

Title: Developing modern technological methods in information seeking behaviour for the achievement of educational success in the secondary education sector.

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Abstract

This study investigates the usage of electronic resources and their impact on students' educational success in a secondary college in Mauritius, based on a sample of a group of fifty, sixth grade students. The key areas examined include: types of library print and electronic resources students use to meet their information needs for completing their academic work, the patterns and frequency of use of library electronic resources, purpose and academic benefits of library electronic resources, the advantages and disadvantages as perceived by the students', problems and constraints they experienced and their expectations and needs of digital learning environment. Ellis' model of the information seeking behaviours was used as an over-arching theoretical framework to explore the students' information search activities.

A mixed method approach, combining qualitative and quantitative research methodology was used to gather the data. Quantitative and qualitative data were gathered through survey questionnaire and semi-structured interview, employing Flanagan's critical incident technique. Data was analysed using descriptive statistics and thematic approach.

The findings showed that students preferred internet information over print materials for their academic information needs. Google was the most preferred engine search. Due to a lack of electronic facilities in the college library, students predominantly used their home computer to conduct internet searches. Perceived academic and practical benefits of electronic resources outweighed the disadvantages. Students' search tasks were largely consistent with Ellis' model of information seeking behaviours. Students reported that internet made a positive contribution to their learning and academic success. No significant gender differences were evident in the pattern of use of electronic resources. The findings have resource implications for the provision of an innovative technological environment and practical support for students to develop their competency in electronic information search.

DECLARATION

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Dedication

I dedicate this study to my son Vishal, my son Ashwin and my caring mother. I especially wish to mention my brother, Prem, for his moral support.

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Abbreviations

EPIC: Electronic Publishing Initiative at Columbia

IFLA: International Federation of Library Association

JISC: Joint Information Systems Committee

BERA: British Educational Research Association

OCLC: Online Computer Library Center

ECS: Education Commission of the States

McREL: Mid-continent Research for Education and Learning

ERs: Electronic Resources

Chapter 1: Introduction the study

1.1 Background of study

Modern technology has opened new channels of information seeking for accessing vast amount of information. In recent years the use of modern electronic information resources in education, has become a driving force for providing diverse and imaginative learning opportunities to meet students' learning needs. The need for and use of electronic information in digital environment has posed major challenges for teachers and library staff to offer digital system connections, accessibility to multimedia information, full-text searching, reference linking and flexibility in searching and browsing information. Electronic information resources have many functions and academic benefits which can positively enhance students' learning experiences and contribute to their academic success. Recent studies have focused on the usage, frequency, benefits and challenges of electronic resources and the search strategies library users apply to access information in a digital environment.

1.2 Profile of study location

The present study was conducted to examine and analyse the patterns of use of the library electronic resources by the students of the secondary sector in Mauritius, the problems and constraints faced by them when accessing the library electronic resources and how these electronic resources contributed to their educational success. The chosen location was the Verdun Secondary College which is a public college and has a population of six hundred students and fifty members of staff. The college has a library which provides access to reading, reference, recreational materials and mainly curriculum support teaching and learning materials. The library is visited by the junior students mainly for recreational purposes whereas the senior students use the library for referencing and curriculum support purposes. The teaching staffs have access to curriculum support teaching materials to learn about updated new teaching strategies allowing them to better plan and implement their teaching programs. The library collection consists of mainly print fiction and reference books, magazines and 2 computers with internet access. The infrastructure of the library is adapted to usage of only print materials.

1.3 Problem statement

The aim of the Verdun Secondary College library is to provide a wide range of accessible print and electronic resources to meet the information needs of staffs and students. The library services and library collection have not undergone significant developments recently to keep

pace with the rapid technological changes. Huge investment is being made annually on printed information resources, which is creating a serious problem of accommodation. Even though these printed resources match with the college curriculum framework still, a decline in usage has been noticed.

The provision of reliable and effective electronic resources has not been a key priority of library collection development for maximising students learning. Two key factors have impacted on this decline: (1) students are increasingly drawn towards modern technology, which has become a critical part of their learning environment (2) the availability of some electronic resources for easy and fast access of information.

General observation over the last twelve months, indicate that students visit the library to look for information to complete their learning activities such as preparing notes for classroom-based sessions, homework, reading and examinations revision. Most students show a preference for internet search, which is the only electronic information resource the library provides in meeting their individual information needs. Some students have often experienced frustrations because of a lack of adequate electronic facilities, waiting time and a lack of information search skills. Since these observations only provide an anecdotal account of the students' experiences, an empirical approach is necessary to gather quantitative and qualitative data about the students' perceptions, experiences and preferences of library resources, that will help ascertain the quality, effectiveness and the role of modern electronic information resources in achieving educational success.

1.4 Aims and objectives of the study

The main aim of the study is to investigate the usage of different types of library electronic resources and their impact on the students' educational success. The aim is pivotal to this study because it provides an important anchor for formulating and articulating the specific and precise objectives and research questions for the study, these in turn will influence the appropriateness and choice of the methodological design to collect the necessary data.

The following six specific objectives provide a framework for determining the research questions and the research methodology, and will serve as overarching criteria to review the overall findings of the study.

- i. To determine the types of library print and modern electronic resources students use to meet their information needs for completing their academic work.

- ii. To determine the patterns and frequency of the use of the library electronic resources by the students.
- iii. To ascertain the purpose and academic benefits of library electronic resources as perceived by the students.
- iv. To identify the advantages and disadvantages of library electronic resources from the students' perspectives.
- v. To identify the problems and constraints students face when accessing library electronic resources.
- vi. To examine the primary search behaviours based on Ellis model that students routinely use to complete an electronic search to satisfy their information needs for academic work.

1.5 Research questions

The following six questions will be addressed in the study and will serve as the basis for the determination of the methodological design, data collection and data analysis and for reviewing the results and overall findings of the study.

1. What types of print and electronic resources do students use to meet their information needs for completing their academic work?
2. What are the patterns of use of the library electronic resources by the students?
3. How do students perceive the purpose and academic benefits of electronic library resources for their academic work?
4. How do students perceive as the main advantages and disadvantages of library electronic resources?
5. What problems and constraints do students face when accessing library electronic resources?
6. What search behaviours do students employ when performing an electronic information search for their academic work?

1.6 Purpose and significance of the study

The role of the librarian in the digital age has moved from a passive intermediary, responsible for guiding patrons to appropriate information resources, to that of more proactive professional role of assessing, creating and managing information, (Ghoricha, 2013, p.1182). Since the aim of digital learning environment in education is to enhance students' learning

opportunities through access and availability of suitable electronic information sources, the new technological opportunities and innovations pose many challenges for librarians at every level of their selection, acquisition, preservation and management process (Chandel & Saikia, p.152). The first and foremost challenge for library professionals is to provide electronic access to all library users. The second challenge is to create a new physical library premises with integrated computer network facilities. The third challenge is to develop new standards and pertinent collection policies to reflect the modern technological information resources (Thamaraisevi, 2009, p.141).

The purpose and significance of this study are set in the context of these challenges. In Mauritius, traditionally library management policies have been implemented with the perception that printed information resources automatically translate into learning and enhance educational success. In the light of recent studies on the use and value of electronic resources in education, this study seeks to understand how modern electronic resources will contribute to students' academic experiences in a Secondary College in Mauritius. A grant aid is annually allocated by the Ministry of Education authority to all libraries in the secondary education sector only for the purpose of purchasing printed materials. The findings may provide useful evidence on how the library services and collections in secondary colleges in Mauritius can be improved by implementing modern technological information resources. Changes can be brought about in the selection criteria for the integration of more technology related educational tools to support academic achievement of students. In the wider educational context, the findings may help to substantiate the academic value of electronic resources in the evolving digital learning environment. It will raise the educational authorities' awareness of the need to partially shift allocated funds from printed resources to developing a diverse and extensive range of modern technological information resources across the wider school communities in Mauritius. The management authorities can align the collection development policy of secondary school libraries with emerging trends and technologies and at the same time keep a balance with traditional print information resources.

1.7 Scope and limitations of the study

The study focuses solely on the use of the main library of Verdun Secondary College. The users of the library comprise of staff and students, but the examination of information seeking behaviour, the use of electronic resources and its impact on educational success is limited to students only. Hence, the chosen participants in the sample are exclusively drawn from the college final year student population. Since electronic resources can be accessed remotely via

internet from a home computer or a hand-held device or locally from a library electronic platform, the information seeking behaviour in this study is confined to visiting the college library for searching, browsing, selecting, retrieving and examining information for educational purpose.

The structure of the dissertation is as follows:

- Chapter 1 sets the backdrop of the study containing the rationale, purpose, aims and objectives and context of the study and postulate list of research questions to be addressed
- Chapter 2 will present a literature review on a selection of themes pertinent to the role, usage, advantages, and disadvantages of modern technological information resources on academic achievement of students.
- Chapter 3 will be a detailed presentation of the rationale of the selected research methods and the process of data collection.
- Chapter 4 will analyse the survey questionnaire quantitative data and qualitative data of the semi-structured interview
- Chapter 5 will discuss the findings of the results in relation to the aims, objectives and research questions of the study and will seek to justify or negate any significant emerging issues.
- Finally chapter 6 will reflect on the research process of this study to formulate a conclusion on the significance of the findings and validity of the study and suggests possible recommendations.

Chapter 2: Literature Review

2.1 Introduction

Hart (1998, p.1) defined literature review as “the use of ideas in the literature to justify the particular approach to the topic, the selection of methods and demonstration that the research contributes something new”. Kadli & Kumbar (2013) state that literature reviews provide a full picture, uncovering new evidence and ideas on relevant topic and encourage objective thinking and systematic approach to the study undertaken. The aim of the literature review is to justify the rationale, the research questions and methodological design of this study by exploring the existing body of knowledge on information-seeking and available research evidence on the role of electronic resources in education (Levy and Ellis, 2006, p.183).

A thematic approach is chosen to guide the sequential development of the literature review in this study, (Croucher & Crom-Mills, 2015 p.80). The chosen topics are drawn out by reviewing the embedded issues in the research questions which are in turn organized into distinct themes that will permeate through the whole study. The literature search and review process involves a number of steps: identifying keywords, refining keywords and search terms to conduct an electronic and manual search of relevant literature, reviewing of all reference sources, selecting and reading all relevant materials sourced, identifying new references through citations and reference list and organising all materials in preparation for analysis and integration in the write up of the review.

2.2 Literature review themes

The following ten themes form the basis of the literature review.

- 1) Print resources.
- 2) Types of electronic resources.
- 3) Patterns of use of different library resources.
- 4) Purpose of using library electronic resources in education.
- 5) Perceived impact of electronic resources on students' coursework.
- 6) Perceived advantages and frequency of use of library electronic resources in school communities.
- 7) Gender differences and the use of electronic resources.
- 8) Perceived disadvantages and constraints of electronic resources.

9) Information seeking models.

10) Information Seeking Behaviour in an electronic environment.

Several literature sources were accessed to locate the appropriate information relevant to the research problem. These include: print resources including text books, government policy documents, reports, journals, online catalogues and gateways, thesis repository, university websites, e-books and e-journals. Examples of online databases and websites include: Information research, ERIC (The Education Resources Institute Information Centre), E-Prints in Library and Information Science, Academia, Research gate.

2.3 Print Resources

The advent of electronic resources and the diversity of tools to locate and access information have had huge impact on users' perceptions of print resources and their information search behaviours. Use of print resources has declined considerably since the introduction of electronic resources. Studies on the students' preferences on the types of information sources for coursework indicate that print materials are least frequently used, compared to electronic resources (Epic, 2003, Xie & Joo, 2009). Traditional print resources have a number of barriers which include time –consuming for accessing and browsing, lack of availability and strict borrowing policy (Lui & Yang, 2004, cited in Liu, 2008). In spite of these barriers, print materials remain a crucial component of academic work because of their perceived readability and reliability, thus continue to meet information needs of users that modern technology cannot yet deliver (Liu 2008, Wu 2005, p.235). Some students find browsing book shelves more rewarding than searching databases (Hai-Jew & McHaney, 2010, p.40). Print materials contain centuries of historical information that are not yet available in other format. Foasberg (2014) conducted a qualitative study on college students reading habit with regard to the usage of print and electronic resources. He found that students preferred print materials for long term because they felt more comfortable annotating documents in a print environment and were able to engage more deeply in academic reading. Bodomo, Lam & Lee (2014, p.41) survey of library resources preferences among students, showed an overwhelming majority (77%) of respondents, preferred print to digital resources because of their readability and high graphic content. Furthermore (OHare & Smith, 2012, p.31) literature reviews and Woody, Daniel & Baker (2010) study on students' preferences of library resources indicate that students still prefer print textbooks over e-books especially for studying.

