>
	Senior ICT Assistant	<p><i>It is the face of the library. Therefore, for the academic library website to be used for scholarly communication, detailed research guides that cover all subject disciplines in the university should be provided.</i></p> <p><i>They can specifically address the needs of doctoral students such as research dissemination.</i></p> <p><i>The KNUST library website currently known as the Prempeh II library does not have anything like that. The website just has an overview of library activities, just like an advertisement of what is done in the library.</i></p>

Face-to-face guidance was indicated by Deputy B as the effective way of scholarly communication guidance. This is reflected in his response on face-to-face and the research portal. *Workshops and seminars* were listed by PL9, PL7, PL8, PL6 and PL10. Deputy A and the Senior ICT Assistant supported the use of a research portal for scholarly communication guidance but the Dean is of the view that doctoral students have limited knowledge and skills for online related facilities. Deputy A and the Senior ICT Assistant revealed that the academic library website which is supposed to be the face of the library does not have any contents guiding students on research and scholarly communication.

The question this study would ask is what about doctoral students who do not visit the research commons nor come for short courses. Deputy B even asserted that most of the time it is the lecturers who are also doctoral students themselves who approach the college librarians. The others mostly go to the research commons. This argument therefore brings in the need for the development of a research portal as part of the academic library website.

6.4.3 Contents of scholarly communication guidance

The deputies and the professional librarians were asked to identify some of the issues that should be integrated in the contents of scholarly communication guidance by the academic library. The responses are presented in Table 6.10.

Table 6.10 Contents of scholarly communication guidance

Contents of scholarly communication guidance		
Theme	Interviewee	Responses
Guidance on bibliometrics	Deputy A	<i>Doctoral students should know what goes into bibliometrics, webometrics, web of science, Scopus and many more. They should know what they do and how it works.</i> <i>All these should be part of the scholarly communication guidance. They should know how these facilities help increase their visibility and the visibility of the university.</i>
Guidance on copyright, plagiarism, fair use	PL3, PL10, PL4, PL5, PL6, PL2	<i>Guidance on copyright, plagiarism and fair use</i>
Guidance on referencing and citation techniques	PL3, PL10, PL4, PL5, PL6, PL2, PL1	<i>Regular trainings on referencing and citations techniques</i>
	Dean	<i>As a PhD student, you must be conversant with various citation techniques. At KNUST, we insist on Harvard, otherwise all sorts of things will come in</i>
Guidance on open access publishing	PL10, PL4, PL5, PL6, PL2	<i>Workshops on open access publishing</i>
Research findings dissemination	PL10, PL4, PL5, PL6, PL2	<i>Training on disseminating current research information.</i> <i>Training on publications</i>
	Deputy B	<i>We have to intensify orientation in publishing literacy especially to doctoral students</i>
	PL3	<i>Bringing to the notice of doctoral students adverts on opportunities to get published in their specialisations</i>

In Table 6.10, PL3, PL10, PL4, PL5, PL6, PL2 identified *guidance on copyright, plagiarism and fair use* and PL3, PL10, PL4, PL5, PL6, PL2, PL1 together with the Dean identified *guidance on referencing and citation techniques*. PL10, PL4, PL5, PL6, PL2 listed *guidance in open access publishing* whilst Deputy B, PL10, PL4, PL5, PL6, PL2 and PL3 identified *research findings dissemination*. Only Deputy A identified *guidance on bibliometrics*.

6.4.4 Research portal

The Deputy Librarians, professional librarians, Senior ICT Assistant and the Dean were asked if there was a need for the research portal and what its contents should be. The responses are presented in Table 6.11.

Table 6.11 Research portal as part of the academic library website

Need for a research portal as part of the academic library website and its contents		
Theme	Interviewee	Responses
Contacts	Deputy A	<i>Should have emails and addresses to very important research institutions in the university</i>
Research support	Deputy A	<i>Areas of research interest. The university might have its own research areas. They should know what has been done, what is being done and what they can contribute so that they don't reinvent the wheel</i>
	Senior Assistant ICT	<i>Should have standards that are supposed to be found in the research processes. It should have support systems that allow the researcher to engage with, not necessarily the academic librarians but knowledge experts.</i> <i>We may not always have enough staff to handle all issues or all requests for support, even if we have, they may not be available at all times. A portal like this will always be there. It is a faceless support.</i> <i>Users can consult the research portal at any time. If it is done very well, it will be a place every student can always go to from the first day of conducting research to the day one decides to end.</i>

	PL1, PL10	<i>How to do proper referencing and citation as well as the use of reference management software for analysis</i>
	PL10	<i>Proper ways of disseminating research findings</i>
	Senior ICT Assistant	<i>The institutional repository should also be found in the research portal</i>
Link to other websites	PL4	<i>Link to other online services of the university library</i>
	PL8	<i>Access to off-campus electronic resources</i>
User-generated content	Senior ICT Assistant	<i>As and when doctoral students are conducting their research and they come up with helpful ways of achieving whatever thing they come across, they can also put it there for others to access.</i> <i>It is an opportunity to build a content base of materials that help. Although the managers of the platform would have to verify such information.</i>
Scholarly communication issues	PL3, PL8, PL9, PL2	<i>Guidance on copyright, plagiarism issues</i>
	PL10, PL6	<i>Should feature intellectual property issues</i>
Interactivity	Deputy A	<i>Although a portal may come in so many forms like an institutional repository, users cannot interact with the institutional repository. A research portal gives users the opportunity to interact with the research community.</i>
Others	Dean	<i>Information should be in booklets especially for postgraduates who are mostly not conversant with online things</i>

In Table 6.11, *Research support* was outlined by Deputy A, Senior ICT Assistant, PL 1 and PL10, thus, answering in the affirmative about the need for a research portal. *Contacts*, that is, the emails and addresses to very important research institutions in the university was indicated by Deputy A. PL4 and PL8 listed *Link to other websites* or other online services of the university library. PL3, PL8, PL9, PL2 together with PL10, PL6 listed *scholarly communication issues*. *User-generated content* and *interactivity* of the research portal were listed by the Senior ICT Assistant and Deputy A respectively.

6.4.5 Collaborators

The success of a scholarly communication guidance programme also depends on some other departments in the university. This study identified the University legal department and the University Information Technology Services (UITS), School of Graduate Studies and supervisors as collaborators of scholarly communication guidance. The Deputy Librarians, Dean and the Senior ICT Assistant were asked to indicate how these offices in the university collaborate or can collaborate for the success of the scholarly communication guidance by the academic library to doctoral students. The responses are presented in Table 6.12.

Table 6.12 Collaborators of scholarly communication guidance

Collaborators of scholarly communication guidance		
Theme	Interviewee	Responses
School of graduate studies	Dean	<p><i>We have done a guide for their theses. There are two types of the thesis. One is a monograph, so we have introduction, etc and the other one is where you do the introduction and then you pick the individual thematic objectives and publish. There are guidelines for all these. They are also invited for experts to talk to them from time to time</i></p> <p><i>The following documents have been produced by the graduate school: Draft policy on publication, Guide for Higher degree research supervision and the Graduate School Handbook</i></p> <p><i>Currently we send soft copies to all students and all lecturers in the university mailing system.</i></p>
University Information Technology Services (UITS)	Deputy A	<p><i>The UITS can ensure that every doctoral student has the needed information technology skills to be able to undertake his or her research. Again, everything about research is deep rooted in technology. UITS can also offer technical support. They can make sure that there is no firewall to prevent users from accessing the kind of information they need. They can serve as resource persons if workshops are organised by the academic library or faculty</i></p>
	Senior ICT Assistant	<p><i>The UITS is an inter network services provider. They do not decide what you need, you have to</i></p>

		<i>decide what you need. They are stakeholders because they have to Implement the technological platform on which the portal would sit as well as every aspect of the technological roll out.</i>
Legal department	Deputy A	<i>They are also a very important collaborator. With the open access issues which is emerging or has come to stay, there is the need to collaborate with the University legal services to ensure that they help us in dealing with licensing and access rights of all our intellectual property emanating from the university</i> <i>A lot of patents are coming out of the university, they can direct as to which materials must go into public domain or fair use, and what kind of creative commons license the materials should have. So that we don't enter into any legal tussle.</i>
	Deputy B	<i>The legal office is involved with contractual issues. Contractual agreements with suppliers</i> <i>They are involved in the contractual issues concerning the subscription of databases and other facilities or research tools. Although the library initiates it, the legal office interprets the agreement to the Vice-Chancellor.</i>
Supervisors	Deputy B	<i>Doctoral students will definitely get to know every resource once their supervisors are aware of them</i> <i>The college or department can direct all the doctoral students to contact the library to ascertain the authenticity of the journals they intend to publish in.</i>
	Dean	<i>Doctoral students also have competent supervisors who are also there to guide them</i> <i>Some supervisors are good writers and it feeds back on the students</i>

In Table 6.12, the Dean indicated that the School of Graduate Studies collaborates through the publication of guidelines for thesis production, supervision and guidelines for publishing for students. Commenting on the UITS, Deputy A and the Senior ICT Assistant indicated that collaboration with the UITS is needed because they would have to provide and implement every

technological support needed for the research portal. Both Deputy A and Deputy B indicated that every contractual agreement and licensing agreements with suppliers should involve the legal department. Only Deputy B and the Dean commented on the supervisors by indicating that if supervisors are made aware of every resource from the academic library, the doctoral students will definitely get to know.

6.5 REACHING OUT TO DOCTORAL STUDENTS

The Deputy Librarians, the professional librarians, the Dean of the School of Graduate Studies and the Senior ICT Assistant of the university library system were asked to indicate the effective means of communicating or reaching out to doctoral students for scholarly communication guidance. This is because scholarly communication guidance will not be effective if the doctoral students do not patronise. The responses are presented in Table 6.13.

Table 6.13 Reaching out to doctoral students

Reaching out to doctoral students to patronise scholarly communication guidance by the academic library		
Theme	Interviewee	Responses
Orientation programmes	<i>Deputy A</i>	<i>Every student of this institution is supposed to go through an orientation to be able to familiarise themselves with our services and resources. Through the orientation we are able to find them</i> <i>Some supervisors bring their students for tour at the library and through this, the library comes into contact with them</i>
	<i>Deputy B</i>	<i>Because some of the doctoral students are progressing from one level of degree to another in the same university they think they don't need an orientation.</i> <i>Others also come from other universities and think they are already familiar with library services and</i>

		<p><i>library tools and for that matter do not attend the orientation.</i></p> <p><i>But some doctoral students walk into the library themselves and by so doing the library gets to know them.</i></p>
	Dean	<p><i>Orientation for undergraduates should be extended to postgraduates.</i></p> <p><i>Undergraduates mostly prefer to have their notes on their phones but postgraduates are not like that so there should be printed sheets for example, fliers and brochures to inform them.</i></p>
Workshops and Seminars	Deputy A	<i>As research partners the library do take part in some of the workshops organised by some faculties for graduate students. During such meetings, the librarians are allowed to make presentations.</i>
	Deputy B	<i>These seminars are mostly attended by masters students rather than doctoral students</i>
Through e-mails	Deputy A	<i>The cohort of our students who by the nature of their programme do not come to the physical building such as the distance learning students, the library has emails and some cell phone numbers through which they can be contacted</i>
	Deputy B	<p><i>That is if the emails can be ascertained. I think the e-mail addresses can be ascertained from the UITS as soon as the students register. The accounts department can also provide how many students a college has admitted as well as the registrar's office.</i></p> <p><i>Your work is going to create a bigger avenue for the library to sit up</i></p>
Face-to-face contacts	PL4	<i>One-on-one contact can also be used to reach out to the doctoral students.</i>
	Deputy B	<i>The face-to-face would be effective. The librarians should even be involved in teaching research methods. It is the librarians who can teach how to search for information or resources.</i>
Text Messages	Deputy B	<i>There used to be a system through which users would send their requests through text messages but I don't know if it is still in place</i>
Students associations	Dean	<i>The Graduate Students Association of Ghana (GRASAG) could get the doctoral students to attend workshops and other programmes</i>

	Deputy B		<i>The library can get their email contact through the executives of Graduate Students Association of Ghana (GRASAG) KNUST Chapter. On the other hand, these executives can also be asked the kind of help they can also offer the library. Meanwhile, doctoral students don't even involve themselves in these elections.</i>
Academic library website	Senior Assistant	ICT	<i>The first port of call should be the academic library website. It should be user friendly, easy to navigate, with things very easy to access to attract students.</i>
Social Media	Senior Assistant	ICT	<i>Contents can also be pushed to the doctoral students through social media.</i>
Other ways	Dean		<i>If the academic library has any material to be known by doctoral students, the graduate school could be contacted for that information to be relayed to them.</i>
	Senior Assistant	ICT	<i>Through the University mobile app. It is mandatory for every student to get the app. The app can be used to check results, pay fees and many more. The academic library can have an icon on that app so that students can have access to the library's services</i>

In Table 6.13, *orientation programmes* were identified by Deputy A, Deputy B and the Dean as a way of reaching out to doctoral students to patronise scholarly communication guidance. Both deputies (Deputy A and B) also identified *Workshops and seminars* as well as through emails. *Face-to-face contacts* were identified by PL4 and Deputy B. *Text messages* was indicated by Deputy B and reaching out to them through executives of student associations were identified by the Dean and Deputy B. The Senior ICT Assistant identified the *academic library website, social media* and through *the university mobile app*. The Dean reiterated that the graduate school could be contacted by the academic library if there is any information needed to be relayed to doctoral students.

Commenting on the response from Deputy A on *orientation* in Table 6.13, the researcher found out that the supervisors normally bring their undergraduate students for tour and not doctoral students. These responses from the deputies under the theme *Through e-mails* made the researcher wonder if the academic library truly has the email address and phone numbers of the students. A further research indicated that some college librarians have such numbers through personal interactions with some doctoral students. Again, at the Research Commons section of the KNUST main library, doctoral students sign a register to indicate their use of the commons. Even in this register it is their names, department, signature, time of entry and time of exit that is required.

6.6 BENEFITS OF SCHOLARLY COMMUNICATION GUIDANCE

The Deputy Librarians, the professional librarians, the Dean of the School of Graduate Studies and the Senior ICT Assistant of the university library system were asked to indicate how scholarly communication guidance can be beneficial to doctoral students and the university as a whole. The benefits of scholarly communication guidance ascertained from respondents is presented in Table 6.14.

Table 6.14 Benefits of Scholarly Communication Guidance

Benefits of Scholarly Communication Guidance to doctoral students and the university as a whole		
Theme	Interviewee	Responses
Strengthen research output	Deputy A	<p><i>Doctoral students need to know all the new models of publishing and how they can also contribute to this chain, so we have to guide them so they will appreciate the scholarly communication chain.</i></p> <p><i>The institution has to ensure that the doctoral students abide by all the ethical regulations of the research</i></p>

	Senior ICT Assistant	<p><i>The portal can be used to streamline the processes and enforce the exact quality regarding research. Depending on what one is doing, there will be specifics here and there.</i></p> <p><i>A portal like this will always be there. It is a faceless support. The staff may also not be able to handle all issues at all times but users can consult the research portal at any time.</i></p>
Visibility of students	Dean	<p><i>Supervisors should guide doctoral students to use whatever is available locally. Thus, materials from the institutional repository. Some PhD works that have gone out are very good and they have been deposited in the repository. The repository cannot contain inferior materials, it contains good research works and publications.</i></p> <p><i>These deposits make the works known to both local and global communities</i></p>
	Deputy A	<p><i>If doctoral students are trained in effective bibliometrics, they would know how to increase their own visibility and that of the university as a whole.</i></p>
	PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10	<p><i>Promoting widespread awareness and use of open access resources for publication.</i></p>
Visibility of the university	Deputy B	<p><i>Deposited materials in the institutional repository can also be accessed anywhere in the world. Citations can also be tracked.</i></p>
	PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10	<p><i>Promotion of open access publishing avenues and options for authors, researchers and graduate students</i></p>
Research processes	Dean	<p><i>For a scholarly communication guidance to be beneficial, it depends on who is supervising. A good supervisor makes good impact by offering good guidance.</i></p>
	Senior ICT Assistant	<p><i>Once the portal has been designed and have been used effectively by students, the university will be confident that the student can do better things as far as research findings dissemination is concerned.</i></p>

		<i>The research portal will provide students with the necessary information that would help in their research and scholarly communication.</i>
Confidence	Senior ICT Assistant	<i>If it is done very well, it will be a place every student can always go to from the first day of conducting research to the day one decides to end.</i> <i>Users can be confident of themselves as well be confident with their research output.</i>

In Table 6.14, Deputy A and the Senior ICT Assistant indicated that the scholarly communication guidance by the academic library can help *strengthen research output* of students and the university. Thus, students will be guided on the ethics and specifics in conducting a research study as well as publishing the research findings.

The Dean, Deputy and the professional librarians were of the view that the *visibility of students* would be enhanced because they would be guided to publish in open access resources and also be guided in depositing their works in the institutional repository. The *visibility of the university* would also be enhanced according to Deputy B and the professional librarians.

Students would also be *equipped in research processes* according to the Senior ICT Assistant. Students will also be *confident* in themselves after being equipped.

6.7 DEVELOPMENT STAGES OF A RESEARCH PORTAL AS PART OF THE ACADEMIC LIBRARY WEBSITE

The Senior ICT Assistant was asked to indicate how long it will take to develop a research portal and what goes into its development. A summary of the stages involved in the development of a research portal outlined by the Senior ICT Assistant is presented Table 6.15.

Table 6.15 Stages in the development of a research portal

No.	Stage	Description
1.	Planning	<p><i>Go to the stakeholders and engage them to know how research should go, what is being left out, how bad it is and so on and so forth.</i></p> <p><i>The stakeholders are the students, library management, library support staff, the university representatives such as the finance officer or his representative on issues like payment of subscriptions, leaders of student bodies/associations even part time students.</i></p> <p><i>Sometimes, third parties are involved like software providers but this largely depends on the university policies.</i></p>
2.	Demographic survey	<p><i>This is done to see the many different kinds of communities or research fields that the research portal would be addressing. Thus, the demographics of the communities.</i></p>
3	Technical aspects	<p><i>Look at the kind of devices that the students have. For example, how many of the students have laptops, desktops, iPads etc.</i></p> <p><i>If the research portal would demand that students upgrade the way they access the internet, you are indirectly asking people to spend more. You are increasing their bill and this is something that you must address for example if there has to be wireless access to the internet wherever they are on campus.</i></p> <p><i>Also look at the specific kinds of services needed and gather data for that.</i></p>

4	Capacity building	<p><i>Capacity planning has got to do with Infrastructure, resources, funding and required skills needed for the service provision. Infrastructure includes, buying the needed equipment.</i></p> <p><i>Resources include the human resource, as many as the number of staff needed for this development. The skill of staff is very important. Different people would also be needed to manage various sections of the portal, for example, front-desk staff who can also assist.</i></p>
5.	Design	<ul style="list-style-type: none"> • Lay out your ideas or the design that can support scholarly communication guidance. • Who are the actors? • What are the different scenarios that can be presented? • What comes as input and what goes as output? • How to respond to emergencies. • What are the different roles to be played by each section? • Disaster management, routine check-ups, continuous monitoring and evaluation platforms, tools. That is quality assurance and standards. <p><i>A decision would have to be taken on whether the users could also be content providers. There should be a platform for that. Internet bandwidth also comes in here. This also incurs cost.</i></p>
6.	Implementation	<p><i>The stage when the research portal is developed for use.</i></p>
7.	Training	<p><i>Training of all the staff, students and other stakeholders to be able to use the research portal effectively for its purpose.</i></p> <p><i>The UITS would have to implement the technological platform on which the portal would function.</i></p>

In Table 6.15, the Senior ICT Assistant indicated that the development of a research portal as part of the academic library website starts from planning which involves consultations with stakeholders. The next stage is demographic survey, then a consideration of the technical aspects of the portal, then, followed by capacity building, then the actual design of the portal, followed by its implementation and lastly training of all stakeholders to be able to use the portal effectively.

6.8 COST OF DEVELOPING THE RESEARCH PORTAL

The Senior ICT Assistant was asked to give an estimate of the cost of developing a research portal for scholarly communication guidance at KNUST. His responses are presented in Table 6.16.

