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Attitudes of teaching staff at the Faculty of Health Sciences, University of the Witwatersrand towards embedding evidence-based information literacy skills programmes into the graduate entry medical programme 1 and 2 curriculum.

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ATTITUDES OF TEACHING STAFF AT THE FACULTY OF HEALTH SCIENCES, UNIVERSITY OF THE WITWATERSRAND TOWARDS EMBEDDING EVIDENCE-BASED INFORMATION LITERACY SKILLS PROGRAMMES INTO THE GRADUATE ENTRY MEDICAL PROGRAMME 1 AND 2 CURRIUCLUM

by

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RESEARCH REPORT

Submitted in partial fulfillment of the requirements for the degree of

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Supervisor: Dr S Cohen

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DECLARATION

I hereby declare that the research report submitted in partial fulfillment for the Master of Education in the field of Educational Technology, apart from any help acknowledged, is my own work and has not been formerly submitted to another university for a degree.

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ABSTRACT

Information literacy (IL) is recognized as the overall critical literacy for the 21st Century. Although large amounts of digital information are available, there is concern within higher education that students lack the competencies to assess and analyse sources in terms of relevance to their courses. Information literacy skills are of critical importance in teaching medical students to engage with evidence-based medicine (EBM), often within a problem-based learning (PBL) curriculum. Information practices that underpin academic and professional life should be embedded into the learning experience of the subject, and not taught extraneously in isolated silos.

Attitudes of teaching staff at the Faculty of Health Sciences, University of the Witwatersrand towards embedding evidence-based information literacy skills into the Graduate Entry Medical Programme 1 and 2 curriculum were examined. Existing integration of IL skills into the curriculum was shown to be limited, and not as high as perceived by educators. Five barriers against the integration of IL skills, and six opportunities for embedding information literacy, were identified in the curriculum. Awareness of evidence-based practice was found to be high, and collaborative teaching of IL skills with librarians was accepted by a large majority of educators. Dynamic Purposeful Learning (DPL) was proposed as a constructivist framework into which collaborative teaching of IL skills could be placed. DPL draws on active and collaborative learning, as well as cognitive scaffolding and apprenticeship, and is suited to PBL in the context of medical education.

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WitsETD

TABLE OF CONTENTS **Page**

DECLARATION		i
ABSTRACT		ii
ACKNOWLEDGEMENTS		iii
1.	INTRODUCTION	1
1.1	Background	1
1.2	Identification of the Problem	3
1.3	Aim of the Research	4
1.3.1	Research Question	5
1.3.2	Sub-Problems	5
1.4	Relevance of Research to the Overall Field of Reference	6
1.5	Justification of the Research Project	6
1.6	Delimitation of the Field of Study	7
1.7	Glossary and Definitions	7
1.8	Outline of the Following Chapters	9
2.	REVIEW OF THE LITERATURE	10
2.1	Information Literacy	10
2.1.1	Information Literacy: the Library Perspective	12
2.1.2	Information Literacy: the Pedagogical Perspective	15
2.1.3	Information Literacy in the Curricula of the Health Sciences	17
2.2	Summary	19
3.	METHODOLOGY	20
3.1	Rationale for Methodology Selected	20
3.2	Study Population and Sampling	21
3.3	Research Instruments	22
3.3.1	Analysis of the GEMP 1 and 2 Curriculum	22
3.3.2	Embedded Information Literacy Skills Assessment Rubric	23
3.3.3	Questionnaire Sent to GEMP 1 and 2 Educators	23
3.4	Summary	27
4.	RESEARCH DATA, ANALYSIS AND INTERPRETATION	28
4.1	The GEMP 1 and 2 Curriculum	28
4.1.1	Analysis of the GEMP 1 and 2 Curriculum for Evidence of Levels of IL Integration	30
4.1.1.1	GEMP 1	31
4.1.1.2	GEMP 2	34
4.1.2	Comparison of IL Skills Embedding in GEMP 1 and GEMP 2	36
4.2	Educators' Perceptions of their Information-Seeking Practices	36