2.4 Types of electronic resources

Shukla and Mishra (2011) describe electronic collection as ‘a collection of information which can be accessed only by the use of electronic gadgets’. IFLA (2014) refer to electronic resources as those materials that require either a personal computer access or hand-held device access. The use and information seeking behaviour involve visiting a library service or electronic resources, searching, browsing, selecting, retrieving and examining information (Konnappa, 2014). Electronic resources vary in terms of content, format, quality, range of information and mode of access. The following electronic resources are considered as the most common library collection in schools and colleges

- Web: Short name for World Wide Web, which is a network of a vast network and growing number of information servers.
- E-books: Books in electronic format.
- Electronic journals: usually an electronic counterpart to a conventional
- E-Books/Database: Electronic reference books or materials like biographies, dictionaries, encyclopaedias.
- E- audio/visual resources: E-images, videos, CD-ROMS, databases, library catalogues, indexing and abstracting databases
- Primary Resources: Electronic pre-prints and prints, electronic copies of thesis, projects, dissertations and reports
(IFLA 2012, Shukla & Mishra 2011, Konnappa 2014)

2.5 Pattern of usage of different types of electronic resources

Research and studies in academic environments focus mainly on usage patterns of both printed and electronic resources, information seeking behaviour and its use and also its impact on educational success. The JISC Usage Surveys of the United Kingdom carried out a survey on the influence of patterns of usage of resources in relation to information seeking and skills (Griffiths and Brophy, 2002). Modern libraries provide students with a wide range of electronic resources and databases to conduct their information search. Zhong & Alexander (2007) and Dave (2012) found that students preferred library website, electronic resources and databases over and above the physical print collections. Andeniran (2013, p.322) study revealed that 35.42% of students used the internet most often, 20.43% used CD-ROM, 18.71% used electronic journals. 18.29% used Email, 3.71% used books and 3.43%

bulletin board. Gakibayo and Ikoja-Odongo (2013) study also showed that the internet featured among the most widely used library electronic resource by students. DeRosa, Cantrell, Hawk & Wilson (2005, p. 100) survey of library resources showed that the use of email and search engines among college students was the highest. Ge (2005, p.62) examined the usage of eight different types of electronic resources and found that the Web, databases and e-journals were ranked top three in order of importance followed by online catalogue and e-mail. The main reasons to the high usage of internet are attributed to the freely available access, the ease of use and the quality of the resources.

2.6 Purpose of using library electronic resources in education

Academic libraries are part of the educational process since they support the academic communities to fulfil their informational needs for research and education by providing the best print and electronic resources (Thachill, 2008). Students use library electronic resources for a variety of educational purposes. Adeniran (2013, p.323) found that students used library electronic resources to acquire information to complete their written assignments and for current awareness. Konnapa (2014, p.9) study showed students accessed library electronic resources for ongoing study and examinations revision. EPIC (2003) online survey revealed that 99% of students used electronic resources for different types of school course works such as research for an assignment, literature searching on a particular topic, accessing databases and clarifying information learned in class. Marcum & George (2003) conducted a National Survey of Information Users in Colleges and Universities. Their survey showed that a substantial proportion of library users said that they used electronic resources in their course works (43% all the time and 52% some of the time). Moreover, other studies suggest that individual learning needs, learning styles, nature of course requirements and learning methods are factors which influence students' use of library electronic resources (Marchionini & Maurer, 1995).

2.7 The perceived impact of electronic resources on students' coursework

Several factors are known to contribute to students' academic success. Library facilities and efficient access to learning resources are integral to students' experiences and their academic success (Zhong & Alexander, 2007). The correlational relationship between the use of electronic library resources and the impact on students' coursework is well documented. Recent studies indicate that electronic resources are assets that positively affect students'

course works. Vakkari, (2008, p. 606) investigated the scholars' opinion on the use of electronic information resources and concluded that ease of access and availability of electronic resources considerably improved the quality of their work and inspired new ideas. Jones (2002) provides convincing evidence that students who used electronic resources more with a higher frequency, performed better academically. Sahin Balta & Ercan (2010) found that the use of internet resources had a positive effect on students' performance in project works that required detailed investigation. The findings by EPIC (2003) suggest that academic benefits of electronic resources allow students greater access to current information, graphics, images and primary government reports and scientific databases for project work, writing papers and preparing arguments about current events. Purcell et al (2012) conducted an online survey of middle and high school teachers and found that students who accessed and utilised electronic resources had the ability to access and integrate deep and broad information topic in their academic work.

2.8 Perceived advantages and disadvantages of electronic resources

Electronic information has many functions and practical benefits. Tella, Tella, Ayeni & Omeoba (2007) suggest that 'electronic information serves as a motivating factor to students as it provides them with opportunity to transmit, acquire or download, process and disseminate information on a subject of interest'. EPIC (2001) outlines the main advantages of electronic information for the user as being: the user can specify select, access and store the information that he/she wants from the most appropriate sources. Among other advantages include faster and easier access to up-to-date information than consulting print indexes, combining multiple searches and cross-referencing searches which lead to other links, saving searches for later references (Ray & Day, 1998, p.5). A number of inter-related factors are thought to influence users' positive perception of electronic resources. Evidence based literatures indicate that electronic resources are convenient, timeless and allow easy and faster access to a wide range of multi-level information and databases.

The disadvantages and constraints experienced by students have been investigated by a number of researchers. EPIC (2003) revealed a number of students' negative experiences of electronic searches. Students thought that electronic searches generated a vast amount of information which was overwhelming to process and manage but time consuming and immensely frustrating and distracting to sift through and discriminate relevant and irrelevant information.

2.9 Frequency of use of library electronic resources in school communities

The frequency of use of library electronic resources is determined by multiple factors. students' learning needs, availability and accessibility, ease of use, coverage, recentness of information, reliability, free access, in-depth nature of information, familiarity of electronic resources and users' experiences and competencies in technological skills. Recent research evidence suggests that majority of users spend time in the library every day or at least a few times or more a week (Gakibayo & Ikoja-Odongo, 2013, Konnapa, 2014, p.9). Time spent online in a given day varies according to individual learning needs. EPIC (2003) study found that more than half of the college students used electronic resources every day for coursework (53.4%). Users' previous experience and competencies in using information technology increase their confidence and in turn impact on the frequency of usage of library electronic resources. Waldman (2003) suggests that students who frequently use the library electronic resources demonstrate high self-efficacy and competencies in information technology. Self-efficacy is defined as a person's judgment about his capability to organise and execute a course of action to attain a certain level of performance (Tella & Tella, Ayeni & Omeoda, 2007).

2.10 Gender differences and the use of electronic resources

Several studies have showed that male and female students differ significantly in their attitudes towards technological applications. Yau and Cheng (2012) study on gender difference in using technology indicated that male students feel more confident in using modern technology for learning than female students. Ford & Miller (1996, cited in Bassi, 2011) suggested that male students engage themselves in internet browsing mainly for recreational purposes whereas female students use it for their course work (Ford & Miller, 1996, cited in Bassi, 2011). Wu & Yeh (2012, p.13) found that although male students possessed higher computer competencies, they used library electronic resources less frequently than female students. Female students tend to experience more difficulty in using modern technology for learning because they felt that they lacked the required skills and confidence (Yau & Cheng, 2012). On the contrary, Ozoemelem (2009) reported that there was a high frequency of usage of electronic library resources by both male and female postgraduate students and that there was no significant gap between both sexes. Koohang (1986, cited in Waldman, 2003), study of college students showed that neither age nor gender was related to computer technology confidence and anxiety but it was rather experience that influenced the use of electronic resources.

2.11 Information seeking models

The emergence of information technology has led to the introduction of alternative models on information seeking which attempt to elucidate the dynamic process involved in the pursuit of seeking information to satisfy a need. There are several models which describe and attempt to predict the actions of people seeking to find information, namely Krikelas (1983), Wilson (1981), Kuhlthau (2004) and Ellis (1989). In this section Ellis' model will be outlined to support the theoretical application of information-seeking behaviour to research question 6.

2.12 Ellis model of information seeking

Ellis (1989, 1993, cited in Case 2007, p. 143) developed an eight feature behavioural model of information seeking. The model was first developed to explain how social scientists search for and interact with materials. It is based on the 'perception' of users (social scientists) own information seeking activities in unique circumstances.

Ellis describes eight fundamental characteristics or features of information seeking used by social scientists. These are:

- Starting: the means employed by the user to begin seeking information, for example, identifying references, consulting index, catalogue, online data, asking some knowledgeable colleague.
- Chaining: following or tracking footnotes, referential connections between materials and citations in known material or 'forward' chaining from known items through citation indexes.
- Browsing: 'semi-directed or semi-structured searching'. Casually looking for and scanning information of interest.
- Differentiating: using known differences in information sources as a way of filtering the amount of information obtained; discriminating what is important and not important.
- Monitoring: Keeping up-to-date or current awareness searching
- Extracting: selectively identifying relevant material in an information source
- Verifying: checking the accuracy and currency of information
- Ending: which may be defined as 'tying up loose ends' through a final search

Ellis model is based on empirical evidence. It is user-centred, that is, it focuses on the information seeking activity from the user unique perspective. Ellis does not claim that the

features occur in any sequential pattern; however, the model does not take into account the emotional aspects of the information seeker as in Kuhlthau model.

2.13 Information seeking behaviour in an electronic environment

Modern technology has provided libraries with new tools and techniques to generate information so it is important to understand how students navigate this labyrinth of resources. The advent of electronic resources has created new conditions of information seeking and information seeking behaviours to adapt to modern technology. Furthermore the new information environment is bringing about motivating changes and is creating new conditions of information seeking adapted to modern technology. Research on information seeking behaviour has attributed great importance to information sources (Prabha et al, 2007). Since technology has been introduced in secondary school libraries, the internet has become the most popular source of information for the school community. The School Libraries and Information Literacy Unit online survey (2009) revealed that students try to keep pace with the rapid developments in technology by changing the ways in which they access, share and communicate information. The internet, e-books, online database, online library catalogue, digital readers and a variety of educational software are the most common research tools used by students. However, according to Chen (2003), students still encounter certain difficulties with rapid surfing strategies and are unable to browse and search for information needed in spite of easy internet service. The glut of information poses many challenges to users. Herbert Simon (1955) concept of 'satisficing' is relevant to information competency, whereby individuals assess how much information is good enough to satisfy their need. Hence, students must have the competency to assess to what extent information gathered by them is relevant to their course work and can contribute positively to their academic achievement.

2.14 Summary of Literature Review

Research evidence suggests that electronic resources and proper skills of their usage play a vital role in students' education and positively impact on their academic work in a number of ways. In spite of the perceived disadvantages, quantitative research findings indicate that students access a variety of electronic resources on a regular basis to meet their learning and information needs. The patterns and frequency of use are influenced by a range of individual, practical and resource availability factors. The Internet seems to be the most popular among all the available electronic resources. An array of conceptual models on information seeking contributes to the understanding of library users search activities from different perspectives. Ellis' model provides a behavioural framework for internet information search. Aspects of

the above evidence-based literature review and relevant theoretical principles will be integrated in the discussion of the findings of the study to affirm or negate any significant emerging issues. In the next chapter, the research methods and the targeted population for this study will be considered.

Chapter 3: Methodology

3.1 Introduction

Research is referred to investigation or careful study with consideration of facts in a specific field of knowledge. The use of appropriate research methods is vital to conducting a research for ensuring that the research questions yield reliable and valid answers. This chapter will give a detailed presentation of the research methods used in this study together with the reasons for justifying the chosen methods. In addition, the process of data collection and analysis and the ethical issues will also be described. Fundamentally, a research design provides a comprehensive plan to guide the researcher throughout the process of the investigation. According to Creswell (2008), the main factor for the selection of a research design, is the basic characteristic of the research study.