Table 6.16 Cost of developing the research portal at KNUST

Theme	Responses
Funds	<i>Cost will only incur if there has to be a purchase of equipment which is not available or if there should be subscription to any service.</i>
Staff	<i>Apart from that, every staff who would be involved would work on his salary, because the research portal is for the university and staff are supposed to work and be paid their monthly salary.</i> <i>Staff would not be paid for working on this, unless it is outsourced. There are experts so there would be no need for outsourcing</i>
Project	<i>In another case, if the research portal is going to be a project of the university, then sometimes due to the nature of a project, there would be the need to co-opt people to spend a bit more time on it. In this case there can be additional funds for remuneration for the extra hours spent.</i>

In Table 6.16, the cost was seen in the areas of funding for equipment and if the portal development will be seen as a special project requiring additional remuneration for extra hours spent. It was also revealed that each staff at KNUST will work on his salary and for that matter, cost will not incur as far as staff is concerned.

6.9 DOCUMENTARY ANALYSIS VERSUS BIBLIOMETRIC SURVEY OF THE INSTITUTIONAL REPOSITORY

Policy documents and other booklets were analysed to ascertain information on doctoral students, scholarly communication to doctoral students, scholarly communication guidance and data on doctoral graduates. The following documents were analysed:

- KNUST Library Strategic Plan
- Basic statistics of KNUST from 2010/2011 to 2016/2017 academic year
- Graduation brochures from year 2010 to 2017.
- Draft policy on publication
- Guide for Higher degree research supervision

6.9.1 KNUST Library strategic plan

The KNUST Library Strategic Plan was published to cover the periods 2005 to 2014. It is a nine-page document. A new one for the next decade starting from 2015 has not been published yet. This study therefore had to analyse that of 2005- 2014.

Table 6.17 KNUST Library strategic plan

Theme	Information	Comments from researcher
Needs	<i>The role of the University library is to select and acquire publications to build up a comprehensive collection with regard to the goals and objectives of the university and to assist users in meeting their information needs. It also organises, preserves and makes available relevant texts and documents that</i>	This statement in effect would require users to be trained in the use of the resources to be able to meet their information needs.

	<p><i>would support the teaching and research activities of the university (Page 2)</i></p> <p><i>To assist users in meeting their information needs</i></p>	<p>Although the staff in the library may occasionally search for information for students, they are supposed to be equipped in handling searches, evaluating information, managing the information, using the information effectively for research and presenting findings of the research by themselves.</p>
	<p><i>The identification of information in databases and assisting users to access the information</i></p>	<p>Information in databases subscribed to by the library must be effectively accessed by students. Otherwise, there will loss intellectually and financially. The information acquired from the databases must be used by students in the conduct of their research and subsequent dissemination of the research findings.</p>
<p>Scholarly communication guidance</p>	<p><i>Vision statement – To be an excellent repository of recorded knowledge for effective teaching, research and entrepreneurship training in science and technology for industrial and socio-economic development of Ghana and other countries</i></p> <p><i>The strategic mandate of the university library - To assist the university to become globally recognised as the centre of Excellence in Africa for teaching, research and entrepreneurship training in science and technology(Page 3)</i></p>	<p>This indicate that there is a need for scholarly communication guidance to be made a critical service by the academic library especially to doctoral students.</p>
<p>Library resources</p>	<p><i>The university library aspires to improve upon its position as the link between teachers, learners and researchers</i></p>	<p>The academic library has to be an effective link in the chain of knowledge. The academic library, whiles providing scholarly communication guidance to doctoral students need to</p>

		collaborate with these stakeholders.
	<i>A high quality and well-balanced library collection forms the core of knowledge distribution. The university library foresees building and developing a collection that eliminates obsolescence (Page 4)</i>	This can relate to the collection in the institutional repository in addition to the general collection in the library.

6.9.2 Basic statistics of KNUST

The document is published by the Quality Assurance and Planning Unit of the Vice-Chancellor's Office, KNUST. It contains a breakdown of the number of graduates for both undergraduate and postgraduate programs in the university. It is published once every academic year, irrespective of the number of congregations organised within a year and because the academic year at KNUST is from August and ends July the next year, the title of each academic year is a combination of two years (for example 2017-2018 academic year). The following basic statistics were analysed to ascertain the number of doctoral graduates for the period 2010-2017.

- Basic statistics for 45th Congregation, June 2011 – This contains the figures for 2010/2011 academic year
- Basic statistics for 46th Congregation, August, 2012 – This contains the figures for 2011/2012 academic year
- Basic statistics for 47th Congregation, June, 2013 – This contains the figures for 2012/2013 academic year
- Basic statistics for 48th Congregation, June, 2014 – This contains the figures for 2013/2014 academic year

- Basic statistics for 49th Congregation, June, 2015 – This contains the figures for 2014/2015 academic year
- Basic statistics for 50th Congregation, June, 2016 – This contains the figures for 2015/2016 academic year
- Basic statistics for 51st Congregation, July, 2017 – This contains the figures for 2016/2017 academic year

Table 6.18 contains the figures for doctoral graduates for the listed academic years for all the colleges in the university.

Table 6.18 Number of doctoral graduates

Academic year	Total
2010/2011	32
2011/2012	21
2012/2013	15
2013/2014	20
2014/2015	4
2015/2016	87
2016/2017	95
Total	274

The number of graduates was ascertained in order to have a fair knowledge of the number of doctoral theses that were to be deposited in the institutional repository between the stipulated years for this study (2010-2017).

6.9.3 Graduation list brochures from year 2010 to 2017 versus bibliometric survey of the Institutional Repository

Every congregation organised by the university has a programme outline which is made into a booklet that also contains names of the graduates, their degrees and their academic programmes. The brochures for all the congregations organised from 2010 to 2017 was analysed in order to get the names of doctoral graduates. All the names of doctoral graduates deduced from the graduation brochures within the period of 2010 to 2017 were typed and grouped under the years of graduation according to the brochure. These names were used as part of the key words for searching in the institutional repository to confirm whether their theses were deposited.

The outcome of the bibliometric survey of the institutional repository as against the names of the graduates within the stipulated period revealed that although some names were found in a particular year's graduation booklet, the actual thesis was submitted either a year or two years before. Thus, their names were featured in the brochure for the year they decided to come for their graduation. Some even exceeded two years.

To validate the actual year of graduation, the hard copies of the doctoral thesis deposited in the main library of KNUST were retrieved for analysis. This was also done because the thesis of some

of the names picked from the graduation brochures as doctoral graduates could not be found in the institutional repository. Table 6.19 is a presentation of the data retrieved.

Table 6.19 Number of theses of doctoral graduates in the institutional repository

Year	Number of doctoral graduates ascertained from the basic statistics	Number of thesis and dissertation found in the institutional repository
2010	32	15
2011	21	5
2012	15	9
2013	20	6
2014	4	20
2015	87	71
2016	95	67
TOTAL	274	193

Interestingly, the data shows that the basic statistics for the year 2014 had four doctoral graduates but twenty doctoral theses were retrieved from the institutional repository for that same year. Although there is a compulsory deposit policy, some thesis could still not be found. A comparison of the total number of doctoral graduates and theses found in the institutional repository shows that eighty-one theses are yet to be deposited. Further checks from the KNUST Library indicated that the students may have submitted the soft copy to the graduate school but the library was yet

to upload into the system. This is because the institutional repository has not been made a self-archival type.

During the face-to-face interview with the Senior ICT Assistant, he reported that some checks and balances are normally done on submissions before uploading them into the system. These checks sometimes delay the process of uploading. He was of the view that this could be the reason why some of the theses were not found.

The view of this study is that, the number of theses that have not be published would still have to be uploaded into the institutional repository. This is because information delayed is information denied.

6.9.4 Draft policy on publication and Guide for Higher degree research supervision

These two documents were analysed to ascertain the presence of issues regarding scholarly communication guidance by supervisors, school of graduate studies and the academic library. These issues include collaboration of the school of graduate studies and the academic library, guidance on copyright, authorship, determination of predatory journals, preparation of good manuscripts for publication. They were also analysed to ascertain policies on guiding students to access the academic library resources.

The draft policy on publication is an eighteen-page document developed by the school of graduate studies, KNUST. Guide for higher degree research supervision is a 48-page document on the responsibilities of the research supervisor and the graduate student. The data is presented in Table 6.19.

Table 6.20 Draft policy on publication (DPP) and Guide for Higher degree research supervision (GHDRS)

Theme	Information	Comments from researcher
Dissemination of research findings	<i>Dissemination of research results through publication in scholarly and research journals, presentations at conferences, seminars and workshops and where appropriate, through protection (patent or copyright) enhances the education and training experience (DPP, page 6)</i>	These statements have outlined some of the ways of scholarly communication of research findings.
	<i>The theses of a Graduate student should be retained in the designated locations of the Department and the KNUST Central Library Repository for a reasonable period beyond the time of publication (DPP, page 7)</i>	
	<i>Dissemination of research results is a primary function of KNUST and is highly emphasised by the School of Graduate Studies. (DPP, page 8)</i>	
	<i>Other means of publication refers to the publication of thesis/research or part of it in newspapers, magazines, reports and reviews etc. (DPP, page 13)</i>	
	<i>Elsevier's Journal Data in Brief publish data as a stand-alone article, where only the data generated can be published. In such cases, the results from the data itself can also be published (DPP, page 15)</i>	
	<i>Dissemination of information through scientific journals should be done as much as possible through Thomas Reuters Index Journals (DPP, page 15)</i>	
	<i>Post-enrolment: The postgraduate candidate is expected to 7. Communicate research findings to others in the academic community (GHDRS, page 6)</i>	
Authorship	<i>Authorship is credited to those who make substantial intellectual contributions to a piece of work. All authors accept responsibility and credit for their work and ensure that the work conforms to the highest standards of academic and scientific integrity (DPP. Page 6)</i>	Students are guided in these statements on their rights as authors.
	<i>No party should unreasonably suppress or delay presentation or publication of completed work. All reasonable efforts should be made to contact all contributors. However, the inability to contact and obtain the agreement of a co-author should not</i>	

	<p><i>prevent dissemination of the work in a timely manner (DPP, page 12)</i></p> <p><i>Under no circumstance should an article emanating from the work of a postgraduate student have the main author other than the student himself/herself.</i></p> <p><i>Supervisor(s) should take note that their contributions in such articles for publication does not merit the 'main authorship right'. However, he/she could be a co-author.</i></p> <p><i>Any article(s) sent to the School of Graduate Studies in order to meet the publication submission policy for any student in which the student is not the main author shall not be accepted by the School of Graduate Studies (DPP, page 15).</i></p>	
Scholarly communication guidance (Supervisors as collaborators)	<p><i>It is the responsibility of the student's supervisor(s), in early discussions about the research topic, to advise:</i></p> <p><i>a) Against selection of thesis topics if the results cannot be published upon completion of all requirements for their degrees.</i></p> <p><i>b) On policies and regulations that will affect the publication of their theses, such as requirements of agencies from whom the students may have received funding for their research (DPP, page 9)</i></p> <p><i>The supervisor(s) are expected to support their postgraduate students in the following:</i></p> <p><i>13. Advising about resources and funding sources.</i></p> <p><i>20. Collaborating with the student leading to joint publications</i></p> <p><i>21. Encouraging academic visibility online (GHDRS, Page 9)</i></p>	<p>These statements have outlined how supervisors should guide their students in coming out with publications.</p> <p>Advice to be given to students about resources should include directing them to professional librarians as well.</p>
Copyright issues	<p><i>If the thesis contains a chapter (or chapters) that the student has published as a journal article or as part of a book, permission must be obtained from the copyright holder(s) (i.e. publisher) to include the material in the thesis. In the light of this, a student should make sure that he/she does not concede full copyright to any publisher in the event of submitting an article from his/her thesis for publication (DPP, page 8)</i></p> <p><i>in the case of transcription of the entire or large parts of the thesis into a complete peer-reviewed article, technical report or textbook by a graduate student,</i></p>	<p>Guidance of copyright issues are stipulated in these statements.</p>

	<i>prior written permission from the School of Graduate Studies should be sought(DPP, page 8)</i>	
Policies	<i>b) On policies and regulations that will affect the publication of their theses, such as requirements of agencies from whom the students may have received funding for their research(GHDRS, page iv)</i>	
Courses	<i>Post-enrolment: The postgraduate candidate is expected to</i> <ol style="list-style-type: none"> <i>1. Dedicate effort and time to meet the requirements of the program</i> <i>2. Undertake courses for the needed competencies(GHDRS, page 6)</i> 	Such courses should include information literacy and scholarly communication guidance by the academic library. Their contents should also be found in the research portal
Scholarly communication guidance (School of graduate studies as a collaborator)	<i>The School of Graduate Studies monitors the following activities</i> <ol style="list-style-type: none"> <i>6. Conferences attended and papers presented: The student prepares this report and sends copies to the supervisors, the Head of Department and the School of Graduate Studies.</i> <i>7. Number of draft manuscripts prepared: the student prepares this report and sends copies to the supervisor, the Head of Department and the School of Graduate Studies. (GHDRS, page 18)</i> 	The role of the School of graduate studies on scholarly communication by doctoral students is briefly explained in these statements.

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In the draft policy presented in Table 6.20, no mention has been made concerning the role of the academic library in the promotion of scholarly communication by doctoral students or guidance from the academic library. The academic library exists to guide students to access the right information, evaluate the information and use the information to produce new knowledge. For a student to be able to produce a good publication, the services of academic librarians are also critical.

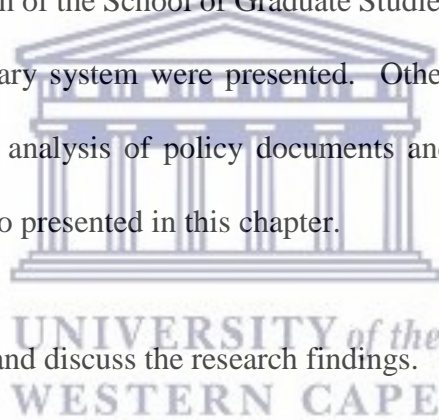
The researcher after analysing the whole document did not find any portion entreating supervisors to direct students to academic librarians or guiding students to access and use the resources of the academic library.

6.10 CONCLUDING SUMMARY

The chapter presented and analysed qualitative data gathered for this study.

The data and findings gathered from face-to-face interview conducted with the two KNUST Deputy Librarians, written interviews with ten KNUST professional librarians, a face-to-face interview with the KNUST Dean of the School of Graduate Studies as well as with the senior ICT Assistant of the university library system were presented. Other qualitative data and findings obtained through documentary analysis of policy documents and a bibliometric survey of the institutional repository were also presented in this chapter.

The next chapter will interpret and discuss the research findings.

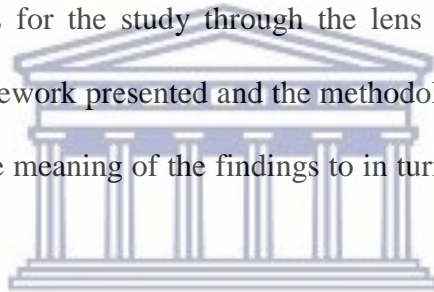


CHAPTER SEVEN

INTERPRETATION OF FINDINGS

7 INTRODUCTION

Chapter five presented and analysed the data elicited from the two different questionnaires distributed to KNUST doctoral students and supervisors of doctoral students. Chapter six presents and analyses the qualitative data gathered during interviews with academic librarians, Dean of school of School of Graduate Studies, and a Senior ICT Assistant. This chapter interprets and discusses the research findings for the study through the lens of the literature reviewed, the theoretical and conceptual framework presented and the methodology outlined. The ultimate aim of this chapter is to discover the meaning of the findings to in turn assist in providing answers to the research questions.



7.1 PROFILE OF KNUST DOCTORAL STUDENTS, SUPERVISORS AND LIBRARIANS

The data indicates that more males (82%) than females (18%) had enrolled for doctoral programs with the majority of them (90%) enrolled full-time. The majority of the respondents are in the first year of their study (52%).

The gender of doctoral students received through their questionnaire was compared to the statistics of registered doctoral students for the 2017/2018 academic year and it confirmed that more males 549 (78.7%) than females 149 (21.3%) registered for the academic year. This is in contrast with

the literature reviewed. Pyhältö, Toom, Stubb and Lonka (2012:3) surveyed 669 doctoral students in Finland and had response rates of 60% females in the Faculty of Arts, 76% females in the Faculty of Behavioural Sciences and 71% females in the Faculty of Medicine. In coherence, the study by Mazerolle, Bowman and Klossner (2015:227) had more female (19) participants than males (9). Fry, Tress and Tress (2005:197) discovered 50% of Scandinavia PhD students female. They further reported that female PhD students are increasing in most subjects resulting in many subject areas being dominated by women PhD studentships. This is an indication that, although the data of doctoral students for this study compared with the statistics of registered doctoral students is a true representation in terms of gender, it is slightly different from what pertains in literature.

Interestingly more male (83%) supervisors of doctoral students completed the questionnaire and of the ten KNUST professional librarians interviewed, six were males and four were females.

A comparison of the year of study of doctoral students within the colleges showed that with the exception of College of Engineering which had the highest number of students (40.9%) in year 3, all the other colleges had the highest number of students in year 1: College of Agriculture and Natural Resources (54.5%), College of Art and Built Environment (52.4%), College of Health Science (52.6%), College of Humanities and Social Sciences (64.3%) and College of Science (56.0%). On the other hand, registration statistics reflect that both the College of Engineering and College of Science had the majority of students in year 2. This is an indication that more year 1 students decided to respond to the questionnaires. They might have responded because of the statement in the survey indicating permission granted by the graduate school to conduct the research. Wilson's 1981 model of information behaviour suggests that information-seeking

behaviour arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in success or failure to find relevant information. In line with Wilson's model, year 1 students may have answered the questionnaire because they saw it to be a way of getting solutions to their research needs through the academic library if the services outlined in the questionnaire are provided.

The age of the study's doctoral students ranged from 31 to 40 years. The literature indicated a similar age group for doctoral students worldwide. Stackhouse and Harle (2014:178) reported that the mean age of doctoral students studying in Africa is 37.4 years, compared to the 31.8 years of European students. Mouton (2016) identified the average age of doctoral students in South Africa at enrolment as 39 years. Pyhäntö, Toom, Stubb and Lonka (2012:3) gave the mean age of doctoral students in Finland as 41 and the median as 39.5. The majority of KNUST doctoral students partaking in the study were in the age group 26-40: year 1 (32.8%), year 2(33.3%), year 3 (30%) and year 5 (100%). For year 4, the respondents were in age group 31-35 (50%) and 51-55 (50%) respectively.

Their year of study in relation to mode of study also revealed that only 50% of year 4 respondents were enrolled as full-time students. For all the other years of study, the majority of students were enrolled on a full-time basis: year 1 (90.6%), year 2 (94.4%), year 3 (85.0%) and year 5 (100%).

The majority of the respondents being in their first year is an advantage for the academic library to start providing scholarly communication guidance for them to acquire the required and

necessary skills from the beginning of their study continuing through to the last stages in their study.

For the supervisors, more males 24 (83%) than females (17%) responded to the questionnaire, with majority of them (41%) being senior lecturers in their 1st to 5th year of supervision.

The highest number of supervisors were from the College of Humanities and Social Sciences (38%), followed by College of Engineering (21%), College of Art and Built Environment (17%), College of Agriculture and Natural Resources (14%), College of Science (7%) and College of Health Sciences (3%). The majority (59%) of supervisors had 1–5 years of doctoral student supervision experience, followed by 6–10 years (24%). Only two supervisors had respectively 11–15 years and 16–20 years of experience.

Most of the supervisors had not been in doctoral supervision long enough to graduate students. One supervisor had graduated fourteen students, another eleven and one other graduated seven. Eight supervisors have graduated each one doctoral student. It can be deduced that majority of these supervisors relatively had limited experience in doctoral supervision.

Most of their doctoral graduates had published from their theses while one supervisor indicated that three of his students had published before they graduated. One supervisor each had respectively eleven, ten and five doctoral graduates who published peer-reviewed articles from their theses. Five supervisors had two, eight had one and five had none of their doctoral graduates publishing from their theses. One focus of scholarly communication guidance is to motivate and equip doctoral students to publish even before graduation.

7.2 RESEARCH AND SCHOLARLY COMMUNICATION NEEDS OF DOCTORAL STUDENTS

Wilson's 1981 model of information behaviour (Wilson, 1999:251) introduces concepts of information seeking (success/failure) and degree of satisfaction of information need. According to Wilson, Ford, Ellis, Foster and Spink (2002:705), this model suggests that information-seeking behaviour is goal-directed behaviour with the resolution of the problem and, possibly, the presentation of the solution as the goal. This study supports the assertion by Pinto et al (2013:145) that doctoral students do not only have to be able to recognize their need for information, but also need to develop skills for searching, locating, organizing, evaluating and presenting information. Presenting information would therefore mean preparing manuscripts for publication in peer-reviewed journals as well as conference presentations.