WitsETD

4.2.1	Educators' Information-Seeking Practice and Frequency	37
4.2.2	Importance of Resources Used for Teaching	37
4.2.3	Source of Resources Used for Teaching	39
4.2.4	Perceived Levels of Educators' IL Skills Integration into the Curriculum	39
4.3	Educators' Perceptions of Evidence-Based Practice	41
4.3.1	Educators' Awareness of Evidence-Based Sources of Information	42
4.3.2	Educators' Expectations of GEMP 1 and 2 Students with Regard to Evidence-Based Information-Seeking	43
4.3.3	Educators' Perceptions of Who should Teach Evidence-Based Information-Seeking Skills	45
4.4	Comparison of Used and Recommended Resources for Teaching and Practice	45
4.5	Summary	46
5.	DISCUSSION	48
5.1	Extent of IL Skills Integration into the GEMP 1 and 2 Curriculum	48
5.2	Opportunities and Barriers Regarding IL Skills Integration into the GEMP 1 and 2 Curriculum	49
5.2.1	Barrier: The "Silo" Effect	49
5.2.2	Barrier: The Conflict of "Core" and Self-Directed Learning	51
5.2.3	Barrier: The Reading List	52
5.2.4	Barrier: Resources for Novice and Expert Learning	53
5.2.5	Barrier: Terminological Confusion	54
5.2.6	Opportunity: Changing Pedagogical Practice	55
5.2.7	Opportunity: The Link between e-Learning and IL Skills Integration	56
5.2.8	Opportunity: The Link between the Librarian and IL Skills Integration	56
5.2.9	Opportunity: The Link between the Practice of EBM and IL Skills Integration	57
5.2.10	Opportunity: Communities of Practice and IL Skills Integration	58
5.2.11	Opportunity: Curriculum Review and Accreditation Standards as an Agent for Change	58
5.3	Educators' Attitudes Regarding Evidence-Based Practice and Recognition of Opportunities that Exist for the Teaching of Critical Thinking and IL Skills within the Practice of Evidence-Based Medicine	59
5.4	The Possibility of Using Dynamic Purposeful Learning (DPL) as a Pedagogical Framework to Integrate IL Skills into the GEMP Curriculum	60
5.5	Summary	62
6.	CONCLUSIONS	63
6.1	Extent of IL Skills Integration into the GEMP 1 and 2 Curriculum	63
6.2	Opportunities and Barriers Regarding IL Skills Integration into the	

WISETD

GEMP 1 and 2 Curriculum 63
6.3 Educators' Attitudes Regarding Evidence-Based Practice and Recognition of Opportunities that Exist for the Teaching of Critical Thinking and IL Skills within the Practice of EBM 65
6.4 The Possibility of Using Dynamic Purposeful Learning (DPL) as a Pedagogical Framework to Integrate IL Skills into the GEMP Curriculum 65
6.5 Study Limitations 66
6.6 Areas for Further Research 67

REFERENCES 69

Appendix A: Ethics Protocol 2010ECE63C 86

Appendix B: Questionnaire Information Sheet 87

Appendix C: Questionnaire 88

LIST OF FIGURES

4.1 Average Scores for IL Skills Integration in GEMP 1 31
4.2 Scores for All Blocks in GEMP 1 Expressed as Percentages 32
4.3 Average Scores for IL Skills Integration in GEMP 2 34
4.4 Mode for IL Skills Integration in GEMP 2 35
4.5 Scores for All Blocks in GEMP 2 Expressed as Percentages 36

LIST OF TABLES

4.1 Topic Blocks in the GEMP 1 and 2 Curriculum 28
4.2 Representative Example of Weekly Cases from Block 3: Cardiovascular System 29
4.3 Embedded Information Literacy Skills Assessment Rubric 30
4.4 Comparison of Average Scores for IL Skills Integration in GEMP 1 and 2 36
4.5 Importance of Resources Used for Teaching 38
4.6 Active and Passive Learning Resources 40
4.7 Comparison of Observed and Reported Levels of Resource Integration 41
4.8 Sources Considered Important by Educators for Evidence-Based Information-Seeking Practice 42
4.9 Comparison of Top-Ranked Resources Used in Educators' Own Teaching, Recommended to Students and Believed Important for Evidence-Based Information-Seeking 46

WitsETD

Chapter 1
INTRODUCTION

1.1 Background

Information literacy (IL) is recognized as the overall critical literacy for the 21st Century (Bruce, 2002). IL skills can be defined as a core set of competencies required to access, evaluate, organize and use information in order to learn, solve problems, and make decisions in formal and informal learning contexts (SCONUL, 1999; ACRL, 2000; Bruce, 2003; CILIP, 2004; Bundy, 2004; Weiner, 2010). Information literacy can be regarded as a "natural extension of the concept of literacy … inextricably associated with information practices and critical thinking" (Bruce, 2002). Like literacy itself in the context of education, IL forms the foundation for learning in an environment of constant technological change (Bruce, 2002).

The advent of Web 2.0 and the availability of open content publications have significantly increased the amount of information available to students. However, there is increasing concern within higher education that students lack the competencies to assess these sources in terms of relevance to their courses (Barnes, Marateo & Ferris, 2007; Katz & Macklin, 2007; Shanahan, 2009). This lack of competence occurs despite a wide-spread perception that so-called "digital natives" think differently, and that therefore IL skills are somehow inherent in the so-called "Net Generation" (Prensky, 2001; Prensky, 2009; Van Deursen & Van Dijk, 2009). For educators, simply providing the technology required to engage these students may not be as effective as improving students' IL and critical thinking skills (Barnes, Marateo & Ferris, 2007). While many of today's educators are concerned with creating learning activities that incorporate engagement with the ICT environment, what is required are fundamental IL skills that need to be incorporated into students' learning practice. The way in which information is sought and interpreted is critical to higher order cognitive levels inherent in Bloom's Taxonomy of cognitive skills (Keene, Colvin, & Sissons, 2010), as there are definite cognitive aspects inherent in the information-seeking process (Kuhlthau, 1988, 1991). If students are to learn from the vast quantity of digital resources available to them, IL skills need to be "woven into" the learning experience itself (ACRL, 2000; Bruce, 2002). Thus information practices that underpin academic and professional life need to be brought directly into the curriculum of the subject discipline, rather than being taught as an isolated "silo-like" entity. When IL skills are taught in a collaborative framework, the link between student-centred active learning and higher order cognitive skills such as critical thinking, is effectively demonstrated and clear (Colvin & Keene, 2006).