3.2 Justification of research methods

In this study a combination of qualitative and quantitative data collection methods were used. The aim of using a mixed method design was to provide effective approaches of data collection in order to obtain reliable answers to the proposed research questions. A mixed methods research design is a procedure for collecting, analysing, and “mixing” both quantitative and qualitative research methods in a single study to understand a research problem, (Creswell, 2012). Patton (2002) defines qualitative research as ‘attempting to understand the unique interactions in a particular situation.’ Quantitative approach is based on the measurement of quantity or amount. To this end, the quantitative approach will measure the students’ patterns of use of electronic resources, its perceived academic benefits, barriers, level of satisfaction and their information-seeking behaviours. The qualitative approach will complement the quantitative approach in so far as helping to gain better understanding of students’ experiences of information –seeking and the quality of electronic learning environment to meet their academic informational needs.

The main strength of mixed methods approach is that, it sequentially proceeds from one stage to another and is useful for exploring quantitative results in more detail, (Burke & Onwuegbuzie, 2004). A number of research on information seeking behaviour have employed the mixed methods design to obtain valid and reliable answers to research questions namely, Choo, Detlor & Turnbull (2000).

3.3 Reliability and Validity of Mixed Methods

The quality of data collection instruments and approaches is very critical because “the conclusion researchers draw is based on the information they obtain using these instruments” (Fraenkel & Wallen, 2009, p.147). Reliability measures the consistency of a research tool. Validity of a research tool measures the accuracy of the tool that is the degree to which an instrument measure what is supposed to measure. Face validity evaluates usability of the questionnaire (Drost, 2011). The questionnaire was pre-tested for its face validity and reliability with a small group of eight students to obtain verbal feedback on the clarity of language, questions and instructions, readability , wording and if the questions prompted appropriate responses. Subsequently, a few alterations were made to the content and format of the questionnaire.

Construct validity refers to the extent degree to which the items on a measurement relate to the theoretical construct (Drost, 2011). The operational definitions and refinement of Ellis’ behavioural categories were important to ensure reliability and validity of the appropriate interpretation and measurement of information seeking behaviours. Hence, the categories were translated and contextualised into meaningful information-seeking tasks.

A fundamental strategy to enhance the validity of a study is triangulation which involves multiple methods to gather research evidence from several viewpoints perspectives and add to objectivity as it reduces the effect of researcher bias (Greene, Caracelli & Graham, 1989, p.256). The validity of the research methods in this study is achieved by triangulation via a combined research method of survey questionnaire and semi-structured interview.

3.4 Research methods

Since this study is based on a mixed methods research design, quantitative and qualitative approaches were implemented to gather the data to address the research questions. Two methods of data collection were employed, namely questionnaire and semi structured interview. The data collection process consisted of a two-stage process. Stage one involved the collection of quantitative numeric data using the self-administered questionnaire. In the second stage, a qualitative Critical Incident Technique approach (Flanagan, 1954), was used through a semi-structured individual interview along with a quantitative questionnaire to ascertain which Ellis’ information seeking categories the students employed in an electronic information search.

3.4.1 Stage One Data Collection Method –Questionnaire

Questionnaire is considered as a common method to collect data in information seeking studies that provide both qualitative and quantitative data on unobserved behaviour. Participants have the freedom to take their time to respond to a questionnaire independently and this reduces the possibility of bias of the interviewer. Ellis (1993) points out that the quantitative research approach which consists mainly of questionnaire survey is the most traditional and commonly used method that provides a complete overall picture of information use of a specific group of users. Several researchers have employed quantitative methods and surveys to quantify the students' pattern of usage of different types of electronic resources and the number of students who thought that electronic resources had a positive impact on their coursework (Ge, 2005, Andeniran, 2013, Griffiths & Brophy, 2002, Marcum & George, 2003).

3.4.2 Questionnaire: Aim and design structure

The aim of the questionnaire was to gather quantitative data on the i) the types of print and electronic resources students commonly accessed ii) how frequently they accessed the library facilities and electronic resources iii) the types of academic benefits students thought electronic resources impacted on their course iv) the advantages and disadvantages of electronic resources they had identified v) the types of problems and constraints they had experienced and vi) the kind of suggestions they thought, would improve the library facilities.

The questionnaire contained 18 closed questions which required specific responses and gave the participants the opportunity to choose from two or more fixed options, for example "Yes" or "No" response or a response based on the Likert scale. The questions were clearly worded and include words like 'how, often, where, what, sometimes, rarely, never, considerably and to some extent'. These acted as measuring instrument to address all six research questions. Question 1 is a demographic question on gender that was intended to help identify the male and female students and to establish any differences in the patterns of use of electronic resources between the two gender groups. However, the main limitation of closed questions is that they limit a respondent's choice for expanding on an answer whilst an open question offers a respondent the opportunity to answer without restrictions.

The questions include the following response categories:

- ‘ Yes’ or ‘ No’ answer e.g. Question 10: From your experience of using electronic resources which of these would you say are the main advantages of electronic resources over print resources?
 - Level of importance e.g. Question 15: How important is the availability of electronic resources to your academic success?
 - Frequency of information seeking behaviour e.g. Question 7: During the last academic term, how often did you use the college library internet electronic resources to access information you needed for your coursework?
 - Ranking various options in order of importance e.g. Question 18: Please rank in order of your preference which of these five electronic resources would you like to see included in the library? Write 1 for most important and 5 for least important.
- (Appendix B: Questionnaire)**

Upon receiving the students’ consent for participating in the research study, the questionnaires together with instructions on how to complete them were hand-delivered to each participant from the selected participants group (20 males and 20 females). They were given one week to complete and return the questionnaire personally to the researcher.

3.5 Stage Two Data Collection Method – Critical Incident Technique

In the second stage of the study, a qualitative research through semi-structured individual interview based on the Critical Incident Technique was carried out. Patton (2002) suggests that there are three approaches to interviews: conversational interview, guided interview and open- ended interview.

3.5.1 Rationale for choosing Critical Incident Technique

Flanagan (1954) Critical Incident Technique was chosen as the preferred method for gathering qualitative data in this study because it provided a set of comprehensive and empirical guidelines within the flexible approach of a qualitative study and allowed the participants to reflect on both positive and negative aspects of their experiences in a real situation. The technique is essentially a semi-structured interview where participants describe past critical situations. Since most individuals do not remember details of what happened in specific situations, this technique encourages them to reflect on their actual experiences through guided reflection and the use of sensitive questioning techniques in a face to face semi-structured interview facilitated by a researcher.

Several researchers have successfully used the critical incident technique to observe and study the experiences of information seekers (Choo, Detlor & Turnbull 2000, Hughes, Williamson, Lloyd, 2007).

3.5.2 Flanagan Research design

Flanagan (1954) recommends five flexible basic steps in the procedure of data collection and data analysis which can be adapted to the research situation. These are:

1. Establish the general aim of the activity
2. Establish plans and specifications
3. Collect the data
4. Analyse the data
5. Interpret and report the data

3.5.3 Data Collection (Critical Incident Technique)

(Aim, specifications and collect data steps 1, 2 & 3, Flanagan 1954)

The aim of the Critical Incident Technique was to gain an understanding of the students' experiences in the use of internet electronic resources for their academic success through semi-structured interview. The pre-defined interview questions were derived from the themes of the literature review and previous research studies on electronic information, for example; Adeniran (2013), Konnapa (2014), Ge (2005), EPIC (2003), Chen (2003). The interview format and question design were adapted from Hughes, Williamson, Lloyd (2007), Critical Incident Technique. The questions were broadly open-ended and were intended to encourage students to recall information on recent internet search episodes for academic purposes. Open ended questions lead to a greater level of discovery of the respondents' thoughts, feelings and attitudes. Wordings in the questions included reflective statements such as "in what ways, how satisfied".

3.5.4 Interview format and structure

The interview schedule comprised of the following format and structure:

Introduction: The introduction contains instructions that should be given to students prior to the start of the interview e.g. explaining the aim of the interview, recording participants' details, reasons for the interview and confidentiality issues.

Main body: Asking a set of questions in a sequential way and recording responses on the two sets of experiences:

- a) Experiences of the use of electronic resources
- b) Experiences of information searching and Ellis model of information seeking behaviours

Conclusion: Thanking the participants for their contribution

3.5.5 Interview procedure

(a) The students' experiences in the use of electronic resources.

The interviews were conducted in a quiet room free from distractions, each lasting for 10 minutes. At the start of the interview, students were greeted in a friendly manner to build a rapport with them. The aim and format of the interview were carefully explained and confidentiality issues were clarified. At the beginning of the interview, permission was asked to record the participants' responses on a record sheet. The researcher progressively worked through the list of questions and recorded their responses in writing on a data record sheet. The recorded transcripts of the interviews were checked and verified with the interviewees to ensure accuracy and objectivity of the data and to prevent any researcher bias. Questions 1-10 of the interview schedule focused on the participants' experiences of the use of library electronic resources. (**Appendix C**)

(b) The students' search behaviours and Ellis model.

Question 11 specifically focused on the participants' information-seeking strategies and tasks of an episode of information search based on Ellis model to gather quantitative and qualitative data of students' information-seeking behaviours. The questions were designed to reflect the students' level of understanding and experience in electronic search activities. An information sheet of twelve tasks, corresponding to Ellis' eight information-seeking behavioural categories was presented to the students, (**Appendix D**). Students were asked to reflect on a recent episode of internet search and select which tasks they performed to access information for academic purposes. Then, they were asked to give a brief description of the strategies they used to perform those tasks. The researcher ticked off the tasks performed by the students' and recorded their description of the search activities.

3.6 Sample

The study targeted participants consisted of 50 final year students of Verdun Secondary College. The criteria for selecting the participants included: (1) Studying at full-time at this college. (2) Gender: 25 male participants and 25 female participants. (3) Age of: 18 years and

above (4) Level of study: final year of secondary education. Final year students have a good deal of experience in the use of electronic resources.

Purposive sampling was employed in this study, and the sample group selected was the final year students because they were considered the best to answer the research questions as they were most involved in information search and were information-rich individuals (Patton, 1990). According to Patton (1990) purposive sampling method involves a purpose in mind and the researcher chooses participants whose characteristics best suit the purpose. The final year students have had prolonged exposure to electronic environment during their long years of studying, thus enabling them to draw on their personal experiences and offer a critical view of the availability and the practical and academic benefits of electronic resources.

In the first quantitative stage of this study, a purposeful sample of 40 students were selected (20 males and 20 females), and in the second qualitative stage of this study a purposeful sample of 10 students were selected for semi-structured interview (5 males and 5 females), who were regular users of the library.

3.7 Ethical considerations

“Research ethics” refers to the principles of appropriate conduct that govern research. The purpose of research ethical guidelines is to safeguard the welfare, the dignity, rights, safety and the well-being of human participants, (BERA, 2011). In accordance to these ethical guidelines, the following steps were taken to ensure that the guidelines are adhered to in this study.

A meeting was held with the College rector to seek his permission to conduct the study and to explain the purpose, significance, methods, procedures, participants and scope of the study. The participants’ class tutor was also informed about the study. Arrangements for granting the participants extracurricular time to participate in the interviews was discussed and negotiated with the class tutor.

The selected participants were invited to a group meeting prior to the start of the study. The aim of the meeting was to inform the participants of their role in the study, their rights for confidentiality and anonymity. They were reassured that their personal details such as names, age and their class name will not be divulged. In written questionnaires and summary of interviews, their names will be anonymised and coded.

An informed consent letter was given to each participant where details about the study and their involvement were defined (**Appendix E**). It stated that participants were giving their

consent to participate in the study and that they had the option to withdraw and that their rights of anonymity and confidentiality would be protected. Participating students were asked to sign a consent form to say that they agreed to participate in the study (**Appendix F**).

3.7.1 Managing the recorded data

The anonymity of participants was protected by numerically coding each returned questionnaire and keeping the responses confidential. While conducting the individual interviews with the selected respondents, codes were assigned for use in the description and reporting of the results. All study data, including the electronic files, interview data and transcripts were securely locked. Participants were informed that summary data would be documented and presented to an academic supervisor and assessor as part of a submission for a graduate study.