Access to credible journals and databases were identified by Deputy A and the Dean as the research and scholarly communication needs of doctoral students. Deputy A further indicated access to internet services and the ability to make research findings accessible and visible to the global audience.

Information literacy skills was indicated by Deputy A and the professional librarians. *How to do proper citation and avoid plagiarism* was listed by PL4 and PL5 and *How to evaluate and utilise credible information* was indicated by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10 as part of the information literacy skills. Deputy A added *computer or information technology skills* and *effective communication skills*. Similar needs of doctoral students were identified by Becker and Chiware (2015:614) in a study based on quantitative and bibliometric survey of an

institutional repository. According to them this method helped in determining the research information needs of their study population. Their findings indicated that journals were the most used or needed resource, followed by books and other categories such as conference proceedings and online resources. Tomaszewski (2012:442) adopted an electronic survey instrument to identify such needs. The study revealed that the most frequent response to popular resources used by doctoral students and postdoctoral scholars were journals (106 respondents), databases (87 respondents), books (66 respondents), and interlibrary loan (60 respondents).

Research and information needs identified by Johnson, Kuglitsch and Bresnahan (2015) included knowing what experiments have already been done and which have failed; understanding how to analyse data; keeping up with the literature; finding a research question and knowing which methods to use to answer it; library spaces for convenient access to workshops, group work, browsing collections, and promotion of library services/resources.

Others are dedicated email, phone, and in-person support from librarians; workshops/tutorials/seminars on skills/tools useful for research and easier electronic access to journal article. Although they used participatory and service design methods to identify emerging research needs and existing perceptions of library services among science and engineering faculty, post-graduate, and graduate student researchers based at a satellite campus at the University of Colorado Boulder in the United States, their findings are in relation to what has been identified in this study. The authors define participatory design as an approach to building spaces, services, and tools where the people who will use those facilities participate centrally in coming up with concepts and then designing the actual products. Participatory design used by Johnson, Kuglitsch

and Bresnahan (2015) could be adopted in the design of the research portal as part of the KNUST Library website, this will help to get all stakeholders involved.

Communicate the results, the most extensive part of the scholarly communication life cycle model by Bjork (2007), with an end result called disseminated scientific knowledge is consistent with the identified needs of doctoral students in this study. This is because it reflects the viewpoint that scientific results which have been published, but which are not read by the intended readers are rather useless. The ability to determine where to publish, ability to determine predatory journals and the skills to handle reviewer's comments were listed by some of the professional librarians (PL1, PL2, PL3, PL4, PL5, PL6, PL7 and PL8). Skills in using data analysis software was listed by Deputy B and PL1, PL2, PL3, PL4, PL5, PL6, PL8 and PL9.

One need of doctoral students identified in the findings and worth mentioning is *How to access funding for their research or doctoral studies* (34.5%). This coincide with funding been identified as very important in the scholarly communication life cycle model by Bjork (2007:12). Funded research and dissemination is included in the model to show the importance of research funders (understood in the widest sense including basic university funding) in the shaping of the scientific communication chain, since they, through research contracts and university guidelines, potentially have the power to strongly influence a move towards open access. Doctoral students should therefore have access to a list of potential funders to approach for funding.

The literature reviewed in chapter 2 has shown that academic libraries can use various ways to identify the research and scholarly communication needs of their doctoral users. Becker and Chiware (2015) adopted quantitative and bibliometric survey of an institutional repository whiles Johnson, Kuglitsch and Bresnahan (2015) used participatory and service design methods with Tomaszewski (2012:442) using an electronic survey instrument.

7.3 RESEARCH AND SCHOLARLY COMMUNICATION SKILLS OF DOCTORAL STUDENTS

Catalano (2013:243), Iwara, (2015:79) and Pinto, Fernández-Ramos, Sánchez and Meneses (2013:146) have all indicated that when the detailed information needs of students are known, more directed library preparation and information literacy programs are possible. With this background from the literature, the research and scholarly communication skills were therefore ascertained to guide the academic library in establishing effective scholarly communication guidance.

Doctoral students in general regarded themselves as having moderate levels of skills for effective research and scholarly communication. A third of doctoral students (33.3%) indicated that they had moderate levels of skills, while 31.6% indicated high levels of skills, 19.9% low levels of skills, 9.3% expert skills and 6% no skills. The fact that 59.2% of students indicated no, low or moderate levels of skills clearly points to the need for the academic library to establish a scholarly communication guidance programme to effectively guide them in mastering research skills.

This is further strengthened by the fact that the minority of doctoral students rated themselves as to having high levels or expert skills regarding specific research and scholarly communication activities:

- *Knowledge to access funding possibilities/grants for your research/doctoral studies (18.7%)*
- *Ability to access electronic resources available on the University library website (49.6%)*
- *Ability to access full text articles from the university library online databases (41.6%)*
- *Ability to use different referencing styles such as APA, Harvard, MLA, Chicago (49.6%)*
- *Ability to use reference management tools such as Mendeley, Zotero, Refworks (28.5%)*
- *Ability to use data management software like SPSS, Excel, AtlasTi (41.5%)*
- *Knowledge of preparing a manuscript for publication in a peer-reviewed journal (48%)*
- *Knowledge of preparing a manuscript for conference presentation (43.1%)*
- *Knowledge to determine where to publish your final research results (41.5%)*
- *Knowledge on how to negotiate your right as an author (17.1%)*
- *Knowledge on how to determine journal impact factor (30.1%)*

The rating by the students corresponded with doctoral supervisors rating their doctoral students as having moderate level of skills in research and scholarly communication. This is evident in the low percentages for high level or expert skills in eleven of the thirteen activities:

- *How to access full text articles from the university library online databases (37.5%)*
- *How to use reference management tools such as Mendeley, Zotero, Refworks (20.7%)*
- *How to access all the electronic resources available on the library website (41.3%)*
- *How to prepare a manuscript for publication in a peer-reviewed journal (37.9%)*
- *How to prepare a manuscript for a conference presentation (44.8%)*
- *How to determine where to publish their final research results (37.9%)*
- *How to access funding for their research or doctoral studies (13.8%)*
- *How to summarise the final thesis into a 15 power point slides for presentation (41.4%)*
- *How to negotiate one's right as an author (10.3%)*
- *How to determine journal impact factor (20.6%)*
- *How to use data management software like SPSS, Excel, AtlasTi or others (44.8%)*

From the findings, it is clear that students rated themselves higher compared to supervisors' ratings. It is also apparent that skills on especially the use of reference management tools such as Mendeley, Zotero, Refworks must be developed and guidance regarding accessing funding

possibilities or grants, how to negotiate rights as an author and how to determine journal impact factors is needed.

Supervisors rating doctoral students' skills as moderate corresponds with Drisko and Evans (2018:198, 204) who concluded that the typical entering PhD student displayed solid conceptual, ethics, and writing skills but lesser preparation for conducting quantitative and qualitative research including methods related to understanding evidence-based practice.

7.3.1 Research and scholarly communication skills within age groups of doctoral students

When research scholarly communication skills were related to age groups, it became apparent that the younger age groups were more skilful as compared to their older counterparts. Both age groups 46-50 and 56-60 had low level of skills, while age group 36-40 had moderate level of skill, age group 51-55 had both moderate and high level of skills and age groups 26-30, 31-35 and 41-45 had high level of skills in research and scholarly communication. This is an indication that the age groups of doctoral students should, therefore, be taken into consideration in the designing of scholarly communication guidance by the academic library. It can also be concluded that not all age groups have high or expert level of skills, indicating that research and scholarly communication guidance should be repeated and installed in all enrolment levels.

7.3.2 Research and scholarly communication skills of doctoral students within academic colleges

After comparing different academic colleges, it became apparent that high level and expert skills were recorded by the minority of doctoral students in the College of Agriculture and Natural

Resources (43.08%), College of Art and Built Environment (41.27%), College of Engineering (39.7%), College of Health Sciences (38.6%), College of Humanities and Social Sciences (32.6%) and College of Science (38.27%). This is a clear indication that research and scholarly communication guidance is needed across all the colleges and that the guidance should be discipline orientated.

An application of Wilson's 1981 model of information behaviour to these findings mean that tailor-made scholarly communication guidance should therefore be developed to cater for the needs of all the colleges and the level of their research skills. The model refers to information systems, information sources and the information user. This supports the recommendation by Tury, Robinson & Bawden (2015:319) that practical lessons such as promotion of systems and resources and training in their use, are particularly important. Although their focus was on distance learners, their suggestion is still applicable to this study because of the 10% of doctoral students being enrolled on a part-time basis and the fact that most doctoral students are not visible on campus. This also support the need of a research portal which will allow access for all off-campus students on a 24/7 basis.

7.3.3 Research and scholarly communication skills of doctoral students in relation to gender

In comparing female and male doctoral students, it was revealed that, although male students rated themselves slightly more skilled, the minority of both genders had high levels or expert research and scholarly communication skills: females (35.9%) and males (39.9%). Therefore, both males and females need some form of guidance for effective research and scholarly communication.

7.3.4 Academic library identifying needs of doctoral students

An exploratory study seeking to understand the ways in which humanities and social science doctoral students manage information for their dissertation or PhD thesis, at different stages of their doctoral programmes was conducted by Cushing and Dumbleton (2017:41). The aim was to inform the development of library services for doctoral students to fill a gap in literature. The findings from this study suggest that academic librarians are in a unique position to provide support to social science doctoral students, and understanding their personal information needs at the different stages in the program is necessary to provide the best possible help.

How the academic library can identify the needs of doctoral students was sought for in this study. This is to enable the academic library to provide the best possible help as a background for the doctoral studies. The interview data received from librarians, the Dean and the Senior ICT Assistant revealed that for the academic library to identify the research and scholarly communication needs of doctoral students, the following must be done:

- Needs assessment survey seeking for the profile of doctoral students;
- Communication with doctoral students through emails and social media;
- Face-to-face interactions with doctoral students and;
- Drawing of orientation programmes that would be of interest to doctoral students.

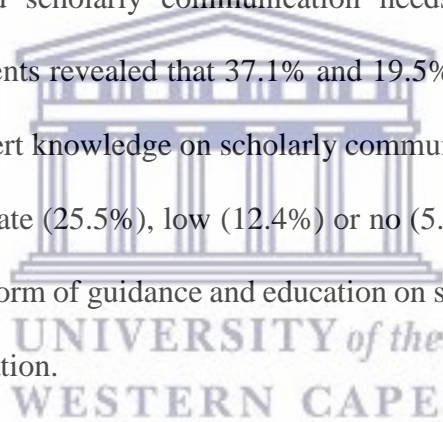
The findings are similar to the suggestion by Tomaszewski (2012:442) that science librarians should consider using social networking channels such as facebook, linkedIn, and text messaging for such marketing.

7.4 KNOWLEDGE OF DOCTORAL STUDENTS ON SCHOLARLY COMMUNICATION ISSUES

The operation of the scholarly communication system is the “bedrock” of academic information literacy and forms the “sociocultural frame of reference” for understanding library research skills (Mooney, 2016:212).

7.4.1 Doctoral students rating themselves on scholarly communication issues

Issues bordered on open access, plagiarism, copyright and creative commons were also identified in this study as research and scholarly communication needs of doctoral students. The questionnaire for doctoral students revealed that 37.1% and 19.5% of doctoral students regarded themselves to have high or expert knowledge on scholarly communication issues, while 43.4% of students indicated either moderate (25.5%), low (12.4%) or no (5.5%) levels of knowledge. This implies that they require some form of guidance and education on scholarly communication issues for effective research dissemination.

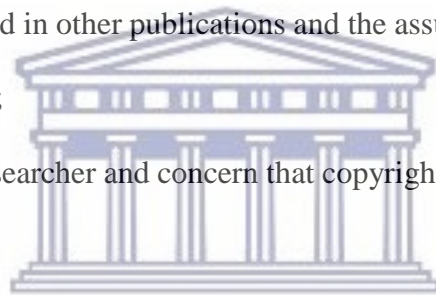


7.4.1.1 Open access

The majority of students (61%) rated themselves as having high levels of knowledge (42.3%) or expert knowledge (18.7%) regarding the statement *Open access is defined as free online access to scholarly works*. To a lesser extent, the statement *An open access journal is a scholarly journal that a reader can access online* drew 35% and 15.4% of students respectively; indicating high level of knowledge and expert knowledge. Most students (64.2%) regarded themselves as knowledgeable about *Open access literature of all types is digital, online, free of charge and free of most copyright restrictions*.

Contrast to the studies by Carpenter (2012:12) and Stanton and Liew (2012:1) who revealed low awareness of open access and repository archiving but support for the concept of open access, this study reflects widespread lack of understanding and uncertainty among all doctoral students about the nature of open access. The main concerns that emerged were:

- Lack of impact factor, status or credibility of open access journals in the eyes of academic colleagues and potential employers;
- strong preference for peer-reviewed journals with a general assumption that open access journals are not peer-reviewed;
- importance of being cited in other publications and the assumed impossibility or difficulty of this with open access;
- cost to the individual researcher and concern that copyright is not protected in open access journals.



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It is apparent that a KNUST scholarly communication guidance will have to include a section on what open access and publishing in open access journals entail.

7.4.1.2 Plagiarism

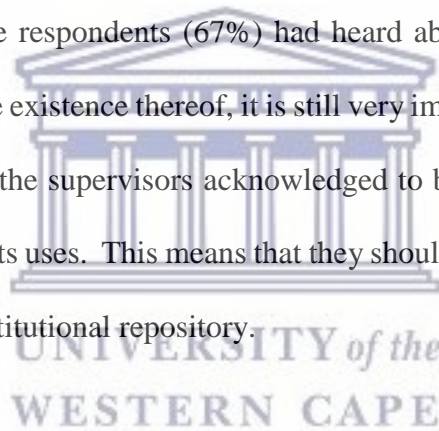
Most doctoral students (73.5%) rated themselves positively by indicating that they have high levels of knowledge (41.5%) or expert knowledge (39%) on what plagiarism entails (*Plagiarism - the act of falsely owning someone else's ideas or intellectual efforts*). The finding confirms existing study results indicating high levels of awareness and understanding by postgraduate students of plagiarism (Cheema, Mahmood, Mahmood & Shah, 2011:668 and Ramzan, Munir, Siddique & Asif, 2012:80).

7.4.1.3 Creative Commons

Doctoral students rated themselves as having only moderate (43.1%), low level (15.4%) or no level (14.6%) of knowledge on the statement *Creative Commons licences set out the re-use conditions for someone making use of another's material*. Standing on the hybrid system of scholarly communication proposed by Costa (2000), doctoral students should be guided to adopt creative common licences to share their research output online to the world at large.

7.4.1.4 Knowledge of Institutional Repositories

A third (33%) of KNUST doctoral students had no knowledge of the institutional repository. Although more than half of the respondents (67%) had heard about the institutional repository indicating their awareness of the existence thereof, it is still very important that students know how to utilize it. Almost all (93%) the supervisors acknowledged to being aware of the existence of the institutional repository and its uses. This means that they should be able to direct their students to access materials from the institutional repository.



The study by Stanton and Liew (2012) determining the level of awareness of open access and the concept of institutional repositories, publishing behaviour and perceptions of benefits and risks of open access publishing by New Zealand doctoral students also found low levels of awareness of the university repository. A low level of awareness of institutional repositories is also evident in the study by Watson (2007:225) at Cranfield University in the United Kingdom.

Both the scholarly communication lifecycle model developed by Björk and the scholarly communication guidance model developed for this study show that the findings of completed research must be communicated to the right stakeholders. Costa's proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment

represented the co-existence of the printed and the electronic media. Not only should the final print versions of thesis of doctoral students be deposited at the academic library, the electronic copies should also be deposited in the institutional repository.

An active awareness campaign should be implemented to ensure that doctoral students are aware of the institutional repository and the purposes thereof.

7.4.1.4a Accessing materials from the Institutional Repositories

Although 67% of KNUST doctoral students acknowledged to being aware of the institutional repository, only 44.7% of them accessed materials from it. It seems students have heard about the institutional repository but have never bothered to check its content to find relevant information. This is more or less in line with Stanton and Liew (2011) finding only 51.2% of doctoral students accessing a New Zealand university repository.

A total of 52% supervisors acknowledged to accessing materials from the KNUST repository. Alarming from the academic library's point of view, is that 41% respondents indicated not accessing the institutional repository. This may result in them not encouraging their students to access materials from it.

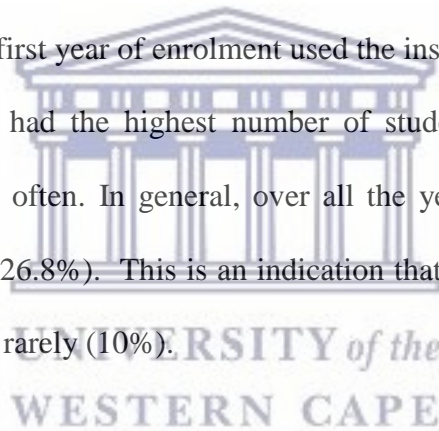
Serrano-Vicente, Melero and Abadal (2016:595) also reported that professors, researchers and doctoral students of the University of Navarra, Spain were aware of the repository but were unsure of how to utilize it to disseminate their own research.

7.4.1.4b Frequency of accessing materials from the institutional repository

Figure 5.16 shows that only 0.8% of doctoral students used the institutional repository very often, 6.5% often, 26.8% sometimes and 10.6% rarely. The rate at which doctoral students visited and accessed materials from the institutional repository was therefore very poor. This poor rate of accessing materials from the repository is evident elsewhere as Serrano-Vicente, Melero and Abadal (2016:595) report that the good opinion of open access among the researchers does not correspond to their use of the institutional repository.

7.4.2 Influence of year of study on the use of institutional repositories

Only one respondent in his/her first year of enrolment used the institutional repository very often. Interesting is that year 1 also had the highest number of students (16) using the repository sometimes, while three used it often. In general, over all the year levels, only 6.5% used the repository often or sometimes (26.8%). This is an indication that the majority of students either never used it (55.3%) or used it rarely (10%).



7.4.3 Supervisors advising doctoral students to use institutional repositories effectively

The majority of supervisors (69%) indicated that they directed their doctoral students to access materials from the institutional repository. The rest (31%) should be motivated to direct their doctoral students to use the institutional repository. This agrees with the suggestion of Baker and Wilson (1992:204) that productive faculty members are positive role models to their students leading to productive doctoral scholarly outcomes. Erichsen, Bolliger and Halupa (2014:322) support the notion by concluding that doctoral students expect their advisor to be actively involved in leading them through the disquisition process.

7.5 PERCEPTION ON SCHOLARLY COMMUNICATION ISSUES

Doctoral students and supervisors were asked to indicate their agreement with some statements pertaining to scholarly communication. The questions were asked to ascertain how doctoral students perceived an institutional repository and open access as well as an academic library website for guidance on scholarly communication.

7.5.1 Perception on open access and institutional repository

A total of 35.8% doctoral students agreed and 19.5% agreed strongly on the statement *The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings*. This indicates that more than half (55.3%) of the respondents had quite a good perception about the contents of an institutional repository. Supervisors also had good perception about the contents of the institutional repository. This is reflected in 58.6% agreeing and 34.5% strongly agreeing - totalling 93.1%.

Responses to the statement *Institutional Repositories contain published material of inferior quality* indicated that most students either disagreed (30.1%) or strongly disagreed (26.8%). Misperceptions of institutional repository are reflected in the 4.9% of respondents agreeing and 4.9% strongly agreeing. However, the minority of supervisors agreed (13.8%) or strongly agreed (3.4%) and an alarming 34.5% of respondents were neutral indicating uncertainty about the statement.

The statement *An increase in the visibility would lead to more citations of my work* had 37.4% of students agreeing and 26.8% strongly agreeing. In unity with doctoral students, the majority of

supervisors also either agreed (48.3%) or strongly agreed (41.4%). This indicates that both doctoral students and supervisors perceive that depositing their work in an institutional repository and thus enhancing international visibility would lead to more citations of their work.

The fact that 31.7% and 33.3% of students agreed and strongly agreed respectively to the statement *Depositing my research findings in an open access institutional repository can make my work highly visible* is testimonial that doctoral students had good perceptions about open access. The majority of supervisors also either agreed (48.3%) or strongly agreed (41.4%) with the statement indicating good perception.