Information literacy skills are of critical importance in teaching medical students to engage with evidence-based medicine (EBM), often within a problem-based learning (PBL) curriculum (Gruppen,

WiSE'D

Rana & Arndt, 2005; Kingsley & Kingsley, 2009). Evidence-based medicine is defined as the process of systematically finding, appraising and using current research findings as the basis for clinical decision making. The practice of EBM therefore requires the conscious integration of clinical knowledge and skills with the ability to search the literature to retrieve the evidence needed to support a clinical decision. The acquired information must subsequently be assessed critically for validity, reliability and appropriateness according to specific EBM criteria, in order to apply the evidence to patient care (Rosenberg & Donald, 1995). IL skills for medical students need to go beyond digital searching and retrieval to include the contextualization, analysis and synthesis of medical information. These are complex skills that require critical thinking (Lorenzo & Dziuban, 2006). Evidence-based practice is listed as one of the core competencies in international standards for health professions' education (Greiner & Knebel, 2003), and one of the stated outcomes of the medical curriculum for the MBBCh (Bachelor of Medicine) degree at the University of the Witwatersrand, Johannesburg (University of the Witwatersrand, Johannesburg, 2000).

At this University, a new curriculum for the medical degree (MBBCh), known as the Graduate Entry Medical Programme (GEMP), was introduced in 2003. The GEMP runs across the final four years of the six-year MBBCh degree (from the third to the sixth year of study), henceforth designated GEMP 1, 2, 3 and 4. It aims to provide different integrated learning opportunities for medical students in order to assimilate large amounts of facts (Tosteson, 1990). The GEMP curriculum is "hybrid" in that it contains some elements of problem-based learning (PBL), alongside more traditional elements such as lectures and practical tutorials, with EBM as a common theme throughout. This curriculum was adopted in order to foster the critical thinking skills required for self-directed and lifelong learning, identified as an essential component of medical education (General Medical Council, 2003; World Federation for Medical Education, 2003; Greiner & Knebel, 2003). The first two years of the curriculum (GEMP 1 and 2) are viewed as part of a continuum, and so the use of the singular "curriculum" is therefore used throughout this study to denote the two years.

Problem-based learning (PBL) is intended to be constructivist, self-directed, collaborative and contextual (Dolmans, Snellen-Balendong, Wolfhagen & Van der Vleuten, 1997). A problem-based learning curriculum is generally believed to assist students, as self-directed learners, to develop critical thinking skills (Norman & Schmidt, 1992; Epstein, 2004). PBL has for some time been used as a method to instill lifelong learning together with the more traditional, clinically orientated medical curricula worldwide (Burton & Underwood, 2000). Essentially, a PBL curriculum includes the use of clinical problem solving in a small group setting, so that fundamental knowledge can be mastered

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(Donner & Bickley, 1993; Buga, 1998). PBL strategies play a major role in the education for evidence-based medicine (EBM).

1.2 Identification of the Problem

Despite opportunities afforded for self-directed information-seeking in the GEMP, there is little evidence that students are in fact transferring EBM skills into practice in terms of their information-seeking activities. Critical thinking skills, deemed so necessary for medical students, are taught by educators only in respect of clinical knowledge, while the information retrieval aspects are taught by librarians in relative isolation from the rest of the curriculum. The role that IL can play in developing more integrated cognitive techniques for the comprehension of complex data (Jackson, 2008), particularly as far as information-seeking for EBM is concerned, has not been addressed.

A study of information use by residents and interns (Phua & Lim, 2007 suggests that EBM information literacy skills have not yet made inroads into the practice of junior doctors either, despite the emphasis afforded to EBM in medical curricula worldwide. The lack of use of specific EBM resources may in fact therefore be based on a lack of understanding of the need to use resources other than print books within the context of IL skills training amongst medical educators, as well as the lack of role models using EBM amongst educators themselves (Ulvenes, Aasland, Nylenna & Kristiansen, 2009).

Although the library at the Faculty of Health Sciences, University of the Witwatersrand has been involved in training medical students to use a set of IL skills from the outset of the introduction of the new GEMP curriculum, there have been limited opportunities to integrate IL into the curriculum. The literature from all subject domains however suggests that best results in terms of student outcomes arise from information literacy programmes that are “embedded” into the curriculum (Reed, Kinder & Farnum, 2007; Bent & Stockdale, 2009). The information practice that underpins academic and professional practice needs to be brought directly into the curriculum of the subject discipline, rather than being taught as an isolated entity (Bruce, 2002). Collaboration across disciplines has been shown to add benefit by bringing together expertise, knowledge and training from the various subject perspectives in teaching and when developing curricula (Montiel-Overall, 2006, 2008; Miller, Jones, Graves & Sievert, 2010).