3.8 Limitations

A few challenges were encountered during this study. Usage of a mixed methods research design required skills in both qualitative and quantitative methods and it was quite challenging to implement because it was time consuming to work with two methods simultaneously. Interviews required careful planning and group discipline to obtain valuable information from students. Since the students were known to the researcher, they had the tendency to talk about the general issues of the library instead of focusing on their past information search incidents. They had to be guided throughout the whole process to avoid irrelevant conversations and to remain focused.

3.9 Summary

This chapter has set out the research methodology of this study and a justification for its selection. Research questions which needed to be addressed quantitatively as well as qualitatively have been clarified. Flanagan concept of recalling past incidents were followed in the qualitative phase of the study. A detailed description of the data collection procedures provide the procedural and sequential stages of gathering the qualitative and quantitative data and therefore, meets the requirements of implementing a mixed methods approach. The selection process for choosing the sample has been described to set the study in context. The ethical issues have been considered to ensure compliance with the principle of research ethics to protect the rights of the participants. The next chapter will consider the data analysis and discussion on the findings of the study will follow.

Chapter 4: Results

4.1 Introduction

This chapter presents and analyses the data collected from the first and second stages of data collection; the survey of a purposive sample of 50 participants comprising of 25 male and 25 female, final year college students and the semi-structured interview using the Critical Incident Technique of a purposeful sample of 10 final year college students comprising of 5 male and 5 female students. The results of the survey and the semi-structured interview are summarised and supported by tabular results.

Table 1. Mapping of research questions against survey questionnaire and semi-structured interview

Research Questions	Survey Questions	Interview Questions
1. What types of print and electronic resources do students use to meet their information needs for completing their academic work?	Q 3 ,4,5	Q 1
2. What are the patterns of use of the library electronic resources?	Q2, 6 ,7 ,8	Q 2
3. How do students perceive the purpose and academic benefits of electronic library resources for their academic work?	Q 9,16 ,17	Q 3
4. How do students perceive as the main advantages and disadvantages of library electronic resources?	Q 10 ,11	Q 4
5. What problems and constraints do students face when accessing library electronic resources?	Q12,13,14 ,15,18	Q5,6,7,8,9, 10
6. What search behaviours do students employ when performing an electronic information search for their academic work?		Q 11

4.2 Quantitative Data analysis procedure of Survey Questionnaire

The aim of data analysis is to organise and present the findings of a study in a systematic and meaningful way. Rigorous scrutiny and ordered organisation of data collected is vital to ensure the high quality of data analysis. All returned questionnaires were cross-checked

against the list of codes allocated to each questionnaire. Basic descriptive statistics and calculations were applied to organise, tabulate and analyse the quantitative data. Forty completed questionnaires were returned which demonstrates a response rate of 100%.

4.3 Results of questionnaire responses

Research question 1:

What type of print and electronic resources do students use to meet their information needs for completing their academic work?

Related survey questions:

Q 3: What is your preferred medium of information search to complete your coursework?

Q 4: During the last academic term, what types of print resources did you mostly access from the library to do your coursework?

Q5: During the last academic term, how often did you use the library print resources e.g. reference books to access information for your coursework?

Table 2. Preferred medium of information search to complete your coursework

Information search medium	Total number and % of students' response	Number and % of boys' response	Number and % of girls' response
Print resources	0	0	0
Electronic resources	40 (100%)	B 20(100%)	G 20(100%)

Table 3: Types of print resources mostly accessed from library to do your coursework

Print resources	Number and % of students' response	Two or three times a week	Once a week
Books	0	0	0
Reference books	40(100%)(20B,20G)	10(25%) (B4,G6)	30(75%) (B16,G14)
Magazines	0	0	0

Table 2 indicates that all participants preferred electronic resources over print resources. All forty students accessed print materials; 25% two to three times a week and 75 % once a week as shown in Table 3. Only reference books were accessed.

Research question 2:

What are the patterns of use of the library electronic resources by students?

Related Survey questions:

Q2. During the last academic term, how often did you visit the college library?

Q6. Where do you access the Internet most to do your information search?

Q7. During the last academic term, how often did you use the college library internet/electronic resources to access information you needed for your coursework?

Q8. During the last academic term, how often did you use the following search engines to carry out your information search for coursework?

Table 4. Comparison frequency of access: library, electronic resources and print resources

Frequency of access	Library visits	Internet/e- resources	Print resources
Daily	0	0	0
2 or 3 times a week	10(25%) (B4,G6)	0	10(25%) (B4,G6)
Once a week	30(75%) (B16,G14)	0	30(75%) (B16,G14)
Once a month	0	35(87.5%)(B 18,G17)	0
Never	0	5(8%) (B2,G 3)	0

Table 5. Location of internet access

Location of internet access	Number and % of students' response	Boys response	Girls response
From home	40(100%)	20(100%)	20(100%)
In the college library	0	0	0

Table 6. Students' preferred search engines

Search engines	Always	Sometimes	Rarely	Never use
Google	38(95%) B20,G18	2(5%) (B0,G2)	0	0
Yahoo	0	22(55%)(B10,G12)	8(20%)(B6,G2)	10(25%)(B4,G6)
Bing	0	0	40(100%)(B20,G20)	0
Ask.com	0	0	0	40(100%)(B20,G20)
Others	0	0	0	0

Table 4 depicts the frequency of use of the college library and both electronic and print resources. 25% of the sample used the college library two or three times a week and while 75% used the library once a week. A vast majority of students accessed the internet “*once a month*” and a small majority never accessed the college internet in a month. Table 5 shows that all forty students reported using the internet from home Google search engine was the most frequently accessed web by the majority of the students. Among the other search engines, Yahoo was the second best, Bing was rarely used and Ask.com was never used.

Research question 3: How do students perceive the purpose and academic benefits of electronic library resources for their academic work?

Related survey questions

Q9. For what educational purposes did you use the college library internet/electronic resources?

Q16. To what extent has the use of internet/ electronic resources influenced the quality of your coursework?

Q17. Overall, to what extent internet electronic resources have contributed to your learning experiences and your academic success?

Table 7. Educational purposes of internet/electronic resources

Educational Purposes	Yes	No
To complete course assignment	40 (100%) (B20, G20)	No
To revise for examination or test	40 (100%) (B20, G20)	
To complete homework	40 (100%) (B20, G20)	
To prepare notes on a topic for classroom activities	40 (100%) (B20, G20)	
To complete a project work	0	0
For general reading on a topic/s	0	0
Other purposes: None		

Table 8. Extent to which students thought the internet/ electronic resources have influenced the quality of coursework.

Areas of my coursework	Considerably	To some extent	Not at all	Don't know
Electronic resources supported my coursework with detailed up-to-date literature resources.	32 (80%) (B 17, G 15)	8 (20%) (B3, G5)	0	0
Electronic resources helped me gain new knowledge and ideas.	40 (100%) (B20, G20)	0	0	0
Electronic resources guided me to other relevant information on my search topic.	32 ((80%) (B17,G15)	8 (20%) (B3, G5)	0	0
Use of electronic resources has improved my grades.	32 ((80%) (B17,G15)	8 (20%) (B3, G5)	0	0

Table 9. Extent to which the students thought internet/ electronic resources have contributed to their learning experiences and academic success.

Level of contribution	Number and percentage of students' response
Considerably	32(80%) (B17, G15)
To some extent	8 (20%) (B3, G5)
Not at all	0
Don't know	0

Table 7 shows that all forty students predominantly used the internet to complete their coursework, to revise for examination or test, to complete homework and to prepare notes on a topic for classroom activities/discussion set by their teacher. Table 8 indicates that electronic resources have “*considerably*” influenced the quality of the majority of the students’ coursework by supporting it with detailed up-to-date literature and by guiding them to other relevant information and by also improving their grades while for eight students electronic resources had an effect to “*some extent*” in those areas. It is observed from Table 9 that for 80% of the students internet/electronic resources made “*considerable*” contribution to their learning and academic success, while for only a minority electronic resources made a contribution to “*some extent*”.

Research question 4: How do students perceive as the main advantages and disadvantages of the library electronic resources?

Related survey questions

Q10. From your experience of using internet/electronic resources, which of these would you say are the main **advantages** of internet/electronic resources over print resources?

Q11. From your experience of using internet electronic, which of these would you say are the main **disadvantages** of internet electronic resources?

Table 10. Perceived advantages of electronic resources

Advantages of electronic resources	Yes	No
Reduced time for browsing and searching	32(80%)(B17,G15)	8(20%)(B3,G5)
Easy access to information	32(80%)(B17,G15)	8(20%)(B3,G5)
Information access is faster	32(80%)(B17,G15)	8(20%)(B3,G5)
Can access a wide range of resources on a topic	32(80%)(B17,G15)	8(20%)(B3,G5)
Materials are up-to-date, accurate and relevant	32(80%)(B17,G15)	8(20%)(B3,G5)

Table 11. Perceived disadvantages of electronic resources

Disadvantages of electronic resources	Yes	No
The search process can be very time-consuming	8(20%) (B3,G5)	32(80%) (B17,G15)
Electronic search can result in vast amount of information which can be confusing and frustrating to select the right materials	8(20%) (B3,G5)	32(80%) (B17,G15)
Sometimes it is difficult to check the accuracy and reliability of information	8(20%) (B3,G5)	32(80%) (B17,G15)
The easy access of electronic resources makes it more likely to delay my coursework	0	40(100%) (B20,G20)

The majority agreed that the internet/electronic resources have a number of advantages: reduced time for browsing, easy and faster access to information, wide range of resources on a topic and up-to-date materials available, information is accurate and relevant, as shown in Table 10. For a few students, electronic resources did not have these advantages and electronic search can be very time-consuming and can yield vast amount of information which can cause confusion and frustration thus creating doubts about accuracy and reliability

of information, as shown in Table 11. However, there was total agreement among all forty students that easy access of electronic resources did not make it more likely to delay their coursework.

Research question 5: What problems and constraints do students face when accessing library electronic resources?

Related survey questions

Q12. Does the college library have adequate access to computer terminal for internet usage?

Q13. What challenges and constraints with regard to internet/electronic resources have you personally experienced during the past six months?

Q14. How important is it for you to learn how to use internet/electronic resources?

Q15. How important is the availability of electronic resources to your academic success?

Q18. Please rank in order of your preference which of these five electronic resources would you like to see included in the library?

Table 12. Students' satisfaction level of electronic facilities

Adequacy of computer terminals	Number and percentage of students' response
Yes	0
No	40(100%) (B20, G20)

Table 13. Students' experiences of challenges and constraints

Constraints and challenges	Yes	No
Retrieving electronic information is too time-consuming	8(20%)(B3,G5)	32(80%)(B17,G15)
Access and retrieval of information is too slow	8(20%)(B3,G5)	32(80%)(B17,G15)
Electronic information is not always available	40(100%)(B20,G20)	
I have insufficient knowledge and skills to retrieve information from electronic resources	32(80%)(B15,G17)	8(20%)(B5,G3)

There is limited access to IT facilities in the library	40(100%)(B20,G20)	
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Table 14. Levels of importance of electronic literacy and access to electronic resources

Level of importance	Electronic literacy Number of students & % of response	Availability of electronic resources for academic work Number of students & % of response
Very important	6 (15%) (G6)	40 (100%) (B20,G20)
Important	31 (77.5%) (B17,G14)	0
Somewhat important	3 (7.5%) (B3)	0
Not important	0	0

Table 15. Students' perceptions of the influence of electronic resources on their coursework.

Areas of my coursework	Considerably	To some extent	Not at all	Don't know
Electronic resources supported my coursework with detailed up-to-date literature resources	32(80%) (B17,G15)	8(20%) (B3,G%)	0	0
Electronic resources helped me gain new knowledge and new ideas	40(100%) (B20,G20)	0	0	0
Electronic resources guided me to other relevant information on my	32(80%) (B17,G15)	8(20%) (B3, G5)	0	0

search topic				
Use of electronic resources has improved my grades	32(80%) (B17,G15)	8(20%) (B3, G5)	0	0

Table 16. Students' preferred choice of electronic resources

Ranking	Online databases	Online Public Access Catalogue	Electronic Journal	E-Books	CD-Rom Multimedia
1	0	0	0	40(100%) B20,G20	0
2	40(100%) B20,G20	0	0	0	0
3	0	6(15%)B6	13(32.5%) B3,G10	0	221(52.5%) B11,G10
4	0	3(7.5%) B3	27(67%) B17,G10	0	10(25%) G10
5	0	31(77.5%) B11,G20	0	0	9(22.5%) B9

As shown in Table 12, all forty students agreed that there was limited access to IT facilities in the college library. Table 13 depicts students' experiences of the challenges and constraints in the usage of electronic resources. A minority of students indicated that electronic information retrieval was too time-consuming and slow whereas a significant number didn't experience these difficulties. All forty students were unanimous in their views that there was limited access and lack of availability of electronic facilities in the college library.