A total of 40.7% and 25.2% respectively, agreed and strongly agreed with the statement *Publishing in an open access journal can give me an increased web visibility*. This is a further indication of the good perception students have about their works being highly visible through open access channels. The majority of supervisors also, either agreed (41.4%) or strongly agreed (41.4%) with the statement, indicating the good perception they have about the fact that open access can make doctoral works highly visible.

Generally, both doctoral students and supervisors had good perception on scholarly communication issues specifically open access and institutional repositories. This is consistent with findings of previous studies like Lwoga and Questier (2014:134) as well as Creaser et al (2010:152).

7.5.2 Perception on the academic library website

Reacting to the statement, *Every piece of information I need on disseminating my research findings can be found on the university library website*, 39.9% of students either strongly disagreed (10.6%) or disagreed (39.9%). A large percentage of students (42.3%) were neutral reflecting uncertainty. The majority of supervisors were either neutral (38.3%) or disagreed (31%) or strongly disagreed (6.9%) with the statement. This means that there is a negative perception and dissatisfaction with the services rendered on the academic library website. Previous studies reviewed in literature are in agreement with the findings that users do not have good perceptions about the academic library website. Kim (2011a:63) and Kim (2011b:9) indicated that users perceive university library websites as somewhat difficult to use. Although users find resources on library websites useful, they demanded the visual appeal to be enhanced (Pant, 2015:896).

These results call for attention from the KNUST academic library as both students and supervisors perceived the website not supplying enough guidelines, to develop the website further as well as create a research portal with additional research specific information and guidelines.

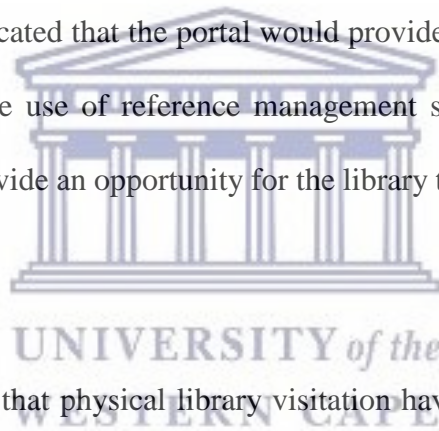
7.6 RESEARCH PORTAL

The evolution of computer programs (hardware and software) has created opportunities to extend the library instruction experience well beyond the traditional classroom setting (Douglass & Mack, 2015:543). Many academic libraries have started using as part of their library portal, a research portal dedicated to supplying various forms of research and scholarly communication guidelines. In order to develop a research portal, the opinions and input from stakeholders were sought.

7.6.1 Need for research portal as part of the KNUST academic library website

One deputy expressed the need for a research portal because it could supply students with areas of research interest. *It will guide them to know what has been done already, what is being done and what they can contribute so that they don't reinvent the wheel.* The Senior ICT Assistant also noted that the research portal will supply students with standards that are supposed to be found in the research processes and confirmed that such a portal is needed to supply *faceless support* to students. Thus, users could consult the portal at any time whether a librarian is available or not for research support.

The professional librarians indicated that the portal would provide guidance on how to do proper referencing and citation, on the use of reference management software and on copyright and plagiarism issues as well as provide an opportunity for the library to build content based materials helpful in research.




Various scholars have realized that physical library visitation have decreased over the years. It has been realised that although recently incorporated information commons and equivalent models may partially reverse the trend, there is the need for libraries to revamp their websites to include software that facilitate easy interaction with their universities (Barman, 2014:120; Macauley & Green, 2009:74; Tuñón & Ramirez, 2010:992 and Vezzosi, 2009:72). Kim (2010:978) supports the argument that information technology has changed the way libraries deliver services to users because with a library website, patrons can access digitized records, e-journals, and e-books without ever stepping foot into a library. All these support the assertion by Bussell, Hagman and

Guder (2017:978) who indicated that common library instruction formats, such as one-shot sessions and orientations are also often ineffective for graduate students.

7.6.2 Contents for a research portal

Training on Research Methods (66.7%) was regarded as very important content of a research portal by doctoral students through their questionnaire, followed by *Training on Copyright, Plagiarism and Fair Use* (64.2%) and *Proposal Writing Guides* (64.2%). Only 35.8% regarded *Link to Graduate School website* as very important. Perhaps the students did not realize how the activities of the graduate school can inform them.



The supervisors, apart from rating *Information on research and innovation at KNUST* (48.3%) and *Link to Graduate School website* (37.9%) as important, rated all the other statements as very important. Thus, the content supervisors want in a research portal for scholarly communication guidance are: *Online links to grants and funding* (55.2%), *Training on disseminating research findings* (58.6%), *Training on the preparation of manuscripts for publication* (62.1%), *Link to online library services* (55.2%), *Thesis writing guides* (48.3%), *Citation and reference management software* (55.2%), *Training on copyright, plagiarism and fair use* (65.5%), *Proposal writing guides* (48.3%), *Training on open access publishing* (48.3%), *Off campus access to electronic resources* (62.1%), *Training on referencing and citing* (51.7%), *Training on intellectual property* (55.2%) and *Training on author's rights* (55.2%).

Research support was outlined by Deputy A, Senior ICT Assistant, PL 1 and PL10. *Contacts*, that is, the emails and addresses to very important research institutions in the university was indicated

by Deputy A. PL4 and PL8 listed *Link to other websites* or other online services of the university library. PL3, PL8, PL9, PL2 together with PL10, PL6 listed *scholarly communication issues*. *User-generated content* and *interactivity* of the research portal were listed by the Senior ICT Assistant and Deputy A respectively.

All the contents ascertained in this study have also been outlined by Duncan, Clement and Rozum (2013:269), Patnaik and Mishra (2015:118) and Thomas (2013:170). Thus, this study proposes for their presence in the research portal.

7.6.3 Stages in the development of a research portal

The interview with the Senior ICT Assistant revealed seven stages in the development of the research portal. They are planning stage, demographic survey, technical aspects, capacity building, design stage, implementation and training (See Table 6.15 for details). These stages correlate with questions on scholarly communication outlined by Warren and Duckett (2010:352). Identified stages and engaging students should be taken into consideration while developing the research portal.

7.6.4 Cost of developing research portal at KNUST

Through an interview with the Senior ICT Assistant, the cost for developing the research portal was seen mainly in the area of funding for equipment as some might not be available in the university system. In line with Greene (2010:98), cost of staff was also identified. At KNUST, however, staff members earn salaries and no additional cost in developing the research portal will incur unless it is seen as a special project requiring additional remuneration for extra working hours

or if the project is outsourced. Engaging stakeholders and advocating the benefits of a research portal might motivate all involved to balance time spent working on the portal and their everyday duties ensuring no financial challenges.

7.7 DATA MANAGEMENT SOFTWARE

Supervisors listed a number of software but Stata and MATLAB were listed most (3). The academic library would have to decide on which ones to subscribe to and provide training initiatives to utilize it. Motivation for funds from the parent institution might be based on the fact that doctoral students find data analysis difficult.

7.8 DISSEMINATION OF RESEARCH FINDINGS BY DOCTORAL STUDENTS

Costa's proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment is of the view that scholarly communication based on printed media only no longer existed. A model based entirely on electronic media also did not depict all the interactions within the communication system to illustrate the various ways of disseminating research findings. A hybrid system of scholarly communication was therefore, proposed with both informal and formal channels of scholarly communication (discussion with colleagues, conference proceedings, journal publications), highlighting on both the print and electronic media.

Doctoral students were asked to indicate how they intend to disseminate their research findings through an open-ended question. There was a need to ascertain this data because the literature reviewed shows that there is a movement to increase student involvement in faculty research and

publishing. The documentary analysis and the interviews revealed a KNUST policy demanding two peer-reviewed journal articles from every doctoral student before defending theses.

Publication in journals had the highest response (117 suggestions) followed by conference presentations (26 suggestions). Others are research seminars and workshops (10 suggestions), mass media (5 suggestions) and the traditional thesis (5 suggestions). Supervisors reported that publishing articles in peer-reviewed journals (96.6%), conference presentations (96.6%) and presentation at seminars (96.6%) were used most by doctoral students to disseminate research findings. Publication in the institutional repository (51.7%) seemed less popular, while publishing books (27.6%), policy briefs (20.7%) and in the dailies (6.9%) were the minority. One supervisor indicated as another option *Community-based programmes* as a way of research dissemination.

The same trend appeared during the interviews. All the professional librarians, Deputy A and the Dean outlined publishing in peer-reviewed journal articles. Seven professional librarians, Deputy A and the Dean indicated conference presentations; Presentation at seminars was indicated by the Dean and all the professional librarians; Poster presentations was listed by all the professional librarians. This might be because the professional librarians have recently been trained on poster presentations as part of the building stronger universities programme. Publication of books was listed by five professional librarians and publication in the dailies by one professional librarian. Library deposit of the thesis itself was indicated by the Dean.

A bibliometric survey of KNUST Institutional repository to ascertain research output by doctoral students revealed that, although there is a compulsory deposit policy, some theses could still not be found. A comparison of the total number of doctoral graduates and theses found in the

institutional repository shows that eighty-one theses are yet to be deposited. Further checks against the KNUST Library catalogue indicated that the students may have submitted the soft copy to the graduate school but the library was yet to upload copies into the collection. The similar bibliometric survey of institutional repositories by Bonilla-Calero (2014:46) did not actually ascertain research output of doctoral students but rather the quantity of research output as evaluation rubric of universities. Kannan, Basha and Dhamdhare (2016:5-12) concluded that library users were highly satisfied with the provision of e-theses and that doctoral students should appreciate the need and understand the benefits to disseminate their research findings through the institutional repository.

This is in line with both the scholarly communication lifecycle model developed by Björk (2007) and the scholarly communication guidance model developed for this study. Both models show that the findings of completed research must be communicated to the right stakeholders. Costa's proposed adaptation of Garvey and Griffith's model of scholarly communication for a print plus electronic environment represented the co-existence of the printed and the electronic media. Not only should final print versions of doctoral theses be deposited at the academic library, additionally electronic versions should be deposited in the institutional repository.

7.9 ADVISING DOCTORAL STUDENTS ON RESEARCH DISSEMINATION

Supervisors indicated when they would advise doctoral students to publish during their doctoral studies.

7.9.1 Advice regarding doctoral research stage for publishing journal articles

The majority of supervisors (65.5%) wanted their students to prepare manuscripts for publication in peer-reviewed journals after the final submission of the thesis. The reason may be that at that stage, examiners have verified the facts in the thesis and given input as to how the quality of the thesis can be enhanced. Students will be able to use these input when compiling the journal article. Many supervisors also indicated that they encourage student to publish during the presentation of data writing stage (58.6%) and during the conclusion and recommendation stage (55.2%).

This study did not ascertain whether publishing before final submission of thesis would delay the research process of doctoral students. However, the revelation by Hartley and Betts (2009) seem to support the findings in this study that supervisors want their students to publish after final submission of theses. Pickering and Byrne (2014:536) are of the view that producing papers during a PhD program increases students' chances of securing permanent employment and provides them with an existing research record and broader profile in their research community than that provided by a thesis and conference presentations. Horta and Santos (2016:40) also opined that publishing during PhD studies had a significant and positive impact on the publication count as their study concluded that students who published during their PhD studies had 36% more publications and 48% more average yearly publications during their career than those with no publications during the PhD program.

Ninety percent of supervisors support the KNUST policy compelling doctoral students to submit two peer-reviewed articles before graduation. These results correspond with findings by amongst others Marisano, Winstanley, Morojele and Babor (2017:89) as well as Odendaal and Frick

(2017:1) that research dissemination and publications from doctoral students are very important, especially, researchers who used public money to conduct their research.

7.9.2 Advice regarding doctoral research stage for conference presentations

The majority of supervisors (65.5%) indicated that they would only advise their students to make conference presentations during the presentation of data writing stage of their doctoral studies. However, only slightly less (58.6%) supervisors preferred conference presentations after the final submission of theses. More than half (51.7%) of supervisors also value the literature review to such an extent that they would advise students to present the review as a conference paper. This is an indication that supervisors would like their students to prepare manuscripts from their research findings and present at academic conferences. The different stages of preparing for publication reflected are in line with scholars like Hartley and Betts (2009), Pickering and Byrne (2014) as well as Kwan (2010) reflecting different opinions about the best time to publish.

7.9.3 Increase in publications and web visibility

Supervisors established that for scholarly communication guidance to increase publications and web visibility of the university as a whole, there should be promotion of widespread awareness and use of open access resources (89.7%), which is in line with Bonilla-Calero (2014:46) who stated that it is important to consider services with features such as open access, which has the effect of increasing the visibility of documents (leading to more citations) alongside its primary goal of changing authors' publication habits.

Effective deposit of published articles by faculty in the institutional repository (86.2%) and promotion of open access publishing avenues or options for authors, researchers, and graduate students (82.8%) indicated by supervisors in this study are also in agreement with what pertains in literature. Thus, commonly cited benefits of using an institutional repository are to increase the visibility and citation impact of the institution's scholarship (Ebrahim et al, 2014:121).

Treating “publishing and publications” as a coursework for doctoral students received the least responses (55.2%). Supervisors may not be interested in such a coursework to be facilitated by the academic library. Another way to increase publications as indicated by one supervisor was to offer a course in scientific writing – a vision in line with Kwan (2010).

7.9.4 Motivating doctoral students to publish

The doctoral supervisor or advisor is the individual faculty member who directly supervises a student's doctoral research. PhD advisors are central to the doctoral student's success (Curtin, Malley & Stewart, 2016:715 and Russo 2011:534). KNUST supervisors motivate their doctoral students to publish by means of advice and encouragement (28%), by creating awareness of the benefits of publishing (17%) and by guidance in manuscript preparation for conferences and journal publications (14%). Supervisors were not keen to mentor students on how to handle reviewer's comments, selecting credible journals, co-authoring or making them aware that publishing is a requirement for graduation. These can be seen as opportunities for the academic library to step into those roles.

7.10 SCHOLARLY COMMUNICATION GUIDANCE PROVIDED TO DOCTORAL STUDENTS

The scholarly communication lifecycle model developed by Björk (2007) was adopted to guide this study in conducting a research study into scholarly communication guidance by the academic library to doctoral students. As outlined in section 3.3.1, the model includes all the activities of all the stakeholders in the overall publishing process. All stakeholders, thus researchers, research funders, publishers, libraries, bibliographic services, readers and practitioners need to guide doctoral students.

7.10.1 Level of guidance received from supervisors

The only positive feedback from students regarding the level of guidance by supervisors was that supervisors have trained them to prepare manuscripts for publication from their research (31.7%) and that supervisors have demonstrated various ways of disseminating research findings (28.4%). All the other statements drew relatively high percentages (26.8% - 35%) for the neutral option. This is perhaps an indication of the reluctance of respondents in answering the question in order not to reflect supervisors in a negative light. These findings may support Kwan (2010:63) alerting to the scarcity of formal instruction and courses in research publishing in doctoral degree programs.

In contrast to student responses, supervisors opined that they had provided high level of guidance on how to access library resources (44.8%), prepare manuscripts for publication (62.1%), disseminate research findings (55.2%) and access full text articles from online databases (44.8%). They however acknowledged to only providing moderate levels of guidance in directing doctoral

students to academic librarians for training (34.5%) and on how to access funding for doctoral research (41.4%). Perhaps they agree with Warburton and Macauley (2014:171) that they should focus on guiding students to produce research proposals and prepare publications.

7.10.2 School of Graduate Studies promoting scholarly communication by doctoral students

The opinion of supervisors on how the school of graduate studies promotes scholarly communication guidance was sought. This includes but not limited to any policy from the graduate school on scholarly communication by doctoral students.

Most supervisors (62.1%) agreed to compulsory deposit of theses in the institutional repository. This is in agreement with Carpenter (2012:13) as well as Stanton and Liew (2012:3) reporting mandatory deposit policies being adopted by many institutions to boost repository content and create a sustainable, accessible collection of research outputs. On the other hand, less than half (48.3%) of supervisors agreed with the guidelines on publishing with supervisors. Possible reasons like norms of the discipline, resources, faculty goals for students, faculty goals for themselves, and institutional expectations have been outlined by Maher, Timmerman, Feldon and Strickland (2013:121) as factors that constitute faculty-student co-authorship. Meanwhile, the literature reviewed showed that faculty-student co-authorship were likely to develop significantly higher level of research skills than students who did not (Feldon, Shukla & Maher, 2016:178). One supervisor in this study volunteered peer-review publication as a pre-requisite for graduation to promote scholarly communication by doctoral students.

7.10.3 Promotion of scholarly communication by academic faculty members in the opinion of supervisors

The views of supervisors were also solicited as to how their faculties are promoting scholarly communication by doctoral students. Most supervisors (75.9%) opted for presentation at postgraduate seminars as it involves allowing doctoral students to present their works through faculty and departmental seminars, compulsory deposit of thesis in the Institutional Repository (51.7%) and guidelines on publishing with supervisors (51.7%). However, Feldon, Shukla, and Maher (2016:178) discovered that students who co-authored with faculty mentors were likely to develop significantly higher levels of research skills than students who did not.

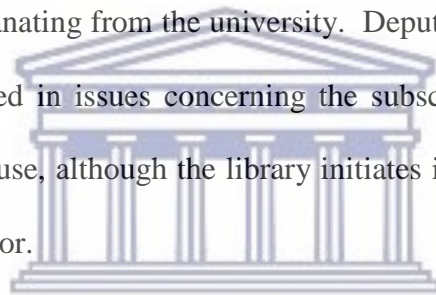
7.10.4 Collaboration with academic librarians for scholarly communication guidance

Supervisors expressed readiness in collaborating with the academic library for scholarly communication as 96.6% are willing to direct students to attend scholarly communication guidance workshops organised by the library and 79.3% to direct students to access resources on the academic library website.

The Dean of the School of Graduate Studies reported that the school collaborates through the publication of guidelines for thesis production, supervision and guidelines for publishing for students. However, the documents from the School of Graduate Studies reviewed in this study did not contain information on guidance from the academic library reflecting a communication gap between the KNUST library and the School of Graduate Studies.

Deputy A and the Senior ICT Assistant indicated that collaboration with the KNUST IT division is needed because they would have to provide and implement every technological support needed for the research portal. Only Deputy B and the Dean commented on the supervisors by indicating that if supervisors are made aware of every resource from the academic library, the doctoral students will definitely get to know it.

Both Deputies warned that every contractual agreement and licensing agreements with suppliers should involve the legal department. Deputy A indicated that the legal department is an important collaborator because they help the academic library in dealing with licensing and access rights of all the intellectual property emanating from the university. Deputy B affirmed by indicating that the legal department is involved in issues concerning the subscription of databases and other facilities or research tools because, although the library initiates it, the legal office interprets the agreement to the Vice-Chancellor.



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These findings are in agreement with Gilman (2015:30) and Thomas (2013:169) who listed scholarly communication guidance partners and campus units to include ICT, research and legal services.

7.10.5 Benefits of scholarly communication guidance

Deputy A as well as the Senior ICT Assistant indicated that the scholarly communication guidance by the academic library can help strengthen research output of students and the university. Thus, students will be guided on the ethics and specifics in conducting a research as well as publishing the research findings. The Dean, Deputy and the professional librarians were of the view that the visibility of students would be enhanced because they would be guided to publish in open access

resources and also be guided in depositing their works in the institutional repository. The visibility of the university would also be enhanced according to Deputy B and the professional librarians.

The benefits of scholarly communication guidance as outlined by Davis-Kahl (2012:214) and Houghton (2011) are increased awareness and understanding of open access and author rights within a library's culture; increase in more publication and, hence, a greater return for institutional investment of money, time, and resources to PhD students; an increase in the stock of useful knowledge; an increase in the supply of skilled graduates and researchers; the creation of new scientific instrumentation and methodologies; the development of networks and stimulation of social interaction; the enhancement of problem solving capacity, the creation of new firms and the provision of social knowledge.



7.11 SCHOLARLY COMMUNICATION GUIDANCE TO BE PROVIDED BY THE ACADEMIC LIBRARY

Formats of scholarly communication guidance envisaged to be provided by the academic library are discussed in this section. They include general formats and specific formats.

7.11.1 General formats

Face-to-face guidance from a professional librarian were rated as very helpful or helpful by 37.9% of supervisors, 70% of doctoral students and by Deputy B. Many students (60.1%) regarded online guidance on the academic library website as very helpful or helpful. Information Literacy Workshops was supported by five librarians and seen as very helpful and helpful by 72,4% of students indicating it an efficient form of scholarly communication guidance.