For the most part it has been to the librarian that the task of information literacy skills training has been delegated within the higher education sector (Blummer, 2009; Johnson, Sproles & Detmering, 2009, 2010). While there are some reports of collaborative teaching of information literacy skills

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between educators and librarians (Mackey & Jacobson, 2005; Brasley, 2008; Hamilton, 2008), there is little evidence to show educators' commitment to embedding information literacy into the curriculum within the field of medical education (Burrows, Ginn, Love & Williams, 1989; Oberprieler, Masters & Gibbs, 2005; Kroth, Phillips & Eldredge, 2009). Most health professionals' commitment to embedded information literacy teaching appears to be in the field of nursing (as opposed to medical) education (Verhey, 1999; Shorten, Wallace & Crookes, 2001; Jacobs, Rosenfeld & Haber, 2003; Innes, 2008; Miller, Jones, Graves & Sievert, 2010). It may be that this lack of commitment to the embedding of IL skills into the curriculum is due in part to the need for professional development of educators in terms of improving their own IL skills (Williams & Coles, 2007). It may also be that professional development is required for medical educators to translate an understanding of EBM into their own teaching practice (Ulvenes, Aasland, Nylenna & Kristiansen, 2009).

The lack of commitment on the part of health professionals towards the embedding of IL skills into the curriculum could also in part be due to the lack of an acceptable theoretical pedagogical framework into which collaborative teaching of IL skills can be placed. This Research Report examines IL skills integration though the lens of Dynamic Purposeful Learning (DPL) (Kenedy & Monty, 2008), a collaborative framework for the introduction of IL skills practice into teaching. DPL draws on various pedagogical strategies, such as active learning, cognitive scaffolding and collaborative learning, as well as cognitive apprenticeship (Brown, Collins & Duguid, 1989). These pedagogical theories are particularly suited to medical education, and will be explored in greater depth in subsequent Chapters.

The curriculum for GEMP 1 and 2 at the Faculty of Health Sciences is currently under review. A valuable opportunity thus exists to inform curriculum change (Kroth, Phillips & Eldredge, 2009). Specifically, attitudes of medial educators towards the integration of IL skills into the curriculum need to be ascertained if "embedded" IL skills are to be co-taught by librarians and medical educators at the Faculty of Health Sciences, University of the Witwatersrand.

1.3 Aim of the Research

While it is generally accepted that resources to support student learning are integrated into the GEMP 1 and 2 curriculum, the extent to which resources are embedded is unknown. Thus an analysis of the nature of resources supplied by educators is required with a view to establishing existing level of IL skills' integration in the GEMP 1 and 2 curriculum.

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Attitudes and perceptions towards the integration of IL skills on the part of the medical educators involved in delivery of the GEMP 1 and 2 curriculum are thought to play a crucial role in the embedding of resources into subject content, particularly with the context of PBL. Educators' readiness to co-teach integrated IL skills in the subject content, alongside librarians, also needs to be investigated. The views of educators towards evidence-based medicine (EBM), and the possibilities for using evidence-based practice to introduce IL integration into various subject domains, need to be ascertained. By correlating the existing actual state of integration of IL skills with the attitudes and perceptions of educators, it is hoped to establish what, if any, opportunities or barriers might exist on the part of educators with regard to embedding IL skills into the medical curriculum at the University of the Witwatersrand in the two years under examination.

Thus the aim of the research is to establish attitudes of teaching staff at the University of the Witwatersrand towards embedding evidence-based medicine information literacy skills into the Graduate Entry Medical Programme curriculum.

1.3.1 Research Question

What are the attitudes of teaching staff at the Faculty of Health Sciences, University of the Witwatersrand towards embedding evidence-based information literacy skills into the Graduate Entry Medical Programme 1 and 2 curriculum?

1.3.2 Sub-Problems

- To what extent are IL skills already embedded in the GEMP 1 and 2 curriculum?
- What opportunities exist for the integration of collaboratively taught IL skills in the revised curriculum amongst medical educators already involved in the GEMP 1 and 2 curriculum? Conversely, what barriers exist in respect of embedding (or further embedding) IL skills programmes into the GEMP 1 and 2 curriculum?
- Are attitudes towards evidence-based practice amongst educators involved in teaching the GEMP 1 and 2 curriculum sufficiently developed to recognize the opportunities that exist for the teaching of critical thinking and IL skills within the practice of evidence-based medicine (EBM)?
- Can Dynamic Purposeful Learning (DPL), a framework of collaborative teaching based on various pedagogical strategies, such as active learning, cognitive scaffolding and collaborative learning, as well as situated cognition, be used successfully to integrate IL skills into the GEMP 1 and 2 programme?

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1.4 Relevance of Research to the Overall Field of Reference

The development of lifelong learners is central to the mission of any higher education institution. By assisting students to construct a framework for learning how to learn, universities provide the foundation for continued development and lifelong learning throughout the student's life and career. Universities need to ensure that students achieve the intellectual abilities of reasoning and critical thinking (ACRL, 2000; Owusu-Ansah, 2004). These abilities are as important as the acquisition of formal knowledge itself within tertiary education (Laurillard (2002:12-13). However, to be able to continue to function as a lifelong learner the student needs to be able to transfer learning across different settings, including problem-solving in the real world, and will require a set of IL skills to facilitate this knowledge transfer.