Table 14 shows the level of importance of electronic literacy where a large majority agreed that they have insufficient knowledge and skills to conduct electronic search. Very few students believed that learning how to use internet is “very important”, while a vast majority indicated that it was “important” and three students viewed it as ‘somewhat important’. All forty students agreed that the availability of electronic resources is “very important” to their academic success, as shown in Table 15. E-Books were the most preferred electronic resource which the students would like to see included in the college library collection and online databases were the second preferred, followed by electronic journals and the least preferred was the Online Public Access Catalogue, as shown in Table 16.

4.4 Gender differences

Female students seem to access the library for print resources more often than boys. However, there are no significant gender differences between both gender groups regarding the frequency and reasons of the use of electronic resources. Both gender groups have similar positive and negative perceptions of electronic resources.

4.5 Procedure for analysing semi-structured interview data

Five males and five females were interviewed, chosen among the final year students who visited the college library regularly.

The following codes were assigned to the participants to conform to the confidentiality rules.

Coding: Male students: BS1, BS2, BS3, BS4, BS5

Coding: Female students: GS1, GS2, GS3, GS4, GS5

There are two elements in the semi-structured interview data: (a) The students’ experiences in the use of internet/electronic resources (b) The students’ search behaviours and Ellis Model of information-seeking.

An inductive thematic analysis approach was used to analyse the students’ information seeking experiences obtained through structured interviews. Patton (1990) states that inductive approach aims to gain a full understanding of the experiences of each individual to which, patterns, themes and categories are assigned. The process involved working inductively to identify and develop a categorisation framework. A two stage process was applied to analyse the data based on the principles of Critical Incident Technique, proposed by Flanagan (1954) and Hughes et al (2007), (a) setting a frame of reference and (b) thematic categorisation.

(a) Setting a frame of reference

The purpose of the analysing the critical incident interview transcripts data is three-fold:

1. To gain an understanding of the students' electronic resources using experiences
2. To gain an insight into students' information-seeking behaviours and needs
3. To make recommendations for improving the quality of electronic environment in order to enhance the academic performance of students.

(b) Thematic categorisation

To begin, the students' interview transcripts were scrutinised. Then, the critical incidents were sorted into three broad categories: (1) Students' perceptions of the advantages and disadvantages of electronic and print resources (2) Students' experiences of the benefits of using electronic resources in academic work (3) Students' experiences of the quality of the electronic learning environment.

Finally, the students' thoughts and feelings with regard to these three categories were highlighted with different colours and coded accordingly.

The following codes were applied: **P**= Purpose of the use of electronics resources. **AB**= Academic Benefits of electronic resources. **RU**= Resources used. **TN**= Training needs.

Additionally a binary categorisation coding system was used to identify the relational experience in terms of level of satisfaction with the present quality and availability of electronic resources, support, level of ease or difficulty in carrying searches and the positives and negatives of electronic resources (Hughes, 2007). e.g. **POS**= Positive and **NEG**= Negative, **S**= Satisfied and **DIS**= Dissatisfied, **E**= Easy and **DF**= Difficult.

All the coded responses were organised and subsumed into relevant critical incident categories. An initial list of themes were extrapolated and revised to produce a final list of four inter-connected themes. These represented the students' whole experience of the current electronic learning environment of the college. (**Appendix G & H**)

These are as follows:

4.6 Four emerging themes relating to students' experiences of the use, needs and expectations of the college library electronic learning environment. (Appendix G)

(a) Issues of accessibility, availability, usability and the scope of coverage in the selection of electronic resources.

(b) The positive influence of electronic resources on students' quality of coursework and grades.

(c) Students' expectations of the availability of adequate electronic resources and facilities.

(d) Students' expectations of the need for training and support.

4.7 Analysis and results of Critical Incident interviews:

(a) Issues of accessibility, availability, usability and the scope of subject coverage in the selection of electronic versus print resources.

All the interviewees expressed their preference for electronic resources and gave similar reasons for using electronic resources for academic purposes. Common reasons given by students were accessibility (ease and speed of access), availability (conveniently available at any time and from anywhere, saving for use later, saving time for other activities), usability (the ease of use, just at a few clicks of the mouse) and scope of coverage, (yielding a broad range of up-to-date information). They perceived print materials to be too time consuming to browse masses of information in several books. As reported, the interviewees mostly used Internet Web search. Data bases, E-books, CD Roms were also among the popular resources which they accessed.

"I prefer ERs. I find electronic resources easier to browse than books. Fast, easy and yields a lot of up dated info. No need to borrow and carry huge books." (GS1)

"I get links which lead me to other web pages and it enables me to collect quite a lot of information. I gain new ideas and knowledge with this linking option." (BS5)

(b) The positive influence of electronic resources on students' quality of coursework and grades.

All interviewees revealed that the main purpose for using electronic resources was to complete assignment and homework. They reported that electronic resources had contributed positively to their academic achievement in several ways such as, helping them to complete their assignment on time, improve the quality of work, marks and grades, grammar, gained a lot of information and new ideas and knowledge and also supported the content of the course syllabus.

"I had to write an essay on poverty, I went on the internet and just had to type a few words. I obtained much more information than I actually needed." (BS1)

“I was absent from school for a few days and missed many classes. I got all the information I needed to complete my assignment on the internet, e-books and the syllabus support CD Rom. I even got high marks for my assignment.” (BS3)

“I had to submit an essay for my economics tuition class and I hadn’t completed my work. After school hours, just before going to tuition, I went to a place where free Wifi was accessible. There I was able to complete my essay with the internet and a few notes that I had already downloaded and saved in my tablet. My teacher told me that my essay was very good and I got quite high marks.”

(c) Students’ expectations of the availability of adequate electronic resources and facilities

All interviewees expressed that their dissatisfaction with the level of internet/electronic resources facilities available in the library and suggested that the college library should implement more electronic resources. One interviewee suggested that their teacher or the library staff should assist their information search and teach them right techniques. All interviewees indicated that the internet and a few CD Roms were the only electronic resources in the library. Some students reported accessing online databases from other location and sources e.g. public library and friends because of lack of facilities in the college library.

“There’s only 2 internet connection points in the library and every time I go to the library I have to queue to use internet. Very often, after waiting for a long time, I have to return to my classroom without getting access to a computer.” (BS5)

“I think that the college must give access to a larger variety of electronic resources like e-books, online databases.....and also provide training support to all library users.” (GS1)

(d) Students’ expectations of the need for training and support

Most interviewees reported that they were quite at ease with electronic resources during their information search. However, four interviewees experienced some frustrations in managing information search. Sometimes they felt confused and anxious as a result of information overload. Some interviewees revealed that they had received some support, but believed to be inadequate.

“I feel that with some guidance I can use electronic resources better and access information more easily. I can manage with CD Roms but with Online databases and e-books I still need help. The college library does not provide these resources so when I get the opportunity to

use these resources from other locations, like the municipal or public library or even from home, I still encounter some problems.” (GS1)

“Library staff should organise training sessions on usage of electronic resources in the college library.” (GS5)

“Once my IT teacher briefly explained to the whole class about electronic resources and a few times the library staff helped me. I think that it’s not enough. What about the electronic resources which are not available in the library? How and when am I going to learn how to use them?” (BS2)

4.8 Summary of the Critical Incident Interview: Students’ experiences of information seeking

The results of the critical incident interviews complement the results of the survey questionnaire. Internet is the preferred mode of electronic search for students to undertake their coursework and have practical and academic benefits. The results also highlight the students’ level of dissatisfaction with the limited availability of electronic facilities in the college and the inadequate level of training and support in information searching. They put forward some helpful suggestions to meet their expectations and needs for adequate facilities, training and support.

4.9 Analysis of the students’ account of performed search tasks matching with Ellis’ model of information seeking

Research question 6

What search behaviours do students employ when performing an electronic search for their academic work?

Related interview question 11

The data was analysed quantitatively supported with qualitative data of students’ descriptive account of strategies employed to complete search tasks. The search tasks on the checklist were coded numerically. The total tasks described, as performed under Ellis’ behavioural categories, were quantified and tabulated on a chart (Table 17). The students’ information-seeking behaviours are illustrated with qualitative accounts of the execution of the tasks.

Starting: This task was performed by all interviewees.

“My most recent information search was for my General Paper assignment; I had to search information on Globalisation. I began by selecting appropriate websites which I obtained

through keywords. As I was at home, I had to do it on my own but if I were in the college library, I would have sought the help of my teachers.” (BS3)

Chaining: All interviewees performed this task and responses similar to the following:

“I opened the web pages of all websites I had selected. I also accessed to further information through the links that I obtained in the webpages.” (GS5)

Browsing: All interviewees performed this task and gave similar responses. They indicated that this was their most important task.

“I browsed nearly 7 web pages in about 10 minutes. I could have never been able to consult 7 books in 10 minutes.” (BS4)

Differentiating: All interviewees reported that they performed this task, where they had refined their search by discarding irrelevant web pages.

“I browsed the table of contents and summary of web pages so that I could differentiate between the relevant and irrelevant contents.” (GS1)

Monitoring: Only three female interviewees performed this task. (30%)

“I didn’t waste time checking for additional information because I had already accessed enough web pages and collected lots of information.” (All male participants gave similar responses.)

Extracting: All interviewees performed this task and described similar situations.

“Since I had already browsed the relevant web pages, I confirmed the information I needed for my assignment.” (BS1....BS5, GS1....GS5)

Verifying: Only 6 interviewees performed this task and they were all females and only one male participant. (60%)

“I didn’t verify anything. I had already checked so many times.” (BS1.....BS4)

Ending: All interviewees performed this task where they ended their search by collecting all information relevant to their coursework.

“I already had relevant and confirmed information so I saved it in my pen drive.” Similar response was given by all interviewees.

4.9.1 Summary of the Critical Incident Technique questionnaire on Ellis information seeking categories and tasks performed.

All students reported that they performed the tasks that matched Ellis behavioural categories of information-seeking for starting, chaining, browsing, differentiating, monitoring, extracting, verifying and ending. On the whole their descriptive accounts of each category were compatible with the basic strategies required to fulfil each task. However, 40% of the students reported that did not check the currency and relevance of information collected, in the ‘verifying category’ and about 60% of the interviewees reported that they didn’t waste time checking for additional information via related links in the ‘monitoring category’. Due to time constraint and word limit, students’ descriptive account of information-search strategies were not analysed thematically.

Table 17. Number of students who performed Ellis information-seeking behaviours and corresponding tasks’

S=Starting, C=Chaining, B=Browsing, D=Differentiating, M=Monitoring, Ex=Extracting, V=Verifying, En=Ending

Corresponding tasks number represented by (i, ii, iii, iv, v, vi, vii, viii, ix, x, xi, xii)

Tasks	Starting	Chaining	Browsing	Differentiating	Monitoring	Extracting	Verifying	Ending
S(i)	10							
S(ii)	10							
S(iii)	10							
C(iv)		10						
C(v)		10						
B(vi)			10					
D(vii)				10				
M(viii)					3			
Ex(ix)						10		
V(x)							6	
En(xi)								10

En(xii)								10
No. of students	10	10	10	10	3	10	6	10

4.10 Overall summary of results of questionnaire and interview data

The results show that the students prefer electronic resources over print resources because of its practical and cognitive benefits and perceived positive contribution to their academic success. The perceived advantages of electronic resources outweigh the disadvantages. There is a significant gap and barriers to learning resources and inadequate training and support. No significant gender differences in the use of electronic resources are evident. Students' information-search behaviours broadly match with Ellis information-seeking model, with identifiable deficiencies in two categories. These findings will be discussed in the next chapter.