The establishing of a research portal were rated by the Deputy A, Senior ICT Assistant as well as the majority of supervisors (82.7%) and students (78.5%) as either helpful or very helpful. This trend supports the need for the academic library to establish a research portal for scholarly communication guidance as requested by Carpenter (2012:3), Krahn and Galambos (2014:94) and Spezi (2016:84).

Students request for both online and face-to-face guidance is in line with the views of Tomaszewski (2012:442) and might mean that although the website is regarded helpful, a more personal human form of scholarly communication guidance is also needed.

7.11.2 Specific formats

For the specific scholarly communication guidance initiatives, most students (55.3%) regarded sourcing research grants and funding, training on referencing and citation (48.8%), information literacy workshops (46.3%), workshops on copyright, plagiarism and fair use (44.7%), workshops on open access publishing (39.0%) and a scholarly communication website (37.4%) as important.

Of the supervisors on the other hand, only 51.7% rated training on referencing and citation as important. Rated as very important were sourcing for research grants and funding (65.5%), workshops on copyright, plagiarism and fair use (62.1%), a scholarly communication website (51.7%), information literacy workshops (51.7%) and workshops on open access publishing (48.3%).

Although the importance of these initiatives were not rated similarly, the KNUST academic library must take into consideration the needed contents and initiatives when formulating a scholarly communication guidance program.

7.11.3 Skills and expertise of academic librarians required for scholarly communication guidance

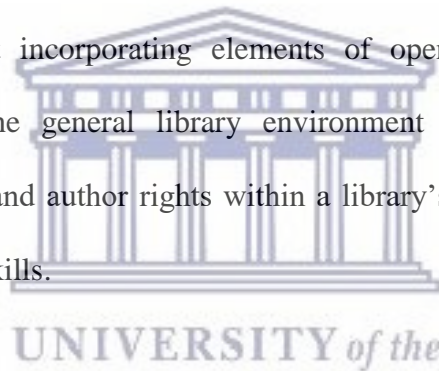
The practice of subject librarianship was identified by Deputy B as a way of making academic librarians experts and skilful for scholarly communication guidance. Information literacy skills was identified by Deputy A and the Senior ICT Assistant. This coincide with the notion of the Hensly and Davis-Kahl (2017: ix) that information literacy and scholarly communication skills are interconnected. Being knowledgeable in scholarly communication issues was identified by Deputy A, Senior ICT Assistant and all the professional librarians. These findings correspond with those of Boustany and Mahé (2015:18), MacGregor, Stranack and Willinsky (2014:165) and Thomas (2013:170), who established that copyright, publishing agreements and research support services must be a basic competency among librarians doing scholarly work.

Both Deputies further identified skills in academic writing, information technology and Web 2.0 technologies echoing scholars like Nilsson (2016) that librarians do not only have to handle restriction in copyright legislation but must also actively provide digital solutions.

7.11.4 Capacity of academic librarians

Thomas (2013:170) established that copyright, publishing agreements and research support services must be a basic competency among librarians doing scholarly work. The capacities of academic librarians in this regard were therefore ascertained through interviews with the professional librarians and the deputy librarians.

Six professional librarians rated themselves as having high levels and expert skills in copyright issues. The same pattern more or less presented in open access publishing skills. Four librarians had high level of skills, while only one claimed expert skills. In correspondence to Davis-Kahl (2012:214) who believes that incorporating elements of open access and other scholarly communication issues into the general library environment will increase awareness and understanding of open access and author rights within a library's culture, some librarians need training to gain the necessary skills.



Both deputies stressed the need for training to ensure that KNUST academic librarians become part of the Google generation as well as to know the collection of the library – especially, databases.

7.11.5 Contents of scholarly communication guidance

Summarised responses from the Dean, Deputies and professional librarians identified that scholarly communication guidance should include copyright, plagiarism, fair use, referencing and citation techniques, open access publishing and bibliometrics. How to use citation management

tools, copyright and plagiarism and research support have also been identified in literature (Buehler & Zald, 2013:215 and Thomas, 2013:170).

7.11.6 Scholarly communication guidance model

Other comments on scholarly communication guidance were categorised and grouped under ten main headings developed from the proposed scholarly communication guidance model:

- Research portals for students (25 submissions),
- Effective communication channels (16 submissions),
- Research seminars and workshops (10 submissions),
- Hands-on-training (7 submissions),
- Face-to-face contacts with academic librarians (5 submissions),
- Taught and compulsory courses (4 submissions),
- Effective guidance by supervisors (4 submissions),
- Specific research needs to be met having (4 submissions),
- Data analysis software (2 submissions)
- Train the trainer workshops (2 submission)

These additional aspects and initiatives regarded as needful for an effective scholarly communication guidance program should be taken into account when the academic library develops such a program.

7.12 KNUST Scholarly communication policy

The presence of institutional scholarly communication policies was ascertained from supervisors, librarians and through documentary analysis.

7.12.1 Knowledge of scholarly communication policies

Policies are needed in every organisation for smooth running and accountability. Almost half (48%) of the supervisors acknowledged to not having policies on scholarly communication. Doctoral students were not asked about policies. Five professional librarians indicated that there are no policies and two had no idea if there were any policies. From this, it can be deduced that if a KNUST scholarly communication policy exist, supervisors and librarians were not aware of it. Although there are general policies on open access publishing, copyright, institutional repositories and research dissemination by doctoral students, the study could not ascertain literature on the knowledge of supervisors and librarians on scholarly communication guidance policies in their institutions. The scholarly communication guidance model adopted for this study however supplies a model for scholarly communication guidance by academic libraries.

7.12.2 Existing policies

The two deputies and the Dean reported that there is a policy requesting doctoral students to publish at least two peer-reviewed journal articles before they will be allowed to graduate. The deputies also reported that the presence of a plagiarism software known as Turnitin was an indication that anti-plagiarism is promoted by the academic library. This study is of the view that because plagiarism software enhances originality and quality of research output, doctoral students should be guided in the proper usage thereof for maximum benefit.

In the draft policy presented in Table 6.20, no mention has been made concerning the role of the academic library in the promotion of scholarly communication to doctoral students or guidance from the academic library. The academic library exists to guide students to access the right information, evaluate the information and use the information to produce new knowledge. For a student to be able to produce a good publication, the services of academic librarians are critical.

The researcher after analysing the whole document, did not find any portion entreating supervisors to direct students to academic librarians or guiding students to access and use the resources of the academic library.

7.13 CONCLUDING SUMMARY

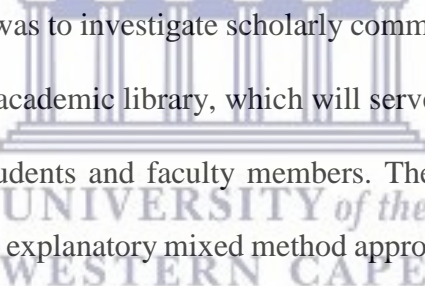
Chapter seven discussed and interpreted all the findings from the questionnaires, interviews, documentary analysis and bibliometric survey adopted for this study. The interpretations and discussions were done through the lens of the literature reviewed, the theoretical and conceptual framework and the methodology. The meanings of the findings presented in chapters five and six were outlined in this chapter. The next chapter will attempt to answer the research questions, draw conclusions and make recommendations.

CHAPTER EIGHT

CONCLUSION AND RECOMMENDATIONS

8 INTRODUCTION

The findings of the study were presented in chapters five and six. Chapter seven contains discussions and interpretations of findings. Chapter eight concludes the study and makes recommendations. Originality and contribution of the study to the body of knowledge as well as suggestions for future study are also presented in this chapter.



The main objective of the study was to investigate scholarly communication guidance for doctoral students as a core service of the academic library, which will serve as an educational platform for academic librarians, doctoral students and faculty members. The study adopted the case study research design with a sequential explanatory mixed method approach for investigations. KNUST was selected as the research site because it is the premier science and technology university in Ghana. The academic library of KNUST also hosts the first institutional repository (KNUSTSpace) in Ghana (Corletey, 2011). The vision of KNUST is to “Advance knowledge in Science and Technology for sustainable development in Africa”. This vision is in line with the Draft National Science, Technology and innovation policy (2017-2020) of the Ministry of environment, science, technology and innovation on basic research (Ministry of Environment, Science and Technology, 2017). This policy seeks to promote and encourage basic research as the bedrock of scientific and technological innovation. One intervention of this policy is to support researchers to undertake basic research relevant to socio-economic development.

The statement of the research problem as indicated in section 1.3 was to investigate scholarly communication guidance as a core service by the academic library to doctoral students, research and scholarly communication skills of doctoral students and effective dissemination of research findings by doctoral students for national development. The study also explores the need for adopting a research portal as part of the academic library website for scholarly communication guidance to doctoral students using KNUST as the case study. Sections 1.1 to 1.3 gives further background to the research problem.

A brief background to the study is that the changing methods and modes of communication due to technological developments in the 21st century are consequently influencing academic libraries to adapt services to keep parity with technological changes and user expectations. Dempsey (2003:104) argues that the major service challenge that libraries are encountering now is how to develop a network presence and how to make services available to users at each point of their studies. Additionally, there are some graduate programmes that are offered partially or fully online but whose students have peculiar research needs that the academic library has to address. Many of such students do not normally come to the university campus to access library services and training programmes offered by the academic library (Bussell, Hagman & Guder, 2017:978).

Concluding the study is based on the research questions adopted for the study. The research question are as follows:

1. What is the research behaviour of doctoral students at KNUST?
 - a. What are their research and scholarly communication needs?
 - b. What skills do they possess for scholarly communication?

- c. What are the systems, sources and library services needed by doctoral students for effective scholarly communication?
2. What has been the research output by doctoral students in the KNUST institutional repository (KNUSTSpace) since it was established?
3. How can the University library establish an effective scholarly communication guidance program for doctoral students at KNUST?
4. How will a research portal for the KNUST library strengthen research output by doctoral students?
5. What are the important features of a research portal?

8.1 WHAT IS THE RESEARCH BEHAVIOUR OF DOCTORAL STUDENTS AT KNUST?



Three sub questions were asked to be able to answer research question 1.

What are their research and scholarly communication needs?

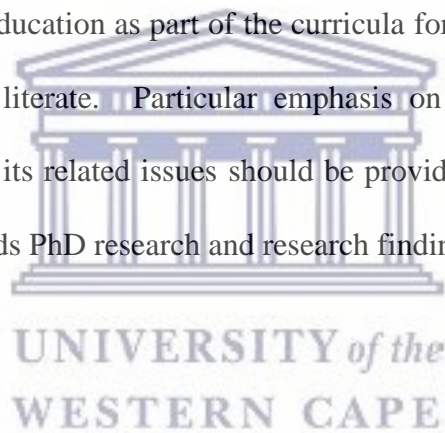
The established research needs ascertained are access to credible journals and databases, access to internet services, the ability to make research findings accessible and visible to the global audience, proper citation skills to avoid plagiarism, evaluation and utilisation of credible information, access to funding or research grants, issues of open access, plagiarism, copyright and creative commons.

What skills do they possess for scholarly communication?

The following skill of students were rated: accessing full text articles from the university library online databases, accessing library e-resources, using reference management tools, using data

management software, accessing research funding, writing an article for a peer-reviewed journal, determining where to publish research results, summarising a final thesis into a fifteen slide power point presentation, negotiating author's rights as an author and determining a journal impact factor. Both the doctoral students themselves and doctoral supervisors indicated that doctoral students had only moderate levels of research and scholarly communication skills. Students, therefore, require guidance and training to acquire and develop skills in research, dissemination of research – in general scholarly communication skills.

From an academic librarian's viewpoint, the mentioned skills are embraced by information literacy. Information literacy education as part of the curricula for undergraduates should ensure that students are information literate. Particular emphasis on sourcing research funds and dissemination of research with its related issues should be provided on postgraduate level. This will in turn prepare them towards PhD research and research findings dissemination.

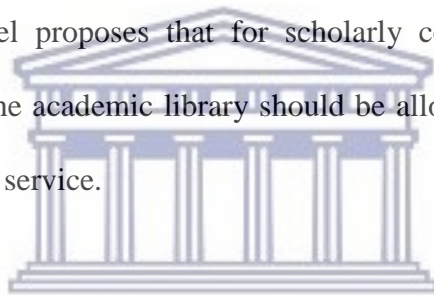


What are the systems, sources and library services needed by doctoral students for effective scholarly communication?

One academic library service established from the findings is the use of subject librarians in each subject area of the university. It was ascertained that for scholarly communication guidance to be effective, there has to be academic librarians who are conversant with particular disciplines or fields of study to be able to guide users.

It was also established that there is a need for an online platform accessible off campus. Self-learning, self-pacing learning and guidance at the point of need can be established using online tutorials, recorded tutorials and video clips. The proposed research portal as part of the academic library website can be employed effectively for this purpose. Initial training workshops and/or face-to-face guidance by a librarian might be needed.

Findings also indicated that doctoral students need access to reference and data management software. Subscription to these software by the academic library with funds provided by the parent institution would help students with referencing as well as with data analysis. The scholarly communication guidance model proposes that for scholarly communication guidance to be effective, funds are needed. The academic library should be allotted a sufficient budget by the parent university to finance this service.



8.2 WHAT HAS BEEN THE RESEARCH OUTPUT BY DOCTORAL STUDENTS IN THE KNUST INSTITUTIONAL REPOSITORY SINCE IT WAS ESTABLISHED?

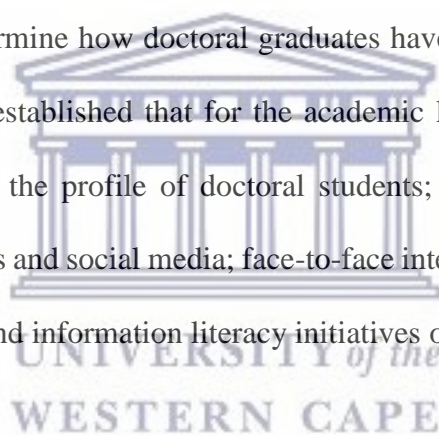
The bibliometric survey of the institutional repository revealed that not all the final thesis from doctoral graduates from 2010 to 2017 had been deposited. The findings revealed that both students and supervisors rarely accessed materials from the institutional repository.

Doctoral students should be encouraged to use materials from the institutional repository in their research works. This will enable them to appreciate the need for them to disseminate their final thesis as well in it.

8.3 HOW CAN THE UNIVERSITY LIBRARY ESTABLISH AN EFFECTIVE SCHOLARLY COMMUNICATION GUIDANCE PROGRAM FOR DOCTORAL STUDENTS AT KNUST?

The study established that for the academic library to establish an effective scholarly communication guidance for doctoral students, firstly, the various ways through which doctoral students intend to disseminate their research findings must be ascertained and secondly, to identify and reach out to doctoral students.

A starting point will be to determine how doctoral graduates have previously disseminated their research findings. It was also established that for the academic library should conduct a needs assessment survey seeking for the profile of doctoral students; establish communication with doctoral students through emails and social media; face-to-face interactions as well as develop and offer orientation programmes and information literacy initiatives of interest to doctoral students.



Scholarly communication by doctoral students

It was ascertained that doctoral students demonstrated scholarly communication behaviour of publishing in scholarly and research journals, presenting at conferences, seminars and workshops, publishing patents where appropriated, depositing in institutional repository, presenting posters, depositing theses in the academic library, writing reports, partaking in policy briefs, stakeholder meetings and community as well as publishing through mass media. Doctoral students also used academic social networks like ResearchGate and Academia.edu to create online profiles or general

social media to post research findings. The interviews revealed that social media offers mostly primary information which needs to be verified before it can be used.

Reaching out to doctoral students

For scholarly communication guidance to be effective, the academic library must be able to establish profiles as well as to identify and reach out to doctoral students. An outreach program can be used to identify their research and scholarly communication needs and to play an active and effective role in meeting those needs. Doctoral students suggested the use of emails, library orientation programs, workshops and seminars, face-to-face contacts, social media platforms like WhatsApp and Facebook as well as ask-a-librarian function for outreach initiatives. It was also suggested that a mobile application be developed for mobile access to the library's resources and services.



Collaborators of scholarly communication guidance

Effective collaboration between academic librarians, supervisors of doctoral students, the school of graduate studies, the university legal services as well as the university ICT services is needed for an effective scholarly communication guidance by the academic library.

Capacity of academic librarians for scholarly communication guidance

Academic librarians need information literacy, academic writing, ICT and Lib2.0 skills, must have knowledge of scholarly communication issues and must be experienced in the practice of subject librarianship. Although the majority of librarians rated themselves as having high and expert skills for scholarly communication guidance, training for those who indicated low and moderate skills

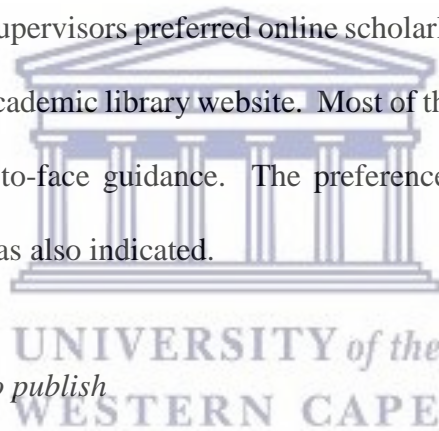
is needed. Academic librarians would also need continuous training to stay abreast with current and emerging trends and developments in order to provide expert guidance.

Contents of scholarly communication guidance

The contents of scholarly communication guidance program should include copyright, fair use, plagiarism, referencing and citation techniques, open access publishing and bibliometrics.

Preferred ways of scholarly communication guidance

Both the doctoral students and supervisors preferred online scholarly communication guidance and a research portal as part of the academic library website. Most of the academic librarians preferred workshops, seminars and face-to-face guidance. The preference for both online and personal human face-to-face guidance was also indicated.



Motivating doctoral students to publish

Supervisors motivated doctoral students to publish by advising and encouragement, creating awareness of the benefits of publishing, guidance in manuscript preparation for conferences and journal publications. Others that required the academic library's role to motivate are how to handle reviewers' comments, guidelines in selecting credible journals, co-authoring and advocacy that publishing is a requirement for graduation.

8.4 HOW WILL A RESEARCH PORTAL FOR THE KNUST LIBRARY STRENGTHEN RESEARCH OUTPUT BY DOCTORAL STUDENTS?

The research portal can be used as a tool to ensure that the academic library imbibe in students the academic requirements necessary to conduct research and produce publications. It will streamline the research processes and will enforce the quality required for research and publication. It can contain areas of research interest as well as standards required for research processes and practices. Possible research funders can be listed in order for students to access research grants and bursaries. Guidelines on preparing journal articles for publication in peer-reviewed journals, lists of accredited journals, list of forthcoming conferences, guidelines for conference posters and papers should result in publications of quality leading to higher KNUST research output.

The research portal can also be used to advocate the institutional repository, how it can be used as an alternative publishing option and how the open access feature thereof increases author and KNUST web visibility. Step-by-step instructions as part of the research portal on numerous research and library related functions, services and facilities like bibliometrics, webometrics, web of science, Scopus and reference and data management software should expose students to available support and give them the opportunity to register for and utilise such platforms and tools also resulting in research output of quality and web visibility.

8.5 WHAT ARE THE IMPORTANT FEATURES AND CONTENTS OF A RESEARCH PORTAL?

The study established that a research portal is a one-stop shop containing all the guidance needed as far as conducting a research is concerned. It should have support systems that allow the researcher to engage with, not only the academic librarians but knowledge experts as well. The contents of the research portal should include, but are not limited to, training on research methods, training on copyright, plagiarism and fair use, proposal writing guides, information on research and innovation, online links to grants and funding, training on disseminating research findings and training on the preparation of manuscripts for publication. Training in the use of selected data and reference management software should also be found in the research portal.

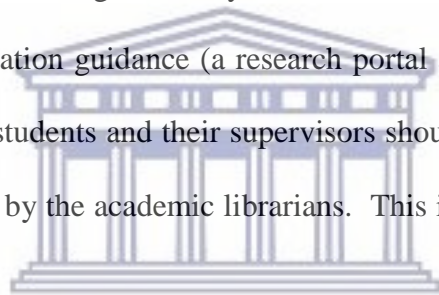
8.6 CONCLUDING THE STUDY

The overall aim of this study was to educate academic librarians to make scholarly communication guidance to doctoral students a core service of the academic library. Scholarly communication guidance from the academic library will help motivate and equip doctoral students to conduct good research and subsequently disseminate their research findings for national development.