Competency in information literacy is therefore a key component of, and contributor to, lifelong learning as it extends learning beyond formal educational settings. Gaining IL skills affords opportunities for students' self-directed learning. As the student moves through the curriculum, a wide variety of information sources should be used to expand knowledge, to ask informed questions, and to sharpen critical thinking for still further self-directed learning (ACRL, 2000). If the student is constructively guided in problem-based approaches, it is possible to nurture the ability to reason about course content at a deeper level than is possible through the exclusive use of lectures and textbooks. To take fullest advantage of problem-based learning, the student needs to employ thinking skills that require skilled use of information sources in many locations and formats.

The ability to achieve competency in information literacy, however, "requires an understanding that this cluster of abilities is not extraneous to the curriculum but is woven into the curriculum's content, structure, and sequence" (ACRL, 2000). This curricular integration also affords many possibilities for furthering the influence and impact of such student-centred teaching methods as problem-based learning, evidence-based learning, and enquiry learning.

1.5 Justification of the Research Project

There is a prevailing belief amongst educators that students somehow acquire IL skills themselves, despite evidence to the contrary (McGuinness, 2006). In practice, educators often believe that skills related to information literacy are in fact already embedded (McGuinness, 2006), even when taught in isolation from the curriculum. The segregation of fundamental IL skills from the teaching process itself is thus exaggerated from the perspective of the student, who is as yet not competent to realize the overarching nature of this skill set. Information literacy skills are of particular importance in

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teaching medical students to engage with evidence-based medicine (EBM), often within a problem-based learning (PBL) curriculum (Gruppen, Rana & Arndt, 2005; Kingsley & Kingsley, 2009). As information literacy augments the student's competency with evaluating, managing, and using information, it is considered by certain discipline-based accreditation associations, such as the Health Professions Council of South Africa (HPCSA) and international bodies such as the World Federation for Medical Education, as a key outcome for students. It is thus recognized professionally that competency in information literacy extends learning beyond formal educational settings in order to provide practice with self-directed investigations as students move into internships, their first professional positions, and increasing responsibilities in all areas of their lives.

Any study that leads to a greater understanding of the ways in which information literacy contributes to the transfer of skills across subject disciplines at university is therefore both relevant, and potentially important.

1.6 Delimitation of the Field of Study

This study is concerned specifically with two years of one particular continuous medical curriculum (GEMP 1 and 2), as taught at the Faculty of Health Sciences, of the University of the Witwatersrand, Johannesburg, South Africa. Only those educators who are involved in the teaching of this particular curriculum will be surveyed in order to ascertain their attitudes towards, and perceptions of, the integration of information literacy skills into the GEMP 1 and 2 curriculum, as well as their understanding of the practice of evidence-based medicine in so far as information-seeking practice is concerned.

1.7 Glossary and Definitions

DPL: Dynamic Purposeful Learning (Kenedy & Monty, 2008) has been proposed as a collaborative framework for the introduction of IL skills practice into teaching, based on the idea that student learning is enhanced by collaborative teaching (Montiel-Overall, 2006; 2008). DPL draws on various pedagogical strategies, such as active learning, cognitive scaffolding and collaborative learning, where skills are connected to form, and content is related to learning the subject matter. DPL is further informed by the idea of cognitive apprenticeship, where "activity, concept and content are interdependent" and "learning must involve all three" (Brown, Collins & Duguid, 1989).

EBM: Evidence-based medicine is defined as the process of systematically finding, appraising and using current research findings as the basis for clinical decision making. The practice of EBM therefore requires the integration of clinical knowledge and skills with the ability to search the

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literature to retrieve the evidence needed to support a clinical decision. The acquired information is subsequently critically assessed for validity, reliability and appropriateness according to specific EBM criteria, in order to apply the evidence to patient care (Rosenberg & Donald, 1995).

EBP: Evidence-based practice is defined as practice in which decisions about health care are based on the best available current, valid and relevant evidence by those receiving care, informed by the tacit and explicit knowledge of those providing care, within the context of available resources (Dawes, Summerskill, Glasziou, Cartabellotta, *et al*, 2005).

E-Learning: The use of information and communications technology to support, create and deliver an educational experience. In the context of this research report, e-learning supports not only the delivery, but also the exploration and application of information (Holmes & Gardner, 2006).

Embedded: Can be used interchangeably with the word "integrated". In the field of library and information science, the term is used to indicate a trend where the physical library becomes subservient to integration of the librarian's information-seeking skills, which can be taken outside the physical library to a different physical or virtual location, such as the classroom or an e-learning programme in the context of teaching and learning. In similar vein, library resources can be "embedded" or "integrated" into subject specific context, such as that provided in a learning management system within the context of e-learning (Kvenild & Calkins, 2011).

Evidence-based information seeking: The practice of finding specific evidence within the literature, according to specific evidence-based criteria (Guyatt, Rennie, O'Meade & Cook, 2008).

GEMP: An acronym for the Graduate Entry Medical Programme within the MBBCh degree at the University of the Witwatersrand. This four year programme (the last four years of the 6 year MBBCh degree) provides an alternate entry path into the medical degree for graduates of other disciplines, who enter the GEMP at year three of the six year MBBCh.

Hyperlinking: A hyperlink is a means of web-based navigation from one web page to another, or to a different domain altogether (Webopedia, 2011). In the context of this research report, it is used to denote a resource or reference that can be directly embedded into the content of any e-learning courseware.

ICT: An abbreviation used for the information and communication technology environment.