Chapter 5: Discussion on Findings

5.1 Introduction

This chapter discusses and interprets the findings based on the results of the quantitative analysis of the survey questionnaire, the qualitative thematic analysis of students' experiences in the use of internet/electronic resources and both qualitative and quantitative analysis of students' information-seeking behaviours. Findings from relevant evidence-based literature will be integrated into discussion to affirm or negate emerging issues.

The following themes form the structure of the discussion:

- (a) Patterns of library use and types of library resources (**RQ1**)
- (b) Patterns of use of electronic resources (**RQ2**)
- (c) The positive influence of electronic resources on students' quality of work and coursework grades (**RQ3**)
- (d) Issues of accessibility, availability, usability and the scope of subject coverage in the selection of electronic resources versus print (**RQ4**)
- (e) Students' expectations of the availability of adequate electronic resources and facilities (**RQ5**)
- (f) Students' expectations of the need for training and support in an electronic environment (**RQ5**)
- (g) Students' information-seeking behaviours and Ellis' model (**RQ6**)
- (h) Gender differences (**all RQs**)

5.2 (a) Patterns of library use and types of library resources

All students surveyed in this study preferred electronic resources to complete their coursework because of ease of access, availability of broad range of up-to-date information and less time-consuming compared to bulky reference books. Epic (2003) and Xie & Joo (2009) support the students' preference of electronic resources over print materials. Similarly, Jones (2002) reported that an overwhelming number of students regarded the internet as their primary site for their information needs. However, the fact that they also accessed print resources weekly indicates they use a mix of print and electronic resources. This combined

choice is supported by Friedlander (2002) findings that some users prefer to meet their information needs through a multiple of mixed print and electronic resources.

5.3 (b) Patterns of use of electronic resources

All students uniformly reported using internet from home rather than from the college library. A majority of students accessed the college library internet/electronic resources only once a month compared to reference books which they accessed weekly in spite of their preference for electronic resources. The main reason for this low usage of electronic resources could be attributed to limited accessed and unavailability of internet/electronic resources. Ge (2005) found that low usage of electronic resources was primarily due to lack of accessibility and availability of technological resources. Students used Google and Yahoo frequently to conduct their information search. Research studies suggest that Google is students' preferred search engine because of the reliability, comprehensiveness and accuracy of its content (Rieger, 2009). The students' first and second choice of search engines is consistent with OCLC (2005) findings which showed that Google and Yahoo were the most preferred search engines.

5.4 (c) The positive influence of electronic resources on students' quality of work and coursework grades

The students were generally very positive about the impact and contribution of electronic resources to the quality of their coursework and academic success. The results support the findings of a previous research on the purpose and academic benefits of electronic resources in terms of improving students' quality of work and grades (Konnapa, 2014 & EPIC, 2003). Konnapa study on perceived benefits of electronic resources approves the students' perceptions that the broad coverage of up-to date resources added credibility to their coursework, boosted academic achievement and help gain new knowledge and ideas. Research findings suggest there is a direct correlation between electronic resources and students' level of academic performance (Ogedebe, 2012 & Wanajak, 2011). Moreover, Metzger et al (2003) study showed that internet use was only slightly useful in helping students to achieve higher grades.

5.5 (d) Issues of accessibility, availability and scope of subject coverage in the selection of electronic resources versus print resources

The findings of this study indicate that a majority of students perceived internet/electronic resources as having many advantages and the perceived practical and academic benefits of electronic resources vastly outweigh the disadvantages. Vakarri (2008, p.606) found that users considered electronic resources as a considerably easier means to access information as less time is spent in browsing as compared to physical libraries and an extended range of up-to-date information is yielded. Availability, accessibility, usability and content quality are the main reasons why students chose electronic resources over prints resources in this study, as specified by Ge (2005). Purdy (2012) survey on students' usage of online searches found similar positive results on students' coursework. Lui & Yang (2004, cited in Liu, 2008) findings on the disadvantages of printed books support the students' experiences as time-consuming to access and browse printed resources.

5.6 (e) Students' expectations of the availability of adequate electronic resources

Students value the contribution of electronic resources to their educational success but felt that their information needs were not being fully met due to lack of resources. The common problems and barriers experienced by the students include limited access to internet facilities and terminals, limited time to conduct electronic searches and a lack of suitable software. They suggested that adequate internet facilities and a range of electronic resources should be made available. Similar problems and constraints are reported in other developing countries (Egberongbe, 2011). Simmonds & Andaleeb (2001) stated that users' satisfaction of the quality of library services is based upon their experiences of resources adequacy. Thus, a resource strategy is important by focusing and delivering what users want.

5.7 (f) Students' expectations of the need for training and support in an electronic environment

The students expressed some dissatisfaction about the level of training and on-going support suggested a pressing need for the provision of assistance. Chen (2003) found that in spite of ease of access of internet, students still encounter difficulties with search strategies. UNESCO (2003, p. 7) report emphasizes that *"for effective education, a mere access to Internet Information resources is not enough. It is necessary to prepare students beforehand to work with information in a multimedia environment."* Kodani (2012) survey on information literacy for electronic resources indicates a primary need for library instructions on the use of electronic resources to improve students' academic performance. Egberongbe (2011) study revealed similar findings to this study; he found that students did not receive adequate

training in the use of electronic resources so they resorted to trial and error approach. Kaminski, Seel & Cullen (2003), suggest a need for a coherent approach to information competency in electronic resources, involving assessment of users' information technology skills and implementing a varied training programme comprising of individually tailored instructions and on-going support.

5.8 (g) Students' information seeking behaviours

The quantitative data analysis of the students' search behaviours revealed that they engaged themselves in a particular mode of searching. Some of the findings are consistent with the findings from large scale research on the application of Ellis model of information-seeking to electronic information search such as Choo, Detlor & Turnbull (2000), Shankar et al (2005), Bronstein (2007), Makri, Blandford & Cox (2008). While the majority of students' information search activities and tasks matched with Ellis behavioural categories, 'monitoring' and 'verifying' steps were not performed by some students. Similarly, the findings of Shankar et al (2005) study reveal that 'monitoring phase was not observed. Evidence shows that students do minimal verification of the accuracy and currency of internet information (Metzger et al, 2003 & EPIC, 2003). This lack in search technique is largely due to inadequate training. Supporting students to assess the credibility of information retrieved from internet/electronic resources is essential.

5.9 (i) Gender differences

There is a slight difference in the patterns of library visits and use of print resources between male and female. Female students seem to access the library for print resources slightly more than male students. However, there is no overall significant gender difference in the patterns and frequency of use of electronic resources. Both male and female students perceived the academic contribution of electronic resources positively. This observation is supported by the findings of Ozoemelem (2009) research study.

5.10 Summary

This chapter has presented a thematic analysis of the findings of the study. The findings have been discussed in relation with the evidence-based literature review. An overall reflection on the aims, objectives, research questions, literature review and related themes and research methods will be presented in the next chapter. Validity of findings will be assessed to draw conclusions and make recommendations.

Chapter 6: Conclusion

6.1 Introduction

This chapter will provide a reflective summary on the following points: (1) Aims, objectives and research questions (2) Literature review and related themes (3) Research methods (4) Limitations and lessons learned (5) Issues of validity and generalisations (6) Recommendations on future research (7) Significance of this study (8) Concluding remarks

6.2 Reflection on the aims, objectives and research questions

The main aim of this study was to investigate the usage of different types of electronic resources and their impact on students' educational success. This was achieved through the accomplishment of the following six objectives:

1. To determine the types of library print and modern electronic resources the students use to meet their information needs for their coursework.
2. To determine the pattern and frequency of use of the library electronic resources by the students.
3. To ascertain the purpose and academic benefits of library electronic resources as perceived by the students.
4. To identify the advantages and disadvantages of library electronic resources from the students' perspectives.
5. To identify the problems and constraints the students face when accessing library electronic resources.
6. To examine the types of search behaviours the students routinely use to undertake an electronic search to satisfy their information for academic work.

The development of the broad aims, precise objectives and research questions provided a coherent and logical framework to address the problem set out in Chapter 1. The nature and wordings of the questions were crucially important in choosing the research design as well as the preparation and execution of the quantitative and qualitative instruments, procedures and data analysis. The findings match the responses to the questions, which clarified the role of electronic resources on students' educational success and their experiences of internet search episodes and tasks in relation to Ellis information-seeking behaviour model.

6.3 Reflection on the literature review and related themes

The selected literature was drawn from a variety of reliable and up-to-date credible sources. The themes support the focus and underpinning theoretical foundation of the study and articulation of research questions. Many authors have explored the role and application of electronic resources in education from many perspectives, offering valuable insights into the effectiveness of their use and positive impact on educational success. The review of evidence-based literature has contributed to the justification of the rationale of the study and to validate the findings of the study hence improving its credibility. The theme on Ellis' conceptual framework on information-seeking provides an appropriate theoretical foundation to explore the students' search behaviours.

6.4 Reflection on search methods

The combination of a mixed method has proved to be effective in achieving the aims and objectives and to address the research questions. The main challenge for developing a survey questionnaire was to ensure its consistency and accuracy. The semi-structured interview based on the Critical Incident Technique, has high validity as the qualitative data resides in the participants' real world and experiences which minimize subjective influences. However, the researcher is the main instrument in the process and the analysis of data is based on subjectivity (De Marrais & Lapan, 2004). Critical Incident Technique presents many challenges for the researcher. Sensitive questioning and listening skills were essential in encouraging participants to reflect on their past experiences and draw out their thoughts and feelings in qualitative data gathering. The critical incident interviews were laborious and time-consuming and needed concise meticulous recording and analysis.

6.5 Assessment of the validity and generalisations of the findings

The quality of the findings of any study is determined by how issues of trustworthiness are addressed. ECS and McREL (2004) report suggests the trustworthiness of research findings can be determined by the extent to which the research design match the research questions, clear operational definition, valid and reliable data collection and data analysis methods, evidence of effective literature to support the findings and the sampling selection approach. In the study, the rationale and procedures of quantitative and qualitative approaches for addressing each of the research questions are clearly delineated, thus confirming the

confidence in the research process. To this end, operational definitions of key concepts are clarified; the use of a mixed method design is clearly justified with reference to other similar studies. The triangulation of combined sources of data enhances confidence in the trustworthiness of the findings. The fact that the researcher was able to check back and confirm the participants' accuracy of responses, add validity to the findings. Furthermore, the face validity and construct validity of the research instruments have contributed to the credibility of the data collection methods and hence the findings. The discussion of the findings is supported by a selection of evidence-based literature to substantiate the findings.

External validity is concerned with the extent to which the findings of a research can be applied to other situations, (Merriam, 1998, cited in Shenton, 2004). The findings of this study have some inherent transferability qualities as these can be selectively applied to other similar secondary colleges with participants of similar age and gender mix studying at the same level and same IT skills and experience. The maximum response rate has contributed to a significant and convincing conclusion about the sampled population but this does not guarantee the generalisation of the findings. The lack of a random sampling in this study, limits the scope for generalising the findings to other educational settings because the sample is not representative of other social, cultural and educational contexts, thus compromising its external validity (Hsieh-Yee, 2001).

6.6 Significance of the study.

This study has contributed to the understanding of the role of electronic resources in students' academic success and information-seeking behaviours in internet search. First, the findings will be beneficial to the library staff in reviewing and improving the library collection to reflect students' electronic resources preferences. Second, the findings will help the library and teaching staff to implement strategies to provide training programmes and support students for developing competency in electronic informational search. Third, the evidence-based findings can strongly influence education authorities to provide funding for improving the electronic facilities in all secondary colleges across the island.

6.7 Lessons learned

Academically and practically, this dissertation has provided the researcher with unique experiential learning in putting the research process into practice and has broadened analytical thinking and problem-solving skills. Undertaking a comprehensive literature search and review was a daunting task. The interpretation and integration of previous research

findings on electronic resources, in education and Ellis' information-seeking behaviours, to justify the rationale of this study and validate the findings have been equally challenging. It required quite a degree of analytical and critical thinking.

An awareness of ethical issues and guidelines involving young students in a study is vitally important. The initial sample consisted of students under the age of eighteen and required the approval of the Ethics committee. Later another sample comprising of students of eighteen years and above had to be chosen.