Knowing the research behavior of doctoral students will help the academic library make informed decisions about the activities and contents to be included in a scholarly communication guidance programme. Thus, their needs and level of skills for research and scholarly communication guidance will be ascertained.

Although it is mandatory for doctoral students at KNUST to deposit their thesis in the institutional repository, there is the need for them to appreciate why they need to do so. They should therefore be encouraged to access and use materials from it. This will in turn encourage them to deposit their works.

There is the need for the academic library to discover all doctoral students to be able to provide scholarly communication guidance to them. This will help the academic library to conduct needs assessment to ascertain their needs and skills level for scholarly communication. There is also the need for regular continuous professional development activities for academic librarians to equip and make them confident in handling scholarly communication guidance. Online ways of presenting scholarly communication guidance (a research portal as part of the academic library website) preferred by doctoral students and their supervisors should complement workshops and face-to-face guidance preferred by the academic librarians. This is because the academic library exist to serve these patrons.



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The study also concludes that guidance to be provided through face-to-face and workshops from academic librarians should be replicated in a research portal for later reference since most doctoral students are mostly not on campus. The research portal would train doctoral students in all matters related to research and dissemination of research findings. This include ethics in research, how to be discovered as an author, how to present a good manuscript for conference presentation or publication, how to handle comments from reviewers and training on the use of the various channels available for research findings dissemination. The research portal is not a replacement for an institutional repository but rather a guidance platform in preparation for materials needed to be needed to be featured in an institutional repository.

The study has established that a research portal for scholarly communication guidance featured on academic library websites would go a long way in helping doctoral students in the conduct of their research and subsequent dissemination of research findings. The contents would include every presentation from workshops, videos and audio on various aspects of the research cycle as well as training on the use of data and reference management software. Every doctoral student irrespective of their year of enrolment would be guided in the research portal.

8.7 RECOMMENDATIONS

In order to effect an effective scholarly communication guidance for doctoral students as a core service of the academic library and to create an educational platform for all stakeholders, the following recommendations, based on the findings of this study, are made.

8.7.1 Academic library and academic librarians

The academic library should determine the research needs and skills of doctoral students on a regular basis in order to adapt, update and develop the scholarly communication guidance accordingly. It is recommended that such an initiative be seen as an outreach to students and be done every academic year at the beginning of each semester.

A framework to guide academic librarians as to the best way to collaborate with the school of graduate studies, doctoral supervisors, the university ICT unit as well as the leaders of the graduate students' association. The library should also investigate the establishment of a campus wide policy involving all stakeholders on scholarly communication.

The feasibility of subject librarianship in order to supply discipline orientated scholarly communication guidance should be investigated by the KNUST library as support for it by the academic librarians was already established. Alternatively, academic librarians should be trained to provide such services irrespective of the department they find themselves.

As preference for online guidance were indicated by both doctoral students and supervisors, it is recommended that a research portal be established.

As technical knowledge is needed, the academic library should consult the university's ICT experts to design the envisaged research portal. A committee represented by all stakeholders (librarians, doctoral students, supervisors, school of graduate studies, ITC experts, university legal services and the finance office) should be established to develop a research portal. The necessary funds should be provided by the management of KNUST.

8.7.2 Supervisors of doctoral students

Doctoral supervisors should direct their students to access every resources that is provided by the academic library. They should not assume that doctoral students know everything pertaining to library services because they have been undergraduates before.

Every information supplied by the academic library to supervisors to be relayed to their students must reach them. Thus, collaboration between faculty and the academic library.

8.7.3 School of graduate studies

The existing policy requiring doctoral students to show evidence of at least two peer-reviewed journal articles before they graduate, must be made visible and be enforced. This should be done by the graduate school in collaboration with doctoral supervisors. An additional statement to have such publications deposited in the institutional repository should be included in the policy. In addition, students should show evidence of their thesis deposited in the institutional repository before they are allowed to graduate. The academic library together with the graduate schools should therefore put in place measures for self-archiving of thesis to speed up processes. This will increase the web visibility of both the author and KNUST.

8.7.4 University Information Technology Services

The University Information Technology Services should make sure that the academic library website is placed on the homepage of the main university website. This will draw the attention to the existence of the academic library and to the information available in the research portal.

8.7.5 University Legal Office

The university legal office should be equipped and be in a position to be able to interpret all contracts to the academic library. This will help the academic library to take the right decisions on subscription to equipment and services for scholarly communication guidance. In addition they should help explain all the processes involved with procurement of materials by the academic library.

8.7.6 University Management

The Draft National Science, Technology and innovation policy (2017-2020) of the Ministry of environment, science, technology and innovation of Ghana on basic research (Ministry of Environment, Science and Technology, 2017) seeks to promote and encourage basic research as the bedrock of scientific and technological innovation.

Based on the above policy, it is recommended that all doctoral students be guided and supported to exploit available funds in order to present findings at conferences after data was analysed. The presentation can be in paper or poster format. This will prepare them adequately for subsequent development of peer-reviewed articles.

The academic library should be allotted sufficient budgets by the parent university to finance this service. The Alumni of the university could also be contacted for support.



8.7.7 Doctoral students

Doctoral students should supply their profiles to the academic library frequently so that tailor-made services and guidance would be provided for them.

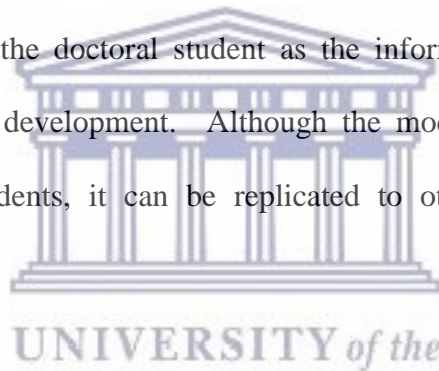
They should also make time for all workshops and seminars organised by the academic library.

They should make the academic library website their friend and access all resources made available to equip them in the conduct of their research and subsequent dissemination of findings.

8.8 ORIGINALITY AND CONTRIBUTION TO THE BODY OF KNOWLEDGE

The study has contributed to the body of knowledge on scholarly communication guidance by the academic library to doctoral students as previous studies recorded in the literature pertains mostly to faculty and not to students – particularly doctoral students.

To fill this knowledge gap, a scholarly communication guidance model was created. The model was purposely created for KNUST and emphasized guidance by academic librarians to doctoral students, funding for scholarly communication guidance, collaborators, a research portal, an academic library website and the doctoral student as the information user who disseminates research findings for national development. Although the model was purposely created for KNUST and for doctoral students, it can be replicated to other universities and to other postgraduate students.



8.8.1 Model for scholarly communication guidance at KNUST

As reflected in Figure 8.1, the components of the model are contents of scholarly communication guidance, contents of the research portal, formats of scholarly communication guidance, collaborators of scholarly communication guidance, funding for scholarly communication guidance, research dissemination and finally the information user or doctoral student.

THE SCHOLARLY COMMUNICATION GUIDANCE MODEL FOR KNUST

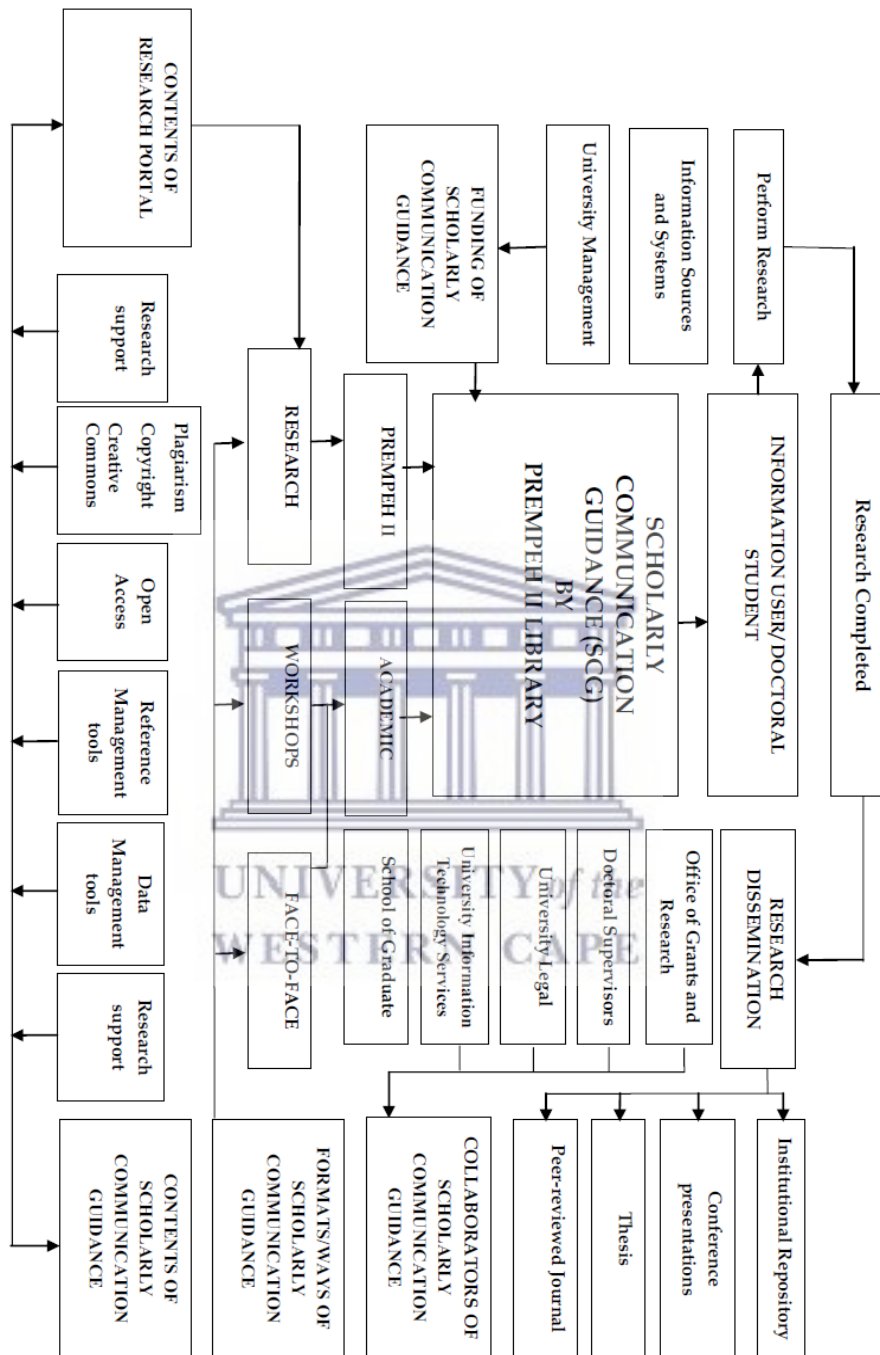


Figure 8.1 Scholarly communication guidance model for KNUST

8.8.2 Contents of scholarly communication guidance

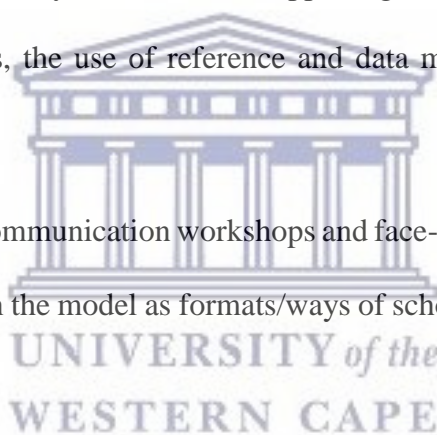
The contents to be featured in scholarly communication guidance by the academic library irrespective of the format as reflected in Table 8.1 include research support, guidance in plagiarism, copyright, creative commons, open access, the use of reference and data management tools and sourcing research grants. The contents were categorised and presented for each year of doctoral studies.

Table 8.1 Contents of scholarly communication guidance for each year of study

Year study	Contents
Year 1	<ul style="list-style-type: none">• Understanding and accessing academic library resources• Understanding and accessing the institutional repository• Choosing a referencing method• Using reference management software• Identifying the right theoretical framework, research design and methodology for research problem• Submitting a proposal
Year 2	<ul style="list-style-type: none">• Sourcing for research grants and funds• Understanding plagiarism and copyright• Understanding the Turnitin report• Preparing for data gathering
Year 3	<ul style="list-style-type: none">• Using data management tools• Preparing manuscripts for publication

	<ul style="list-style-type: none"> • Understanding open access
Year 4	<ul style="list-style-type: none"> • Determining where to publish your manuscripts • Preparing for conference papers and/or poster presentations • Negotiating your right as an author
Year 5	<ul style="list-style-type: none"> • Responding to reviewers comments • Co-authoring with supervisors

The model stipulates that all the contents listed should be featured in the research portal as part of the academic library website. They are research support, guidance in plagiarism, copyright, creative commons, open access, the use of reference and data management tools and sourcing research grants.



The research portal, scholarly communication workshops and face-to-face guidance with academic librarians have been indicated in the model as formats/ways of scholarly communication guidance by the academic library.

In addition to library budgets, the model proposes special funding from university management to support the academic library to provide effective scholarly communication guidance to doctoral students. Funds could also be solicited from Alumni by university management during programmes organised for or by them.

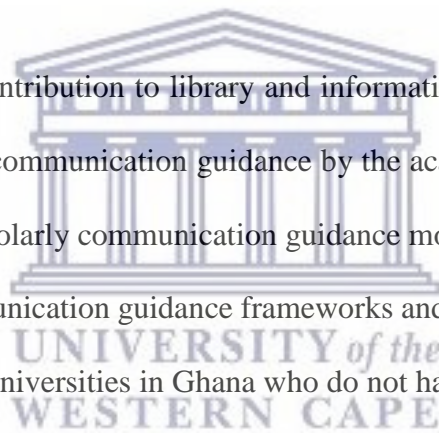
Effective scholarly communication guidance requires the support of stakeholders. The model listed the School of graduate studies, University information technology services, the university legal office, doctoral supervisors and the office of grants and research as collaborators of scholarly communication guidance.

The end product of effective scholarly communication guidance is for clients to be equipped for effective research dissemination. Deposit of thesis and other publications in the institutional repository, conference presentations, the thesis production itself, peer-reviewed journal articles have been outlined as ways for research dissemination by doctoral students.

The information user is the doctoral students who has enrolled in a doctoral programme or has registered as a doctoral student at KNUST.

8.8.3 Contribution to library and information science policy, practice and theory.

The study makes significant contribution to library and information science policy, practice and theory in the area of scholarly communication guidance by the academic library. The findings of this study and the proposed scholarly communication guidance model will serve as a guide to the formulation of scholarly communication guidance frameworks and policies in the KNUST library system as well as other public universities in Ghana who do not have such a system in place.



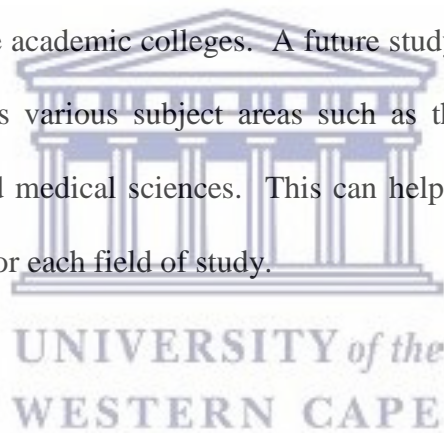
Standards and contents to be featured in scholarly communication guidance especially in a research portal as part of the academic library website for each year of doctoral study have been articulated in the study. Contents of continuous professional development for academic librarians to equip them for scholarly communication guidance have also been presented in this study. All these information serve as an educational platform for academic librarians, library management, supervisors, graduate schools and academic library website developers. They could also be featured in policies guiding scholarly communication guidance by the academic library especially in Ghana.

8.9 SUGGESTIONS FOR FUTURE STUDIES

The researcher has identified some gaps in the research findings that need to be filled up. They have been presented here in this section as suggestions for future study.

Research and scholarly communication needs and skills of doctoral students

This study has shown the importance of ascertaining the research and scholarly communication needs and skills of doctoral students for the development of scholarly communication guidance but there is a limitation in discussion as to the needs and skills of doctoral students in specific subject areas of study under the academic colleges. A future study is needed to make up for this limitation by comparing across various subject areas such as the pure and applied sciences; humanities; social sciences and medical sciences. This can help guide the academic library to develop tailor-made guidance for each field of study.



Scholarly communication by doctoral students

Although doctoral students revealed the various channels through which they intend to disseminate their research findings in this study, their writing and communication skills were not researched into. A review of literature has also shown limited study on the writing skills of doctoral students. A further study is needed to ascertain the writing skills and communication skills of doctoral students. This will determine how they can present their research findings in their thesis and subsequently prepare manuscripts for publication. Research into their communication skills

especially verbal would determine their preparedness in making conference and seminar presentations.

Accessing the research portal and other online library service

The study also established the preference of online ways of scholarly communication guidance by both doctoral students and supervisors. This study did not research into the types of devices (such as laptops and smartphones) doctoral students possess to help them access an online research portal for scholarly communication guidance. A further study is therefore being proposed to establish the devices doctoral students possess as well as their sources of internet access to allow them to effectively access an online library service. A prototype of the research portal indicating all the contents identified in the study, maintenance activities and feedback phase or system should be

Another area that requires further study is whether doctoral students are satisfied with the provision and use of the institutional repository. Such a study will help administrators of the institutional repository in their decision making.

Reaching out to doctoral students

This study established that the academic library should find effective ways of reaching out to doctoral students for them to access a scholarly communication guidance. Social networking tools such as whatsapp, facebook and linkdIn were also identified as one of the ways of reaching out to doctoral students. This study is proposing a further study on the various social networking tools

utilised by doctoral students. This will help the academic library to push information through such platforms to doctoral students.

The researcher also observed that there is a section called Research Commons in the main library accessible to all postgraduate students as well as faculty. This study is of the view that regular users of the research commons could be used as a starting point in reaching out to the others. They could be invited for a breakfast meeting or lunch and then important issues could be discussed with them as well as solicit for their contributions.

Policies on scholarly communication guidance

Although there are general policies on open access publishing, copyright, institutional repositories and research dissemination by doctoral students, the study could not ascertain literature on the knowledge of supervisors and librarians on scholarly communication guidance policies in their institutions. This therefore calls for further studies into the existence of scholarly communication guidance policies in academic libraries especially in Ghana.

Scholarly communication guidance model

The scholarly communication guidance model proposed for this study also requires further review or analysis from scholars - especially academic librarians. It can also be adapted in whole or part to suit other contexts.

8.10 CONCLUDING SUMMARY

Chapter eight presented an overview of the research problem, summary of research findings, conclusions and recommendations of the study that investigated scholarly communication guidance for doctoral students as a core service of the academic library. This study will serve as an educational platform for academic librarians, doctoral students and faculty. The originality and contribution of the study to the body of knowledge, a new model developed for scholarly communication guidance in general and at KNUST and suggestions for future study were also presented in this chapter.

Recommendations were given for the gaps that were identified through the research findings. Areas for further study on scholarly communication guidance by the academic library have also been suggested in this chapter. These will educate academic librarians to provide effective scholarly communication guidance to doctoral students which can be replicated to other postgraduate students not only at KNUST but in other universities as well.

This study is of the view that scholarly communication guidance would equip students with the skills to conduct effective research and subsequently disseminate research findings through the right channels. It is also needed to guide authors to know their rights, preserve their intellectual property and be abreast with the various publishing models. It should also equip doctoral students to increase their visibility as well as that of their institutions through their research output.

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APPENDICES

APPENDIX A

ETHICAL CLEARANCE FROM UNIVERSITY OF THE WESTERN CAPE



OFFICE OF THE DIRECTOR: RESEARCH
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27 February 2017

Mrs E White
Library and Information Science
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Ethics Reference Number: HS16/2/13


Project Title: Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology.

Approval Period: 21 February 2017 – 21 February 2018

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval. Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.


Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

PROVISIONAL REC NUMBER - 130416-049

APPENDIX B

PERMISSION FROM THE SCHOOL OF GRADUATE STUDIES, KNUST

24 OCT 2017

SCHOOL OF GRADUATE STUDIES
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY POST OFFICE
KUMASI, GHANA.