IL: An acronym for information literacy. IL skills are defined as a core set of competencies required to access, evaluate, organize and use information to learn, solve problems, and make decisions in

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formal and informal learning contexts (SCONUL, 1999; ACRL, 2000; Bruce, 2003; CILIP, 2004; Bundy, 2004; Weiner, 2010).

Intergrated: See **embedded** above.

MBBCh: The acronym used for the Bachelor of Medicine and Bachelor of Surgery degree (as conferred at the University of the Witwatersrand).

PBL: Problem based learning is both a constructivist pedagogical methodology and curriculum design philosophy used in higher education, and is believed to promote deep learning as a self directed, learner-centred approach. In medical education PBL essentially includes the use of clinical problem solving in a small group setting, so that fundamental knowledge can be mastered in the same context as basic information is learned and used (Donner & Bickley, 1993; Buga, 1998; Spencer & Jordan, 1999). In the medical science curricula, PBL often replaces the traditional lecture approach to fact-intensive subjects (Savery & Duffy, 2001).

1.8 Outline of the Following Chapters

Chapter 2 consists of a review of the literature, covering the areas of information literacy in general, IL from the perspective of the librarian, and IL from the perspective of educators. The concept of embedded information literacy is examined with reference to curricula in the health professions. The literature from three separate fields was searched: the literature of library and information science; the pedagogical literature; and the medical and health-related literature.

The methodology used in this study is described in Chapter 3. A predominantly qualitative research paradigm using an interpretive case study analysis was adopted. A qualitative log and basic statistical procedures were employed to analyse curriculum content, and a rubric devised to grade levels of information literacy integration into the curriculum. A questionnaire was sent to educators in the GEMP 1 and 2 curriculum to ascertain attitudes towards the teaching of IL skills within an evidence-based framework.

Chapter 4 describes the research data gathered, together with analysis and interpretation of the research findings. Data obtained from the curriculum analysis, and self-reported behaviour and comments obtained from the questionnaire are discussed.

Chapter 5 discusses the results from this study and outlines key findings. Limitations of the study are described, and suggestions made for further research.

References and Appendixes are provided at the end of Chapter 6.

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Chapter 2
REVIEW OF THE LITERATURE

This review concentrates on four perspectives with regard to information literacy: background to the topic in general; IL from the perspective of librarians; and IL from the perspective of educators. The final section examines the literature as it relates to IL programmes in the health sciences. The literature from three separate fields was searched: the literature of library and information science; that of education; and the medical and health-related literature.

2.1 Information Literacy

The body of literature on the topic of information literacy is vast. More than 300 articles were published in 2002 alone (Zabel, 2004), and more than 5000 works from the perspective of the librarian appeared from 1973 to 2002 (Rader, 2002). Two new open access journals devoted to the topic have appeared (Stevens, 2007; Johnson, Sproles and Detmering, 2009, 2010). As the scope of this study does not allow for an in-depth review of the literature, an overview of the most influential or comprehensive themes is given.

The concept of information literacy itself appeared in the literature as early as the 1970's (De Jager & Nassimbeni, 2002), and is attributed to Paul Zurkowski, president of the US Information Industry Association (Behrens, 1994; Doyle, 1994). Zurkowski maintained that people trained in the application of information resources to their work could be called "information literates" (Owusu-Ansah, 2003).

Prior to widespread adoption of the term "information literacy", earlier versions of the topic, such as library or bibliographic instruction, and user or reader education were extensively debated in the literature (Rader, 1991; Snavely & Cooper, 1997). Terms such as library literacy, electronic information literacy, media literacy, and digital literacy have also been used (Bawden, 2001). A comprehensive 30-year overview of terminologies and concepts used in the subject of information literacy (Pinto, Cordon & Diaz, 2010) shows that since first use, the concept appears to have changed meaning somewhat in response to educational concerns. Information literacy in fact consists of truly distinct processes and goals, with specific emphasis on critical thinking and evaluation skills (Goebel & Neff, 2007). The link between IL and learning has been a consistent theme, and has probably strongly influenced its current meaning and definition (Bawden, 2001; Sundin, 2008).

A seminal report from the American Library Association (ALA) Presidential Committee on Information Literacy (ALA, 1989) was largely responsible for disseminating the concept of IL worldwide beyond the field of library and information science (Behrens, 1994; Thompson, 2002). The goal of the

WitsETD

National Forum for Information Literacy (NFIL) is the promotion of "information literacy as a means of empowering individuals and enhancing the educational potential and economics goals of communities everywhere" (Thompson, 2002). This aim takes IL far beyond library services, in that students need to be equipped with the ability to acquire, share and transfer knowledge of all kinds throughout their lives (Pinto, Cordon & Diaz, 2010). Such a perspective promotes a view of IL education grounded in an understanding of the communities and practices of which the users are a part (Limberg & Sundin, 2006).

In tertiary education, IL and research skills at a postgraduate level have always been important. With the rise in use of the Internet, and the resulting proliferation of information, the need for initiatives aimed at producing lifelong learners became imperative (Blummer, 2009).