The use of mixed methods was challenging and yet rewarding, it required a degree of imagination and creativity. Resource and time management are paramount to prepare and implement research instruments, manage and analyse vast amount of data. It was an ambitious attempt to apply a conceptual framework to explore the students' search behaviours. Conducting one to one interview requires professional discipline and effective facilitation skills to draw out participants' positive and negative experiences while remaining unbiased.

Lastly, the core lesson learned has been developing new insights into how students acquire new knowledge and ideas in a technological environment to meet their academic information needs and the quality of electronic infrastructure the college should provide to meet their challenges, expectations and learning needs.

6.8 Recommendations on the replication of the study.

The following considerations are important for future study.

- (a) Considerations of the socio-cultural and educational context of the area where the study is undertaken as different countries have different educational and library systems, such as educational resources, standards, policies and funding.
- (b) Adopting other research methods to explore the application of Ellis information- seeking to information search practice such as naturalistic approach through observation.
- (c) A larger and more representative sample to include different age groups and levels of study would be desirable.
- (d) An awareness of the ethical issues when involving young participants in such a study.

6.9 Concluding remarks

The electronic resources have become central to students' learning and educational success I the digital age. This study has shown the urgent need for (a) advancing the use of modern

technology in teaching and learning in secondary colleges in a fast developing country like Mauritius (b) for developing the students' technological fluency for information search through support and training programmes and (c) for providing quality technological environment and access to adequate technological resources.

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Appendices

Appendix A: Literature Search Process and Strategy

Appendix B: Questionnaire

Appendix C: Interview Schedule

Appendix D: Information sheet for students to answer question 11

Appendix E: Informed consent letter

Appendix F: Consent form

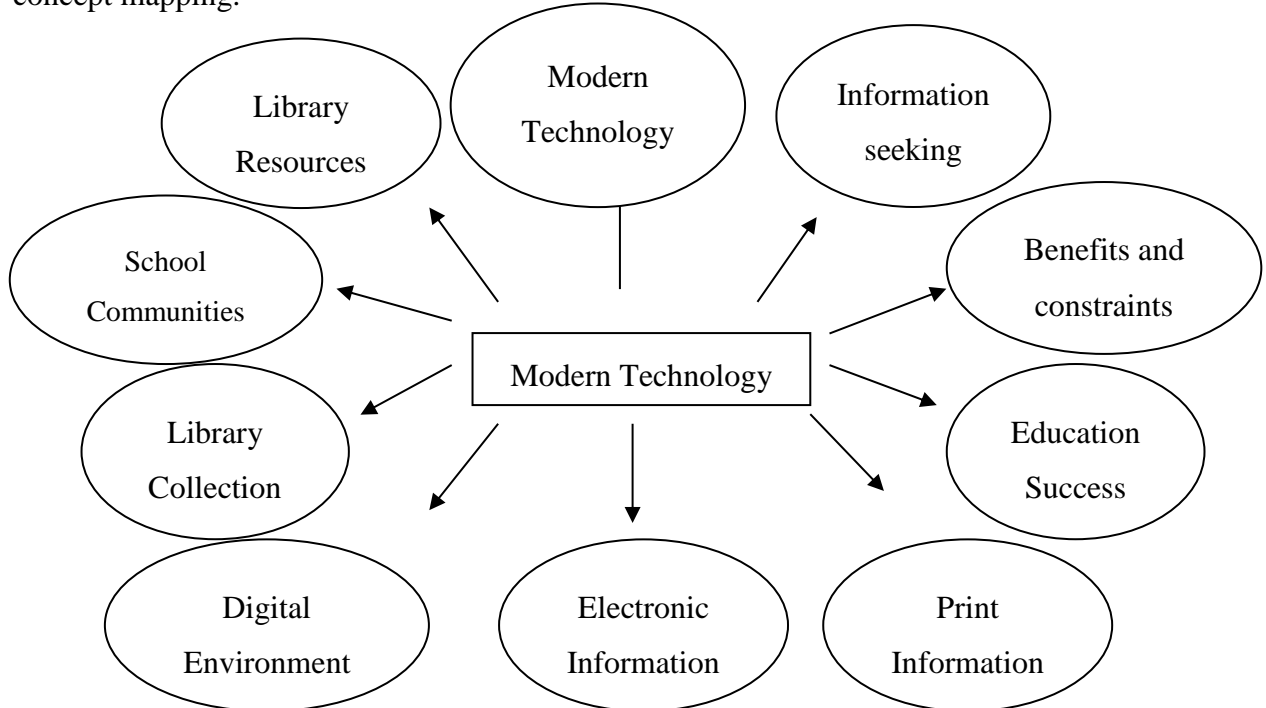
Appendix G: Coding and categorisation chart and themes

Appendix H: Example of student interview transcript

Appendix A: Literature Search Process and Strategy

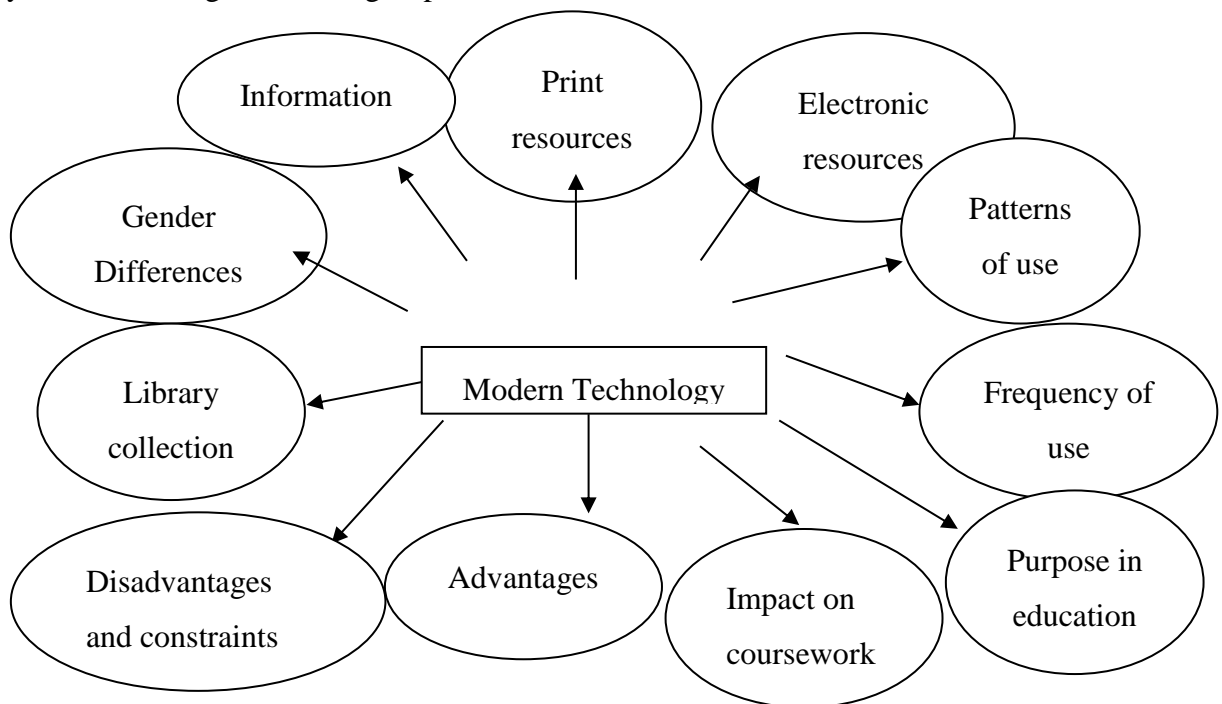
Stage 1

This stage involved reading articles and books related to the research title and the research questions, followed by brainstorming and teasing out a number of keywords and phrases for concept mapping.



Stage 2

Keywords were organised and grouped into eleven themes



Literature Search Process and Strategy

Stage 3

Appropriate search terms and phrases for each theme were identified and refined to make search easier.

Example: Theme- Impact of Electronic Resources on students' coursework

Search terms and phrases

- Electronic Resources
- Electronic Library
- Academic success and library resources
- Academic success and electronic resources
- Positive impact and electronic resources
- Coursework and electronic resources
- Research- Electronic resources and academic work
- Students'/ Teachers' perceptions of electronic resources

Search terms and search phrases were used to locate and access relevant materials through a variety of electronic and print resources. A combination of search techniques was used.

Literature sources accessed

Print resources including textbooks, government policy documents, reports, journals, online catalogues and gateway, thesis repository, universities websites, e-books and e-journals.

Examples of online databases and search engines and websites: Google search engine, Google scholarly articles, Information research, ERIC, E-Prints in Information and Library Science, Academia, Researchgate.

Techniques used:

- Single and Plural terms- e.g. library, libraries
- Combining terms using Boolean operators and advance search methods were used to narrow or broaden search- e.g. electronic resources AND/OR academic success.
- Truncating terms- e.g. education, educational, educationally or technology, technologies, technological

Stage 5

The search yielded a vast amount of information. Results were sifted through, analysed and evaluated for their relevance to the study, currency, comprehensiveness and reliability.

Materials which matched these criteria were selected and recorded for inclusion in the literature review.

Stage 6

Information from the selected materials was organised into coherent and thematic paragraphs to form a comprehensive literature reviews with citations included.

Appendix B: Questionnaire

Questionnaire

I am carrying out a study on the issues related to use of library electronic resources at the Verdun Secondary College e.g. how often students access the library, preferred types of information resources, their educational benefits for students' course work, their advantages, disadvantages and constraints. I am interested in finding out your views on these issues. I would be grateful if you could take a few minutes to fill out this short questionnaire by putting a tick in the appropriate boxes. The information collected will be kept in strict confidence.

1. Gender Male Female

2. During the last academic term, how often did you visit the college library?

Daily Once a week Two or three times a week

Monthly Never

3. What is your preferred medium of information search to complete your course work?

Print resources Electronic resources

4. During the last academic term, what kind of resources did you mostly access from the library to do your course work?

Books Reference Books Magazines

5. During the last academic term, how often did you use the library print resources e.g. books, reference materials to access information you needed for your coursework?

Daily Once a week Two or three times a week

Monthly Never

6. Where do you access the internet most to do your information search?

At home In the college library

7. During the last academic term, how often did you use the college library electronic resources to access information you needed for your coursework?

Daily Once a week Two or three times a week
 Monthly Never

8. During the last academic term, how did you use the following search engines to carry out information search for your coursework?

Search Engines	Always	Sometimes	Rarely	Never use
Google				
Yahoo				
Bing				
Ask.com				
Other – specify please				

9. For what educational purpose did you use the college library electronic resources?
 Please place a tick in the relevant box

Educational purposes	Yes	No
To complete course assignments		
To revise for examination or test		
To complete homework		
To prepare notes on a topic for classroom activities/ discussion set by your teacher		
To complete a project work		
For general reading on a topic		
Other purposes; Please specify		

10. From your past experience of using electronic resources, which of these would you say are the main advantages of electronic resources over print resources?

Please tick 'Yes' If you agree and 'No' if you disagree.

Advantages of electronic resources	Yes	No
Reduced time for browsing and searching		
Easy and quick access to information		
Can access a wide range of resources on a topic		
Materials are up to date, accurate and relevant		

11. From your experiences, which of these would you say are the main disadvantages of using electronic resources? Please tick 'Yes' If you agree and 'No' if you disagree.

Disadvantages of electronic resources	Yes	No
The search process can be very time consuming		
Electronic search can result in vast amount of information which can be confusing and frustrating the right materials		
Sometimes it difficult to check the accuracy and reliability of information		
The easy access of electronic resources make it more likely to delay my coursework		

12. Does the library have adequate internet access to computer terminal for internet usage?

Yes No

13. What challenges and constraints with regard to electronic resources have you personally experienced during the past six months? Please tick 'Yes' if you have and 'No' if you haven't.

Challenges and Constraints	Yes	No
Retrieving electronic information is too time consuming		
Access and retrieval of information is too slow		
Electronic information is not always available		
I have insufficient knowledge and skills to retrieve information from electronic resources		
There is limited access to IT facilities in the library		

14. How important is it for you to learn how to use electronic resources?

- Very important Important
Somewhat important Not important

15. How important is the availability of electronic resources to your academic success?

- Very important Important
Somewhat important Not important

16. To what extent has the use of electronic resources influenced the quality of your coursework? Please tick the appropriate column.