Dear Prof. N. Kyei-Baffour
E-mail: nkyei-baffour.coe@knust.edu.gh



Tel: +233 201332812 / 6

11 OCT 2017

E-mail: graduatesstudies@knust.edu.gh

Secretary: M. K. Okrah

Ref. No. SGS/UTS/Vol.1

Date: 9th October, 2017

DIRECTOR
UTS
KNUST
ATTN: EMMANUEL AFFUL

UNIVERSITY INFORMATION
TECHNOLOGY SERVICES (UTS)
RECEIVED
09 OCT 2017
REF.
KWAME NKRUMAH UNIVERSITY
OF SCIENCE & TECHNOLOGY
KUMASI

UNIVERSITY INFORMATION
TECHNOLOGY SERVICES (UTS)
RECEIVED
24 OCT 2017
REF.
KWAME NKRUMAH UNIVERSITY
OF SCIENCE & TECHNOLOGY
KUMASI

REQUEST FOR DATA ON DOCTORAL STUDENTS AT KNUST

I would be grateful if you could provide Mrs. Esther White, an Assistant Librarian in the University on study leave to pursue PhD at the Department of Library and Information Science, University of the Western Cape, Cape Town, South Africa, with information on all registered doctoral students for the 2017/2018 academic year. Specifically, their names, year of study, email address, cell phone numbers, and programme of study.

Her research requires the participation of all doctoral students currently at KNUST.

Thank you.

CHARLES OWUSU-ANTWI
ASSISTANT REGISTRAR
for: SCHOOL SECRETARY

UNIVERSITY of the
WESTERN CAPE

② Deputy Registrar (Academic)
MS, your approval

④ Mrs E. White

cc: Secretary, SGS

③ Director (UTS)

pls grant her access to the information requested.
Thanks.
Julius
24/10/17

Director (UTS)

Ms ask her to see me for discussions.
M.O
19/10/17

MS see Mrs. White as requested.
24/10/17

APPENDIX C

PERMISSION FROM REGISTRAR, KNUST



**KWAME NKURUMAH
UNIVERSITY OF SCIENCE
AND TECHNOLOGY**

Private Mail Bag
University Post Office
Kumasi, Ghana
Tel: 233-3220-60331
Fax: 233-3220-60137
E-mail: registrar@knust.edu.gh
Website: www.knust.edu.gh

OFFICE OF THE REGISTRAR

KNUST/RO/14

December 19, 2017

Heads of Department
KNUST

PERMISSION TO DISTRIBUTE QUESTIONNAIRES TO SUPERVISORS OF DOCTORAL STUDENTS

THIS is to introduce to you, Mrs Esther White, an Assistant Librarian of this University. Mrs White has been granted Study Leave with pay to pursue a PhD in Library Studies at the University of the Western Cape, Cape Town, South Africa.

As part of her studies, she is to administer questionnaires to all Supervisors of doctoral students of the University, for data collection on the topic "Scholarly Communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology".

Any assistance in this regard would be greatly appreciated.

Thank you.

**A. K. BOATENG
REGISTRAR**

cc: Vice-Chancellor
Pro Vice-Chancellor
Provosts
Head, Quality Assurance and Planning Unit

Mrs Esther White
University Library
KNUST

APPENDIX D

INFORMATION SHEET



Private Bag X17, Bellville, 7535
South Africa
Secretary: Sonia Stroud
Tel: +27 (0) 21 959 2137
Fax: +27 (0) 21 959 3659

FACULTY OF ARTS

INFORMATION SHEET

Dear Participant,

My name is Esther White, a PhD Student (student number: 3600113) in the Department of Library and Information Science, University of the Western Cape, Cape Town, South Africa.

I am conducting a study on "Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwaame Nkrumah University of Science and Technology".

Literature has shown that a lot of research has been conducted on scholarly communication and academic library services around the world, but the same cannot be said about scholarly communication guidance as a core service by academic libraries to doctoral students. This deficit in literature cuts across the world at large and for that matter Ghana. It has also been observed that, most of the doctoral programmes offered in Ghana, do not have courses that give doctoral students enough training, and the required skills needed for scholarly communication. The academic library, with its core mandate to support teaching, learning and research of its parent institution, has to also provide scholarly communication guidance to instil the necessary skills in their doctoral users.

The objectives of this research are to:

- supply academic librarians with insight into the information behaviour and research dissemination by doctoral students with KNUST as a case study
- provide guidelines for the provision of scholarly communication guidance to doctoral students by the academic library
- provide guidelines for the design of a research portal as part of the academic library website
- serve as a platform to educate doctoral students on issues regarding research findings dissemination such as copyright, data sharing, citation techniques and meeting funder's requirements.

Your assistance to participate by answering a questionnaire or partaking in an interview will be highly appreciated. Information provided will be used for no other purpose other than this research. In terms of ethical compliance, please be assured that your participation is strictly anonymous and will be kept confidential.

If you have any questions or concerns or wish to know more about this study, please contact me ebvpub@yahoo.com or my supervisor, Dr. Lizette King, a lecturer in the Department of Library and Information Science, University of the Western Cape at lizeking@gmail.com or lking@uwc.ac.za.

Yours sincerely,

Esther White



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A place of quality, a place to grow, from hope to action through knowledge

APPENDIX E

CONSENT FORMS



Consent Form – Doctoral Students

University of the Western Cape

Research Project

"Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology"

Researcher: Esther White

Please initial box

1. I confirm that I have read and understand the information sheet explaining the Above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. (If I wish to withdraw I may contact the lead research at anytime)
3. I understand my responses and personal data will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the reports or publications that result for the research.
4. As a participant of the discussion, I will not discuss or divulge information shared by others in the group or the researcher outside of this group.
5. I agree for the data collected from me to be used in future research.
6. I agree for to take part in the above research project.

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Name of Participant
(or legal representative)

Date

Signature

Name of person taking consent Date
(If different from lead researcher)

Signature

Lead Researcher Date
(To be signed and dated in presence of the participant)

Signature

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

Researcher:

Supervisor:

HOD:

APPENDIX E CONTINUED



Consent Form – Supervisors of Doctoral Students

University of the Western Cape

Research Project

Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology

Researcher: Esther White

Please initial box

- 1. I confirm that I have read and understand the information sheet explaining the Above research project and I have had the opportunity to ask questions about the project.
- 2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. (If I wish to withdraw I may contact the lead researcher at anytime)
- 3. I understand my responses and personal data will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials and I will not be identified or identifiable in the reports or publications that result for the research.
- 4. As a participant of the discussion, I will not discuss or divulge information shared by others in the group or the researcher outside of this group.
- 5. I agree for the data collected from me to be used in future research.
- 6. I agree for to take part in the above research project.



Name of Participant (or legal representative)

Date

Signature

Name of person taking consent Date (if different from lead researcher)

Signature

Lead Researcher

Date

Signature

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

Researcher: [Signature]

Supervisor: [Signature]

HOD: [Signature]

APPENDIX E CONTINUED



Consent Form – Head of Graduate School

University of the Western Cape

Research Project

"Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology"

Researcher: Esther White

Please initial box

- 1. I confirm that I have read and understand the information sheet explaining the Above research project and I have had the opportunity to ask questions about the project.
- 2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. (If I wish to withdraw I may contact the lead research at anytime)
- 3. I understand my responses and personal data will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be entered with the research materials, and I will not be identified or identifiable in the reports or publications that result for the research.
- 4. As a participant of the discussion, I will not discuss or divulge information shared by others in the group or the researcher outside of this group.
- 5. I agree for the data collected from me to be used in future research.
- 6. I agree for to take part in the above research project.

Name of Participant
(or legal representative)

Date

Signature

UNIVERSITY of the
WESTERN CAPE

Name of person taking consent
(If different from lead researcher)

Date

Signature

Lead Researcher

Date

Signature

(To be signed and dated in presence of the participant)

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

Researcher:

Supervisor:

HOD:

APPENDIX E CONTINUED



Consent Form – Senior ICT Assistant

University of the Western Cape

Research Project

"Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology"

Researcher: Esther White

Please initial box

- 1. I confirm that I have read and understand the information sheet explaining the Above research project and I have had the opportunity to ask questions about the project.
- 2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. (if I wish to withdraw I may contact the lead research at anytime)
- 3. I understand my responses and personal data will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the reports or publications that result for the research.
- 4. As a participant of the discussion, I will not disclose or divulge information shared by others in the group or the researcher outside of this group.
- 5. I agree for the data collected from me to be used in future research.
- 6. I agree for to take part in the above research project.

Name of Participant (or legal representative)

UNIVERSITY of the WESTERN CAPE

Date Signature

Name of person taking consent (if different from lead researcher)

Date Signature

Lead Researcher (To be signed and dated in presence of the participant)

Date Signature

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

Researcher: [Signature]

Supervisor: [Signature]

HOD: [Signature]

APPENDIX E CONTINUED



Consent Form – University Librarian

University of the Western Cape

Research Project

"Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of Kwame Nkrumah University of Science and Technology"

Researcher: Esther White

Please initial box

1. I confirm that I have read and understand the information sheet explaining the Above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. (If I wish to withdraw I may contact the lead research at anytime)
3. I understand my responses and personal data ~~will be kept~~ strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name ~~will not be linked~~ with the research materials, and I will not be identified or identifiable in the reports or publications that result for the research.
4. As a participant of the discussion, I will not discuss or divulge information shared by others in the group or the researcher ~~outside of this group~~.
5. I agree for the data collected from me to be used in future research.
6. I agree for to take part in the above research project.

Name of Participant
(or legal representative)

Date

Signature

UNIVERSITY of the
WESTERN CAPE

Name of person taking consent
(if different from lead researcher)

Date

Signature

Lead Researcher

Date

Signature

(To be signed and dated in presence of the participant)

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

Researcher:

Supervisor:

HOD:

APPENDIX F

ONLINE QUESTIONNAIRE FOR DOCTORAL STUDENTS

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

The researcher would be very grateful if you would take a few minutes of your busy schedule to complete this questionnaire for a thesis titled "Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of KNUST"

**All information provided will be treated as confidential and anonymous

Scholarly communication is understood as the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use.

Scholarly communication guidance (SCG) includes providing training on issues regarding research dissemination, copyright, rights of authors, data sharing, preservation of data, citation techniques, meeting funders' requirements, and many more.

DEADLINE:

Researcher Information

Name: Mrs. Esther White

Contact: 0244525588

Email: estwhite@gmail.com / 3600113@myuwc.ac.za

University: University of the Western Cape, Cape Town, South Africa

**Official permission was sought from the Deputy Registrar (Academic) of KNUST and the Graduate School, KNUST to carry out this research.

* Required

SECTION A: PROFILE OF DOCTORAL STUDENT

1. Please indicate your gender *

Female

Male

APPENDIX F CONTINUED

18

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

2. Please indicate your College *

- Agriculture and Natural Resources
- Art and Built Environment
- Humanities and Social Sciences
- Engineering
- Health Sciences
- Science

3. Please indicate your faculty *

Choose



4. Please indicate your age group *

- 21-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-55
- 56-60
- 61-65
- 66 or older

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APPENDIX F CONTINUED

8

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

5. Please indicate your year of study as a doctoral student? *

- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Year 6
- Year 7
- Other:



6. Please indicate your mode of study *

- Full Time
- Part Time

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SECTION B: INFORMATION NEEDS, BEHAVIOUR AND SKILLS OF DOCTORAL STUDENTS

7. Please value your skills from 1 to 5 in the following research activities.

1 = No skill, 2 = low level of skills, 3 = Moderate level of skills, 4 = High level of skills, 5 = expert skills

APPENDIX F CONTINUED

8

QUESTIONNAIRE FOR KHUST DOCTORAL STUDENTS

★

	1	2	3	4	5
Knowledge to access funding possibilities/grants for your research/doctoral studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to access electronic resources available on the University library website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to access full text articles from the university library online databases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use different referencing styles such as APA, Harvard, MLA, Chicago	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge to identify the right research design and methodology to address your research problem and answer your research questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use of reference management tools such as Mendeley, Zotero, Refworks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use data management software like SPSS, Excel, AtlasTI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to summarise your final thesis into a 15 power point slide presentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge of preparing a manuscript for publication in a peer-reviewed journal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge of preparing a	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



https://www.google.com/forms/d/e/1FAIpQLS6T0K57u-VaNH0V9WH1mgYEpATg6sH0DA_toupKCSjeRg/viewform

APPENDIX F CONTINUED

8

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

manuscript for
conference
presentation

Knowledge to
determine where to
publish your final
research results

Knowledge on how
to negotiate your
right as an author

Knowledge on how
to determine
journal impact
factor

8. Please indicate your level of knowledge on the following issues.

1 = no knowledge, 2 = low level of knowledge, 3 = Moderate level of knowledge, 4 = High level of knowledge, 5 = expert knowledge



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APPENDIX F CONTINUED

18

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

★

	1	2	3	4	5
Open access is defined as free online access to scholarly works	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An open access journal is a scholarly journal that a reader can access online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Open access literature of all types is digital, online, free of charge and free of most copyright restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plagiarism - the act of falsely owning someone else's ideas or intellectual efforts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creative Commons licences set out the re-use conditions for someone making use of another's material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



9. Have you heard of the **KNUSTSpace** (the Institutional Repository of KNUST)? ★

- Yes
- No

APPENDIX F CONTINUED

18

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

10. If your answer to question 9 is Yes, do you access materials/documents from the Institutional Repository for your research?

- Yes
- No

11. How often do you use the Institutional Repository if your answer to question 10 is Yes?

- Never
- Rarely
- Sometimes
- Often
- Very Often



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12. Please indicate your level of agreement with these statements

1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

APPENDIX F CONTINUED

★

	1	2	3	4	5
The institutional repository gives access to digital versions of theses, published journal articles and conference proceedings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depositing my research findings in an open access institutional repository can make my work highly visible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Institutional Repositories contain published material of inferior quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An increase in the visibility would lead to more citations of my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Every piece of information I need on disseminating my research findings can be found on the university library website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Publishing in an open access journal can give me an increased web visibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An increased web visibility can lead to academic and research collaborations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



SECTION C: SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY



APPENDIX F CONTINUED

18

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

13. How would you rate the following ways of scholarly communication guidance

1 = Not helpful, 2 = Quite Helpful, 3 = Don't Know/No Idea, 4 = Helpful, 5 = Very helpful,

★

	1	2	3	4	5
Face-to-face guidance with a Professional Librarian	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online guidance on the academic library website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information Literacy Workshops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The establishment of a Research Portal as part of the academic library website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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WESTERN CAPE

14. How would you rate the following scholarly communication guidance, if offered by the KNUST library?

1 = Not helpful, 2 = Helpful, 3 = Don't know/No Idea, 4 = Quite helpful, 5 = Very helpful

APPENDIX F CONTINUED

8

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

★

	1	2	3	4	5
Scholarly Communication Website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Workshops on Open Access Publishing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Workshops on Copyright, Plagiarism and Fair Use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sourcing for Research Grants and Funding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training on Referencing and Citation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information Literacy Workshops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



15. Please, how would you rate the importance of the following features of a research portal

1 = Not important, 2 = Moderately important, 3=No opinion , 4= Important, 5= Very important

APPENDIX F CONTINUED

218

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

★

	1	2	3	4	5
Provision of online links to grants and funding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on research and innovation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Link to Graduate School website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Link to online library services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thesis Writing Guides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Citation and Reference Management Software	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training on Copyright, Plagiarism and Fair Use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proposal Writing Guides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training on Open Access Publishing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Off Campus Access to electronic Resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training on Research Methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training on how to do proper referencing and citation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



SECTION D: SCHOLARLY COMMUNICATION GUIDANCE BY SUPERVISORS OF DOCTORAL STUDENTS

APPENDIX F CONTINUED

18

QUESTIONNAIRE FOR KHUST DOCTORAL STUDENTS

16. Please rate the following scholarly communication guidance you have received from your supervisor

1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Strongly agree, 5 = Agree

★

	1	2	3	4	5
I have received training on how to access library resources by my supervisor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor has directed me to academic librarians for training on library resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor has trained me to prepare manuscripts for publication from my research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor has shown me the various ways of disseminating research findings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor has trained me to access full text articles from online databases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor has given me guidance on how to access funding for my doctoral research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



17. How do you intend to communicate your research findings to academia and general public? *

Your answer

APPENDIX F CONTINUED

18

QUESTIONNAIRE FOR KNUST DOCTORAL STUDENTS

18. ANY OTHER SUGGESTIONS ON THE SCHOLARLY COMMUNICATION GUIDANCE PROGRAM TO BE PROVIDED BY THE KNUST LIBRARY? *

Your answer

SUBMIT

Never submit passwords through Google Forms.



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WESTERN CAPE

APPENDIX G

QUESTIONNAIRE FOR SUPERVISORS OF DOCTORAL STUDENTS

The researcher would be very grateful if you would take a few minutes of your busy schedule to complete this questionnaire for a dissertation titled “**Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of KNUST**”. All information provided will be treated as confidential and anonymous.

Scholarly communication is understood as the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use.

Scholarly communication guidance includes providing training on issues regarding research dissemination, copyright, rights of authors, data sharing, preservation of data, citation techniques, meeting funders' requirements, and many more.

SECTION A: PROFILE OF DOCTORAL SUPERVISOR

1. Please indicate your gender?

Male	
Female	

2. Please indicate your College

Agriculture and Natural Resources	
Art and Built Environment	
Humanities and Social Sciences	
Engineering	
Health Sciences	
Science	

3. Please indicate your current position?

Emeritus Professor	
Professor	
Associate Professor	
Senior Lecturer	
Lecturer	

4. Please indicate the number of years you have supervised doctoral students?

1- 5years [] 6-10years [] 11-15years [] 16-20years [] 21-25years [] 26-30years []
31-35years [] 36-40years [] 41years and above []

5. Please state the number of doctoral students you have graduated.

6. How many of the doctoral graduates published a peer-reviewed journal article from their thesis/dissertations?

.....

7. Please state the number of doctoral students you are still supervising.

8. Please indicate your level of agreement with these statements

1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Activity	1	2	3	4	5
Open access is defined as free online access to scholarly works					
An open access journal is a scholarly journal that a reader can access online					
Open access literature of all types is digital, online, free of charge and free of most copyright restrictions					
Plagiarism - the act of falsely owning someone else's ideas or intellectual efforts					
Creative Commons licences set out the re-use conditions for someone making use of another's material					

SECTION B: SCHOLARLY COMMUNICATION BY DOCTORAL STUDENTS

9. How would you rate the skills of your doctoral students on these research activities?

1 = no skill, 2 = low level of skill, 3 = Moderate level of skill, 4 = High level of skill, 5 = expert skill

Research Activity	1	2	3	4	5
How to access full text articles from the university library online databases					
How to use different referencing styles required for their research.					
How to use reference management tools such as Mendeley, Zotero, Refworks					
How to access all the electronic resources available on the library website					
How to prepare a manuscript for publication in a peer-reviewed journal					
How to prepare a manuscript for a conference presentation					
How to determine where to publish their final research results					
How to access funding for their research or doctoral studies					
How to summarise the final thesis into a 15 power point slides for presentation					
How to negotiate one's right as an author					
How to determine journal impact factor					
How to use data management software like SPSS, Excel, AtlasTi or others					
How to identify the right research method to be used to answer the research questions					

10. Have you heard of the KNUSTSpace (the Institutional Repository of KNUST)? Yes [] No []

11. If your answer to question 10 is Yes, do you access materials/documents from the Institutional Repository for your research? Yes [] No []

12. Do you direct your doctoral students to access materials from the institutional repository?

Yes [] No []

13. Please indicate your level of agreement with these statements

1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Activity	1	2	3	4	5
The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings					
Depositing research findings in an open access institutional repository can make one's work highly visible					
Institutional Repositories contain published material of inferior quality					
An increase in the visibility would lead to more citations of one's research findings					
Every information needed on disseminating research findings can be found on the university library website					
Publishing in an open access journal can give one an increased web visibility					
An increased web visibility can lead to academic and research collaborations					

14. Is there any policy in your College, Faculty or Department on scholarly communication for doctoral students? Yes [] No []

15. How would you rate the level of guidance you have offered to doctoral students on these scholarly communication issues?

1 = no guidance, 2 = low level of guidance, 3 = moderate level of guidance, 4 = high level of guidance, 5 = expert guidance

Activity	1	2	3	4	5
Guidance on how to access library resources					
Directing doctoral students to academic librarians for training on library resources					
Guidance on how to prepare manuscripts for publication from their research findings					
Guidance on the various ways of disseminating research findings					
Guidance on how to access full text articles from online databases					
Guidance on how to prepare a manuscript for presentation at a conference					
Guidance on how to access funding for doctoral research					

16. At what stage of their study, would you advise your doctoral students to prepare manuscripts for presentation at a conference? Please indicate with a (√). More than one response can be selected.