Undergraduate IL skills gained importance following recommendations from the influential Boyer Commission on Educating Undergraduates in the Research University. The Boyer Commission's report recommended a fundamental shift in the way in which undergraduate education was offered (Boyer Commission [1998]). Included in these suggestions is the tacit acknowledgement of IL in the recommendations of enquiry-based learning and linking communicating skills with course work, alongside the creative use of technology.

The Boyer Commission's views were endorsed by various tertiary educational accreditation bodies in the USA (ACRL, 2000; Thompson, 2002). Other international accreditation bodies have also incorporated the concept of IL into local recommendations (Bruce, 2002). Those in the medical education sector were quick to seize on the possibilities of IL for incorporating lifelong learning into the curriculum (General Medical Council, 2003; World Federation for Medical Education, 2003). This focus on IL within tertiary education is no doubt the reason that the field has been developed primarily within the academic library sector (Limberg & Sundin, 2006), as the practice of teaching information-seeking is related to a long term interest in pedagogical issues within librarianship, and to the specific conditions provided by contemporary ICT.

This review does not cover IL at primary and secondary school levels, but of interest to this study is the impression gained from the literature that it appears to be accepted for the school librarian (or media specialist) to work together with the classroom teacher to create space for these skills within the curriculum itself. Unlike the tertiary education sector therefore, collaboration between teaching staff and librarians at schools seems to be the norm, rather than the exception (Sanborn, 2005; Taylor, 2006). There is widespread recognition that teaching IL skills is an important component in educational success at this level (Smalley, 2004).

WitsETD

Also central to the debates surrounding IL in the 21st century is the theme of the so-called "Net Generation". It is contested by some that these students have different learning needs and styles, having been exposed to technology their entire lives (Prensky, 2001; Ghaith, 2010). These students are said to have a preference for receiving information quickly, and are considered to be adept at processing this information rapidly. They rely heavily on communication technologies to access information, and are said to prefer active learning methodologies. Indications are that modern students dislike reading long passages of text (Weiler, 2005), especially in respect to medical education (Twenge, 2009).

However, it is easy to create simplified stereotypes. Students were also found to use a hybrid mixture of high-tech and traditional information formats, and showed evidence of being able to formulate strategies required to help them focus on their academic tasks (Mizrachi, 2010). Assumptions regarding the use of ICT are complex, and while technology is pervasive and ubiquitous for many, the current generation's use of information resources and IL skills are by no means uniform (Bennett, Maton & Kervin, 2008). In South Africa, especially, IL skills simply do not exist for large numbers of students currently at university, owing to a unique set of factors related to education during the apartheid and post-apartheid era (De Jager & Nassimbeni, 2002).

A recent study emphasizes the notion that IL is no longer an issue for librarians or educators only (Aharony, 2010). Information literacy cannot be taught by librarians or faculty in isolation, but rather it must be learned by students through experiences shaped by librarians and faculty together (Breivik, 1998:78). Contrary to the views of some educators, IL can not be acquired by serendipity in the same way that information can be gathered by browsing, and the teaching of information literacy needs to be part of a strategic curricular approach (Gullikson, 2006; McGuinness, 2006; Travis, 2008). Change in current practice will require the development of partnerships in workplace communities so as to understand the role that information plays in the "knowledge economy" of the relevant subject-disciplines. This will require a new relevant language which ties information literacy instruction to the authentic situations of the workplace (Lloyd, 2003).

2.1.1 Information Literacy: the Library Perspective

Despite the wider significance of information literacy, discussion in the literature remains essentially confined within the discipline of library and information science (Behrens, 1994; Bawden, 2001). The task of IL skills training in the higher education sector has been delegated for the most part to the librarian (Blummer, 2009; Johnson, Sproles & Detmering, 2010). Although there appears to be a reasonable amount of consensus on the need for IL in tertiary education, agreement on how best to

WiSETD

achieve this objective is often lacking amongst librarians, university administrators and teaching staff. Librarians have been prepared to initiate the processes involved in offering IL skills training by virtue of their professional inclination, and have appeared to be most committed to achieving IL goals, even if outside the classroom (Owusu-Ansah, 2004). The reason for these initiatives is not unrelated to the role of the library profession within the educational reform process itself, as it struggled to find an appropriate and relevant niche (Behrens, 1994).

Library Associations internationally have issued various standards and recommendations for information literacy in addition to the seminal report from the American Library Association (ALA) Presidential Committee on Information Literacy (ALA, 1989). The UK Society of College, National and University Libraries (SCONUL, 1999) noted that IL was much broader in concept than "information skills" or "information technology skills" in so far as it was related to the aims and processes of higher education as a "knowledge creation" activity. The Bologna Declaration on higher education also prompted several European library association IL competency standards and guidelines (Kakkonen & Virrankoski, 2010). The American Association of College & Research Libraries (ACRL) approved its own set of *Information Literacy Competency Standards for Higher Education* in 2000, endorsed by the American Association for Higher Education and the Council of Independent Colleges.

Australian and New Zealand Information Literacy (ANZIL) Standards emphasized the role played by IL in the development of lifelong learners through their undergraduate studies (Bundy, 2004). This is the first mention of lifelong learning in connection with undergraduate (opposed to postgraduate) studies. In these standards, IL is seen as a continuum of capacities. Shortly afterwards, a background paper on the topic appeared from UNESCO, the US National Commission on Libraries and Information Science, and the National Forum on Information Literacy (Bruce, 2002). The Library and Information Association of South Africa (LIASA) has not produced standards with regard to IL. Passing mention is made of librarians' expertise in IL programmes as a part of LIASA's *Library and Information Services (LIS) Transformation Charter* (LIASA, 2009), where IL is alluded to only in terms of broad socio-developmental and educational goals.