Areas of my coursework	Considerably	To some extent	Not at all	Don't know
Electronic resources supported my coursework with detailed up to date literature resources				
Electronic resources helped me gain new knowledge and ideas				
Electronic resources guided me to other relevant information on my search topic				
Use of electronic resources has				

improved my grades				
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17. Overall, to what extent electronic resources have contributed to your learning experiences and academic success?

Considerably To some extent Not at all Don't know

18. Please rank in order of your preference which of these five electronic resources would you like to see included in the library collection. Write 1 for the most important and 5 for the least important.

Electronic Resources	Rank 1,2,3,4,5 to indicate the order of your preference
Online Database	
Online Public Access Catalogue	
Electronic Journals	
E-Books	
CD-Rom Multimedia	

Thank you for taking time to complete the questionnaire.

Appendix C

Interview Schedule

Critical Incident Interview Schedule

Interview schedule for qualitative study on ‘Developing modern technological methods in information seeking behaviour for the achievement of educational success in the secondary education sector’.

Aim of the interview

As part of the study, this interview has two broad aims. (a) to gather students’ descriptions of their experiences both positive and negative with regard to the use of electronic resources and its impact of their coursework. The participants will be asked to respond to a series of questions concerning the students’ information seeking behaviour and use of electronic resources for the achievement of educational success, with particular emphasis on their actual experiences of using the library services, types of electronic resources, perceived benefits for their academic work and levels of satisfaction to the ease of access, subject coverage, internet/ electronic facilities and training in information search.

Participants: Final year students

Number of students: 10

Location of the interview: Verdun State Secondary School

Length of interview: 15 minutes

Introduction

- Welcome and explain the reasons for conducting the interview and the research project being undertaken.
- Explain issues of confidentiality e.g. All information you provide will be strictly confidential.

Interview Questions

1. Which is your preferred medium of information search, print resources or electronic resources and why?
2. Look back on your learning experiences of the last academic term, what electronic resources did you use to complete your coursework? Why?
3. In what ways have the internet/ electronic resources helped you to fulfill your information needs in order to satisfactorily complete your coursework? Give examples of positive outcomes, better results, and marks, improved quality of work, improved knowledge and understanding.

4. What did you find hard/ easy about using electronic resources? Why?
5. How satisfied are you with the level of subject coverage of electronic resources? Satisfied or not satisfied, Why?
6. How satisfied are you with the ease of access of electronic resources? Satisfied or not satisfied, Why?
7. How satisfied are you with the level of internet/ electronic resources facilities available in the college library? Satisfied or not satisfied, Why?
8. How satisfied are you with the level of support and training you received during your course to conduct electronic information search?
9. . What support and training do you think the college should provide to further develop your skills in electronic information search?
10. What could be done to improve the current internet/ electronic facilities in the college library?
11. Electronic information search strategies and tasks based on Ellis model (1989)
 - Please have a look at the list of information search strategies and the respective tasks.
 - Now, recall a recent episode in which you carried out an internet electronic search on a topic of your coursework.
 - Could you please tell me which of these tasks you performed during your information search?

(The students will be given a copy of Ellis information seeking strategies and tasks to answer question 8)

Closure of the interview. Thank you very much for your time, participation and responses.

Acknowledgement. Questions 1-10 were adapted from

Hughes, H., Williamson, K., Lloyd, A. (2007) Critical incident technique. In: Lipu, S. (ed) Exploring methods in information literacy research. Topics in Australasian Library and Information Studies, Number 28 . Centre for Information Studies, Charles Sturt University, Wagga Wagga, N.S.W., pp. 49-66.

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Appendix D

Information sheet for students to answer question 11

This information sheet will assist you in answering question 8 about internet strategies you have used in performing information search task.

Professor David Ellis produced a behavioural model on information seeking. The model suggests that we normally use eight types of strategies when we search information. Please take a few minutes to look at the eight strategies and the corresponding search tasks. Could you please recall a recent information search episode? Which of the tasks in column 2 did you perform during your information search and briefly describe what you did?

Describe briefly what you did. Did the tasks help you during your information search?

Categories of strategies	Search Tasks	Tick Tasks performed	Comments and descriptions
1. Starting	I. I identified the information on a particular subject. II. I asked my teacher or the librarian where I could search for the information. III. I selected the appropriate websites to conduct my search.		
2. Chaining	IV. I accessed the content page of the chosen website that was relevant to my search. V. I connected to new links on the subject to follow up my search.		
3. Browsing	VI. I scanned the search content and index.		
4. Differentiating	VII. I refined the search by excluding certain sources that were not relevant to my subject.		

5. Monitoring	VIII. I continued checking the websites for additional information or new ideas on the subject.		
6. Extracting	IX. I searched the selected information sources that were likely to be appropriate for my coursework.		
7. Verifying	X. I checked if information was up to date, useful and relevant to my coursework.		
8. Ending	XI. I gathered a list of most relevant information for my search. XII. I saved or printed the selected information.		

Appendix E: Informed consent letter

Thank you for taking part in this research. ‘Developing modern technological methods in information seeking behaviour for the achievement of educational success in the secondary education sector’. Please read this page carefully-it contains important information about the nature of the research and your rights as a participant.

Who is the researcher? Gayatree. Ramlall

What is the research for? This research is for a MSc. In Information and Library Studies from Aberystwyth, Wales

What does the research involve? The research will involve taking part in a questionnaire survey and interview. You will be asked about your usage of library information resources, particularly about the impact of electronic resources on your educational success. You have the right not to answer any of the questions.

What data will be collected? Data from questionnaires survey and interviews will be collected.

What will happen to data? All study data, including the electronic files, interview data and transcripts will be securely locked and paper copies will be shredded after a reasonable period of time.

To protect your anonymity, any names mentioned in the interview will be deleted and replaced with codes. Information will be included in a written report to be submitted to the University of Wales, Aberystwyth.

What if you change your mind? You can choose to withdraw from the research at any time without giving a reason.

Who do I contact if I have any concerns or queries? You can contact me at any time in the following ways: Email: g_e_e_2001@yahoo.com Phone number: 23057748288

Participation in this study is completely voluntary. Please complete the attached consent form if you are willing to take part in this study.

Thank you for taking time to read this information sheet.

Gayatree. Ramlall

Appendix F

Consent form

Title of project: Master's Dissertation: Developing modern technological methods in information seeking behaviour for the achievement of educational success in the secondary education sector.

Name of researcher: Gayatree Ramlall

Project authority: This research project is being undertaken as part of a Master's in Library & Information Studies from the University of Wales Aberystwyth

- | | Please tick |
|--|--------------------------|
| 1. I have read and understood the information letter for participants and a researcher has explained the study to me. | <input type="checkbox"/> |
| 2. I have received enough information about what my role involves. | <input type="checkbox"/> |
| 3. I am aware that I will be asked about my role and attitudes during the course of this study. | <input type="checkbox"/> |
| 4. I understand that my decision to consent is entirely voluntary and that I am free to withdraw from the study at any time without having to give a reason. | <input type="checkbox"/> |
| 5. I understand that my anonymity will be respected and that none of my personal data (e.g. name, class, etc.) will be published or divulged. | <input type="checkbox"/> |
| 6. I consent to participate in this study about impact of electronic resources on educational success. | <input type="checkbox"/> |
| 7. In case of concern or query I have been given the contact details of the researcher and the University of Wales, Aberystwyth. | <input type="checkbox"/> |

Name of participant (IN BLOCK LETTERS)	Signature	Date
Name of researcher (IN BLOCK LETTERS)	Signature	Date

Appendix G: Coding and categorisation chart and themes

Coding index: **RU**= Resources used, **POS**= Positive, **NEG**- Negative, **P**= Purpose of electronic resources, **AB**= Academic benefits of ERs, **S**=Satisfied, **D**= Dissatisfied, **ERsN**=Electronic Resources needed, **TN**= Training needs, **E**= Easy, **DF**=Difficult

Critical Incident Categories	Students' thoughts, feelings, satisfaction level & degree of difficulty	Initial themes	Final themes
1.Students' perceptions of the advantages and disadvantages of print and ERs	a) Internet (RU) b) E-books, online databases from other locations and sources e.g. home, public or municipal libraries (RU) c) Save time for other activities (POS) d) Ease and speed of access(POS) e)Generate lots of information with a few clicks of the mouse (POS) f) Convenience of use; can be accessed anytime, anywhere, saving for use later(POS) g)Offers a broad subject coverage and additional links of web pages(S/POS) h)Time-consuming to browse in several books for information on only one topic (NEG) i)Bulky and heavy books to borrow(NEG)	<ul style="list-style-type: none"> • Accessibility • Usability • Convenience • Fast • Reliability and subject coverage • Browsing books too time-consuming and not easy to accommodate 	1. Issues of accessibility, availability, usability and the scope of subject coverage in the selection of electronic versus print resources.

<p>2. Students' positive experiences of the benefits of using ERs in their academic work</p>	<p>a) Very useful in preparing notes and doing assignments (P)</p> <p>b) Helped to complete assignments on time(AB)</p> <p>c) Improved the quality of my assignments, my marks and grades. (AB)</p> <p>d) Improved grammar and gained new ideas(AB)</p> <p>e) Gained additional knowledge and lots of information with linking options(AB)</p> <p>f) Curriculum related and support syllabus (AB)</p>	<ul style="list-style-type: none"> • Positive effects • Quality of work • Improved ideas, knowledge, grades and marks • Relevance to course content • Writing and grammar 	<p>2.The influence of ERs on students' quality of coursework and grades</p>
<p>c)Students' experiences of quality of library ERs and learning environment</p>	<p>a) Have learnt the basic internet search (S)</p> <p>b)Search skills for other ERs (D/NEG)</p> <p>c)Need guidance and training for other ERs (TN)</p> <p>d) Limited access to internet, long waiting hours to access computers (D/NEG)</p> <p>e)E-books and databases not available, availability of ERs (D/NEG)</p> <p>f)Need access to access to a larger variety of ERs(ERsN)</p> <p>g) Had to access internet and other ERs from other locations sources</p>	<ul style="list-style-type: none"> • Lack of facilities • Access to a variety of ERs • Need for support in internet search and training in use of other ERs • Impact of lack of ERs; must use ERs from other 	<p>3. Students' expectations of the availability of adequate ERs and facilities</p> <p>4. Students' expectations of the need for training and support in an electronic learning environment</p>

	<p>e.g. home, public or municipal libraries(ERsN)</p> <p>h)Easy with just a few clicks(E)</p> <p>i)Confused with too many links and difficulty to access databases and download information(DF)</p>	<p>locations</p>	
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Appendix H: Example of student interview transcript

Interview transcript and colour coding of BS5

Q1: I prefer ERs. I can obtain lots of info for my homework and classwork (P) easily (E) and very fast, saves me time for other activities(POS).

Q2: I used internet search most of the time(RU) and through internet I was able to download a few e-books (POS) which helped me lot to do both my school and tuition assignments (P). The e-books(RU) were very convenient(E); I was able to do my assignments from everywhere, even in the bus, I used to highlight the relevant info for my assignments (POS).

Q3: Since I have started using ERs, I finish all my assignments on time; my teachers no longer scold me. I find quite a lot of info to write and I check my grammar so I get good results (AB).

Q4: I needed information to complete assignments for my coursework(P); the ERs performed all search for me (E). I just had to know how to use them properly, I got lots of info then I was able to save, copy and paste. ERs are more convenient to use (POS).

Q5: I get links which lead me to other web pages and it enables me to collect quite a lot of information. I also gain new ideas and knowledge with this linking option (S/POS).

Q6: The internet and CD Rom are available in the school library and it's quite easy to access info from these ERs. I still have some difficulties with other ERs(DF).

Q7: I am not satisfied at all. There's only 2 internet connection points in the library and every time I go to the library I have to queue to use the internet. Very often, after waiting for a long time, I have to return to my classroom without getting access to a computer (D/NEG).

Q8: I don't need much training and support to use internet and CD Roms but still learnt a few things from IT teacher. Not satisfied because learnt nothing on ERs like online databases and e-books(D).

Q9: College library should have all ERs (ERsN) and give training on their usage (TN).

Q10: More computers, more internet connections should be added. All ERs should be available in college library. Students should be given easy access to all ERs (ERsN).