Proposal writing stage	
Literature Review stage	
Data gathering stage	
Presentation of data writing stage	
Conclusion and Recommendation Stage	
After final submission of thesis	
Never	
Other	

17. At what stage of their study, would you advise your doctoral students to prepare manuscripts for publication in peer-reviewed journals? Please indicate with a (√). More than one response can be selected.

Proposal writing stage	
Literature review stage	
Data gathering stage	
Presentation of data writing stage	
During conclusion and recommendation stage	
After final submission of thesis	
Never	
Other	

18. How is the Graduate School promoting scholarly communication by doctoral students? Please indicate with a (√). More than one response can be selected.

Compulsory deposit in the Institutional Repository	
Guidelines on publishing with supervisors	
Presentation at Postgraduate Seminars	
Graduate school collaborates with the University Library for such guidance	
Nothing is done by the Graduate School	
Have no idea	
Other	

19. How is your faculty promoting scholarly communication by doctoral students? Please indicate with a (√). More than one response can be selected.

Compulsory deposit in the Institutional Repository	
Guidelines on publishing with supervisors	
Presentation at Postgraduate Seminars	
The faculty collaborates with the University Library for such guidance	
Nothing is done by the faculty	
Have no idea	
Other	

20. Are you in support of the opinion that doctoral students should publish two articles from their research findings before they are allowed to graduate? Yes [] No []

SECTION C: SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY

21. Please rate the following ways of scholarly communication guidance for doctoral students?
1 = not helpful, 2 = quite helpful, 3 = don't know, 4 = helpful, 5 = very helpful

Activity	1	2	3	4	5
Face-to-face guidance with a professional librarian					
Online guidance on the academic library website					

Information literacy workshops					
The use of research portal as part of the academic library website					

22. Please rate the importance of each of the following scholarly communication guidance, if offered by the academic library?

1 = Not important, 2 = Moderately important, 3 = No opinion, 4 = Important, 5 = Very important

Activity	1	2	3	4	5
Scholarly communication website					
Workshops on open access publishing					
Workshops on copyright, plagiarism and fair use					
Sourcing for research grants and funding					
Training on referencing and citation					
Information literacy workshops					

23. Please rate the importance of each of the following reasons for developing a research portal as part of the academic library website

1 = Not important, 2 = Moderately important, 3 = No opinion, 4 = Important, 5 = Very important

Activity	1	2	3	4	5
Provision of online links to grants and funding					
Training on proper ways of disseminating research findings					
Training on the preparation of manuscripts for publication					
Information on research and innovation at KNUST					
Link to graduate school website					
Link to online library services					
Thesis writing guides					
Citation and reference management softwares					
Training on copyright, plagiarism and fair use					
Proposal writing guides					
Training on open access publishing					
Off campus access to electronic resources					
Training on how to do proper referencing and citation					
Training on intellectual property					
Training on author's rights					

24. Please state any other data management software apart from SPSS, Excel and AtlasTi needed by doctoral students in your department.

25. Please outline the various ways doctoral students in your department disseminate their research findings. Please indicate with a (√). More than one response can be selected.

Activity	
Publishing articles in peer-reviewed journals	
Conference presentations	
Publication of book(s)	
Publication in the institutional repository	
Publication in the dailies	

Through policy briefs	
Presentation at seminars	
Other	

26. How can Faculty members liaise with Academic Librarians to offer scholarly communication guidance (SCG) to doctoral students? Please indicate with a (√). More than one response can be selected.

Activity	
Directing students to attend SCG workshops organised by the library	
Directing students to access resources on the academic library website	
Directing students to academic librarians for training	
Participating in SCG workshops in order to train doctoral students	
Inviting academic librarians to offer seminars to doctoral students	
Providing academic librarians with subject specific information for the development of a research portal	
By dropping published articles in the institutional repository for easy access by students	
Other	

27. How can scholarly communication guidance increase publications and web visibility of KNUST as a whole? Please indicate with a (√). More than one response can be selected.

Activity	
Through the effective deposit of published articles by faculty in the institutional repository	
Promoting widespread awareness and use of Open Access resources	
Promotion of Open Access publishing avenues/options for authors, researchers, and graduate students	
Treating “publishing and publications” as a coursework for doctoral students	
Other	

28. Please indicate how you motivate doctoral students to publish

.....

.....

.....

29. Any other comment on scholarly communication guidance?

.....

.....

.....

30. Please, if you are interested in a follow-up interview, please tick ‘Yes’ and provide your preferred e-mail address or mobile phone number. Yes [] No []

Preferred e-mail address or mobile phone
Number:.....

THANK YOU



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APPENDIX H

INTERVIEW SCHEDULE WITH DEAN OF THE SCHOOL OF GRADUATE STUDIES

Research needs and skills of doctoral students

1. What skill should doctoral students possess in order to conduct an original research?
2. What do you think are the research needs of doctoral students in relation to the library?

Scholarly communication by doctoral students

3. What are the various ways through which doctoral students can disseminate their research findings?
4. At what stage of their study would the graduate school advise doctoral students to publish in a peer-reviewed journal? Why?
5. At what stage of their study would the graduate school advise doctoral students to prepare manuscripts for conference presentation? Why?
6. How does the graduate school train or guide doctoral students to produce good manuscripts for conference presentation or publication in a peer-reviewed journal?
7. How can doctoral students be made aware of grants and funding facilities available for research?
8. How can doctoral students be trained in the skills required for accessing research grants and funds?
9. How is the Graduate School promoting the dissemination of research findings of doctoral students?
10. How does the graduate school monitor the thesis writing stage of doctoral students? For example to ensure that the right referencing styles are used effectively.

Scholarly communication guidance for doctoral students

11. How are doctoral students educated on copyright and plagiarism issues?
12. Does the graduate school has a policy on scholarly communication by doctoral students?
13. What is your opinion? Should there be a policy that requires doctoral students to have two peer-reviewed articles accepted for publication before they are allowed to graduate?

Establishment of a research portal

14. What are some of the things you would like to see if a research portal for doctoral students is developed by the university library?
15. How can the research portal strengthen the research output of doctoral students at KNUST?
16. How can a research portal on the library website be used to offer scholarly communication guidance to doctoral students?
17. How can librarians liaise with faculty to offer scholarly communication guidance to doctoral students?

Benefits of Scholarly Communication Guidance

18. What are the advantages of Scholarly Communication Guidance to the university as a whole?
19. How will such a program increase publications at KNUST as a whole?

APPENDIX I

INTERVIEW SCHEDULE FOR ACADEMIC LIBRARIANS

The researcher would be very grateful if you would take a few minutes of your busy schedule to answer these interview questions for a dissertation titled **“Scholarly communication guidance as a core service of an academic library to doctoral students: a case study of KNUST”**. All information provided will be treated as confidential and anonymous.

Scholarly communication is understood as the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use.

Scholarly communication guidance includes providing training on issues regarding research dissemination, copyright, rights of authors, data sharing, preservation of data, citation techniques, meeting funders' requirements, and many more.

SECTION A: PROFILE OF ACADEMIC LIBRARIAN

1. Please indicate your gender?

Male	
Female	

SECTION B: KNOWLEDGE OF ACADEMIC LIBRARIANS ON SCHOLARLY COMMUNICATION ISSUES

2. Please indicate your level of knowledge on these scholarly communication issues

1 = no knowledge, 2 = low level of knowledge, 3 = moderate level of knowledge, 4 = high level of knowledge, 5 = expert knowledge

Scholarly Communication Issue	1	2	3	4	5
Copyright issues					
Open Access publishing					
Digitisation of documents					
Plagiarism					
Creative Commons licences					
How to determine journal impact factor					
How to use different referencing styles required for research and publication					
How to use reference management tools such as Mendeley, Zotero, Refworks					
How to use data management softwares like SPSS, Excel, AtlasTi or others					

Others:

3. Please indicate your level of agreement with these statements

1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Activity	1	2	3	4	5
Open access is defined as free online access to scholarly works					
An open access journal is a scholarly journal that a reader can access online					
Open access literature of all types is digital, online, free of charge and free of most copyright restrictions					
Plagiarism is the act of falsely owning someone else's ideas or intellectual efforts					
Creative Commons licences set out the re-use conditions for someone making use of another's material					

Others:

4. Please indicate your level of agreement with these statements

1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Activity	1	2	3	4	5
The institutional repository gives access to digital versions of thesis, published journal articles and conference proceedings					
Depositing research findings in an open access institutional repository can make one's work highly visible					
Institutional Repositories contain published material of inferior quality					
An increase in the visibility would lead to more citations of one's research findings					
Every information needed by students on disseminating research findings can be found on your university library website					
Publishing in an open access journal can give one an increased web visibility					
An increased web visibility can lead to academic and research collaborations					

Others:

SECTION C: RESEARCH AND SCHOLARLY COMMUNICATION NEEDS/SKILLS OF DOCTORAL STUDENTS

5. How can the academic library identify the research needs/skills of their doctoral student users?

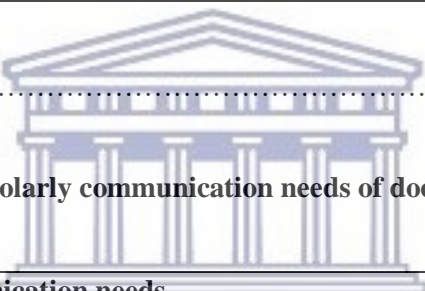
Activity	
Though library orientation/Induction	
Seeking for the profile of doctoral students in their first year of study	
Communicating with doctoral students through social media such whatsapp, facebook, twitter and many more	
Reaching out to doctoral students intermittently throughout each academic year of their study	

Others:

6. What scholarly communication skills should doctoral students possess?

Required Skills	
How to use different referencing styles required for their research.	
How to use reference management tools such as Mendeley, Zotero, Refworks	
How to access all the electronic resources available on the academic library website	
How to prepare a manuscript for publication in a peer-reviewed journal	
How to prepare a manuscript for a conference presentation	
How to determine where to publish their final research results	
How to access funding and grants for their research or doctoral studies	
Thesis presentation and writing skills	
How to determine journal impact factor	
How to negotiate one's right as an author	
How to use reference management software such as Mendeley, Zotero, AtlasTi	
How to use data management software like SPSS, Excel, AtlasTi or others	

Others:



7. What are the research and scholarly communication needs of doctoral students that should be met by the academic library?

Research and scholarly communication needs	
Training and provision of data management softwares by the academic library	
Training in sourcing for funds and grants for their research activities	
Training in proposal writing	
Knowledge on the use different referencing styles required for their research.	
Training in proposal writing	
Training in thesis writing and presentation	
Training in the use of reference management softwares	

Others:

8. How do you (an academic librarian in a college or the university library system) reach out to doctoral students?

Activity	
Through e-mail announcements	
Targeted promotional publications	
Through social media platforms	
Announcement on the academic library website	
Through text messages	

Others:

9. How would you rate the skills of doctoral students at KNUST on these research activities?

1 = no skill, 2 = low level of skill, 3 = moderate level of skill, 4 = high level of skill, 5 = expert skill

Research Activity	1	2	3	4	5
How to access full text articles from the university library online databases					
How to use different referencing styles required for their research.					
How to use reference management tools such as Mendeley, Zotero, Refworks					
How to access all the electronic resources available on the library website					
How to prepare a manuscript for publication in a peer-reviewed journal					
How to prepare a manuscript for a conference presentation					
How to determine where to publish their final research results					
How to access funding for their research or doctoral studies					
How to summarise the final thesis into a 15 power point slides for presentation					
How to negotiate one's right as an author					
How to determine journal impact factor					
How to use data management software like SPSS, Excel, AtlasTi or others					
How to identify the right research method to be used to answer the research questions					

Others:

SECTION D: SCHOLARLY COMMUNICATION BY DOCTORAL STUDENTS

10. Please outline the various ways doctoral students disseminate their research findings. Please indicate with a (√). More than one response can be selected.

Activity	
Publishing articles in peer-reviewed journals	
Conference presentations	
Publication of book(s)	
Publication in the institutional repository	
Publication in the dailies	
Through policy briefs	
Presentation at seminars	

Others:

11. Is there any policy in the academic library at KNUST on scholarly communication for doctoral students? Yes [] No [] Do not know []

12. How is the Graduate School promoting scholarly communication by doctoral students? Please indicate with a (√). More than one response can be selected.

Compulsory deposit in the Institutional Repository	
Guidelines on publishing with supervisors	
Presentation at Postgraduate Seminars	
Graduate school collaborates with the University Library for such guidance	
Nothing is done by the Graduate School	
Have no idea	

Others:

13. How is the academic library promoting scholarly communication by doctoral students? Please indicate with a (√). More than one response can be selected.

Compulsory deposit of thesis in the Institutional Repository	
Providing guidelines on publishing with supervisors	
Directing students to peer-reviewed journals in their areas of specialisation	
Presentation by academic librarians at Postgraduate Seminars	
Academic librarians train lecturers to acquire the skills to train their doctoral students	
The University Library collaborates with faculty members to provide such guidance	
Nothing is done by the academic library	
Have no idea	

Others:

SECTION E: SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY

14. What skills should an academic librarian possess in order to provide expert scholarly communication guidance?

Skills	
The use of web 2.0 technologies	
Skills in academic writing	
Skills in the use of data management software	
Skills in the use of reference management software	

Please state others:

15. Please indicate your level of ability/skill to train doctoral students on these scholarly communication issues

1 = no skill, 2 = low level of skill, 3 = moderate level of skill, 4 = high level of skill, 5 = expert skill

Scholarly Communication Issue	1	2	3	4	5
Copyright issues					
Open Access publishing					
Digitisation of documents					
Plagiarism					

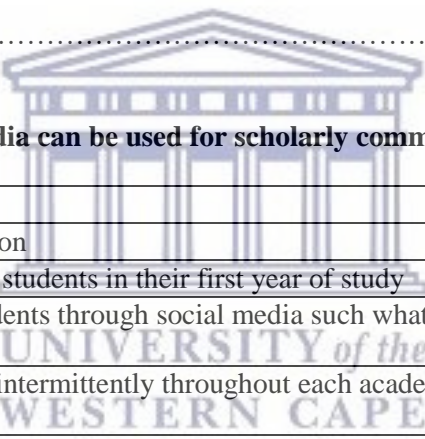
Creative Commons licences					
How to determine journal impact factor					
How to use different referencing styles required for research and publication					
How to use reference management tools such as Mendeley, Zotero, Refworks					
How to use data management software like SPSS, Excel, AtlasTi or others					

16. Please rate (according to importance), the following ways of scholarly communication guidance for doctoral students?

1 = not helpful, 2 = quite helpful, 3 = don't know, 4 = helpful, 5 = very helpful

Activity	1	2	3	4	5
Face-to-face guidance with a professional librarian					
Online guidance on the academic library website					
Information literacy workshops					
The use of research portal as part of the academic library website					
The use of social media for scholarly communication guidance					

Others:



17. Please indicate how social media can be used for scholarly communication

Activity	
Though library orientation/Induction	
Seeking for the profile of doctoral students in their first year of study	
Communicating with doctoral students through social media such whatsapp, facebook, twitter and many more	
Reaching out to doctoral students intermittently throughout each academic year of their study	

Others:

18. Please rate the importance of each of the following scholarly communication guidance, if offered by the academic library?

1 = not important, 2 = moderately important, 3 = no opinion, 4 = important, 5 = very important

Activity	1	2	3	4	5
Scholarly communication website					
Workshops on open access publishing					
Workshops on copyright, plagiarism and fair use					
Sourcing for research grants and funding					
Training on referencing and citation					
Information literacy workshops					

19. Please rate the importance of each of the following reasons for developing a research portal as part of the academic library website

1 = Not important, 2 = Moderately important, 3 = No opinion, 4 = Important, 5 = Very important

Activity	1	2	3	4	5
Provision of online links to grants and funding					
Training on proper ways of disseminating research findings					
Training on the preparation of manuscripts for publication					
Information on research and innovation at KNUST					
Link to graduate school website					
Link to online library services					
Thesis writing guides					
Citation and reference management Software					
Training on copyright, plagiarism and fair use					
Proposal writing guides					
Training on open access publishing					
Off-campus access to electronic resources					
Training on how to do proper referencing and citation					
Training on intellectual property					
Training on author's rights					

20. How can academic librarians liaise with faculty members to offer scholarly communication guidance (SCG) to doctoral students? Please indicate with a (√). More than one response can be selected.

Activity	
Directing students to attend SCG workshops organised by the library	
Directing students to access resources on the academic library website	
Directing students to academic librarians for training	
Participating in SCG workshops in order to train doctoral students	
Inviting academic librarians to offer seminars to doctoral students	
Providing academic librarians with subject specific information for the development of a research portal	
By dropping published articles in the institutional repository for easy access by students	

Others:

21. How can scholarly communication guidance increase publications and web visibility of KNUST as a whole? Please indicate with a (√). More than one response can be selected.

Activity	
Through the effective deposit of published articles by faculty in the institutional repository	
Promoting widespread awareness and use of Open Access resources	
Promotion of Open Access publishing avenues/options for authors, researchers, and graduate students	

Treating “publishing and publications” as a coursework for doctoral students	
--	--

Others:

22. Please indicate how the academic library can motivate doctoral students to publish

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

23. Any other comment/contribution on scholarly communication guidance?

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

THANK YOU



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APPENDIX J

INTERVIEW SCHEDULE WITH ACTING DEPUTY LIBRARIANS

RESEARCH AND SCHOLARLY COMMUNICATION NEEDS/SKILLS OF DOCTORAL STUDENTS

1. What are the research and **scholarly communication** needs of doctoral students that should be met by the academic library?
2. How does the academic library identify these research needs/skills of their doctoral student users?
3. What scholarly communication skills should doctoral students possess?
4. How do you (an academic librarian in a college or the university library system) reach out to doctoral students

SCHOLARLY COMMUNICATION BY DOCTORAL STUDENTS

5. Please outline the various ways doctoral students disseminate their research findings.
6. Is there any policy in the academic library at KNUST on scholarly communication for doctoral students?
7. How is the academic library promoting scholarly communication by doctoral students?
8. What do you think are the various ways the Graduate School promotes scholarly communication by doctoral students?
9. Are you in support of the opinion that doctoral students should publish two articles from their research findings before they are allowed to graduate? If YES, why? If NO, Why?

SECTION C: SCHOLARLY COMMUNICATION GUIDANCE BY THE ACADEMIC LIBRARY

Academic librarians and scholarly communication issues

10. What skills should an academic librarian possess in order to provide expert scholarly communication guidance?

For example

Skill in the use of web 2.0 technologies
Skills in academic writing
Skills in the use of data management softwares
Skills in the use of reference management softwares

11. How can Academic librarians liaise with Faculty members to offer scholarly communication guidance to doctoral students?
12. Please indicate how social media can be used for scholarly communication
13. How can the academic library help doctoral students in identifying sources of funding for their research activities?
14. How can scholarly communication guidance increase publications and web visibility of KNUST as a whole?
15. Please indicate how the academic library can motivate doctoral students to publish

The academic library website and a research portal

16. How can the university library website be used to provide scholarly communication guidance to doctoral students?
17. What online services are available on the library website to guide doctoral students on scholarly communication?
18. What information would be useful to doctoral students in a research portal developed specifically for them?
19. How will a research portal for the KNUST library strengthen research output by doctoral students?

Collaborators of Scholarly Communication Guidance

20. What services can the UITS offer to the academic library in relation to scholarly communication guidance?
21. What services can the university legal office offer to the academic library on copyright and plagiarism issues?

Conclusion

How can the library help in increasing the research output of the university as a whole?

Any other comment/contribution on scholarly communication guidance?



APPENDIX K

INTERVIEW SCHEDULE WITH THE SENIOR ICT ASSISTANT OF THE ACADEMIC LIBRARY SYSTEM

The academic library website and a research portal

1. How can the academic library reach out to doctoral students who cannot visit the physical library building?
2. How can the university library website be used to provide scholarly communication guidance to doctoral students?
3. What online services are available on the university library website to guide doctoral students on scholarly communication?
4. What goes into the development of a research portal?
5. How long will it take to develop a research portal?
6. How can a research portal be used to train doctoral students on scholarly communication issues (such as copyright, plagiarism, citation techniques, publication of articles, how to determine predatory journals and many more)?
7. How can doctoral students be made to access the research portal developed specifically for them?
8. Can you give an estimate of the cost of developing a research portal?
9. How will a research portal for the KNUST library strengthen research output by doctoral students?

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