Much debate surrounds the definition of information literacy in the library literature. "Overwhelmingly precise definitions and elaborate standards" are such that a clear "roadmap" for implementation is lacking by either librarians or educators (Owusu-Ansah, 2003). However, there is a strong contention that IL should be shaped by practice rather than by definition.

Thus practical examples of initiatives by librarians in teaching IL skills abound (Johnson & Rader, 2002; Blummer, 2009; Johnson, Sproles & Detmering, 2009, 2010), and the following examples of

such studies are by no means comprehensive. Most of these studies take the form of case studies at various universities around the world (Cannon, 1994; Hardesty, 1995; Leckie & Fullerton, 1999; Orr, Appleton & Wallin, 2001; Moore, Brewster, Dorroh & Moreau, 2002; Flaspohler, 2003; Lampert, 2005; Arp, Woodard, Lindstrom & Shonrock, 2006; Harrison & Rourke, 2006; Reed, Kinder & Farnum, 2007; Sauperl, Novljan & Grcar, 2007; Malliari & Nitsos, 2008; Ritchie & Ray, 2008; Badke, 2009; Bent & Stockdale, 2009; Cmor, 2009; Cousins & Perris, 2009; Gaspar & Wetzel, 2009; Millet, Donald & Wilson, 2009; Patterson, 2009; Whittaker & Dunham, 2009; Cordell & Fisher, 2010; Hsieh & Holden, 2010). Some articles concentrate on the specific use of various technologies for IL training (Rader, 2000; Bawden, 2001; Armstrong & Georgas, 2006; Zhang, 2006; Berk, Olsen, Atkinson & Comerford, 2007; Grassian, Trueman & Clemson, 2007; Ariew, 2008; Wales & Robertson, 2008; Carr & Ly, 2009; Yang, 2009; Niedbala & Fogleman, 2010; Steiner, 2010), while other studies examine IL in the context of web-based searching (Brown, Murphy & Nanny, 2003; Callinan, 2005; Williamson, Bernath, Wright & Sullivan, 2007; Godwin, 2009; Fu & Kuo, 2010; Luo, 2010; Mizrachi, 2010). Some research examines IL from the students' perspective (Maybee, 2006; Kim & Sin, 2007). Students generally were found to be more optimistic about their IL skills than in their teachers' estimation (Avdic & Eklund, 2010). Studies which examine the method of instruction used in teaching IL, particularly with regard to face-to-face, e-learning or blended learning have begun to appear recently (Andretta, 2005; Hadengue, 2005; Mutula, Kalusopa, Moahi & Wamukoya, 2006; Anderson & May, 2010; Xiao, 2010). Often, the adoption by faculty of an e-learning management system as a new teaching platform affords librarians the opportunity to embed IL services, skills and resources into the electronic curriculum (Tumbleson & Burke, 2010; Xiao, 2010).

Different opinions are also expressed whether IL skills should be taught as part of subject-specific courses, or whether in fact IL skills can be regarded as generic and can be transferred across all disciplines (Grafstein, 2002), with some call for "stand-alone" credit bearing courses on IL skills (Owusu-Ansah, 2004). There is speculation that the concept of IL competencies needs to fit with institutional culture before it will be accepted (Tyron, Frigo & O'Kelly, 2010), and that pedagogic knowledge (in addition to discipline-specific knowledge) is required of all librarians who teach, in addition to their library and information science qualifications (Bewick & Corrall, 2010).

At the time of writing there was little integration of IL skills into subject curricula in tertiary education in Southern Africa (De Jager & Nassimbeni, 2002). Findings were corroborated by a study at two universities in KwaZulu-Natal, and one in Malawi (Chipeta, Jacobs & Mostert, 2009). At the University of Zululand, IL is taught as a stand-alone module by the academic Department of Library and Information Science, whereas at the Durban University of Technology, IL is offered by librarians only

WitsETD

during library orientation programmes. Information literacy is taught as a course by the academic department of Library and Information Science at Mzuzu University in Malawi. None of these courses are integrated into the curricula of the various subject disciplines. A case study at the University of Botswana involving Library and Information Science students could have "shed more light" on the level of IL competency among students had it been carried out from a cross-disciplinary perspective (Mutula, Kalusopa, Moahi & Wamukoya, 2006).

Articles about collaboration with teachers dominated the library and information science literature in 2009 (Johnson, Sproles & Detmering, 2010). This literature review yielded some forty-one articles that discussed some measure of collaboration between librarians and educators. The emphasis in these articles was often on collaboration at a deeper level of IL (such as writing instruction, as opposed to information-seeking). Collaborative IL skills programmes are beginning to be integrated into the curricula of various subject specialties (Smith & Presser, 2005; Miller, 2010; Mounce, 2010; Muir & Heller-Ross, 2010). Relationships between librarians and educators are explored (Donham & Green, 2004; Scales, Matthews & Johnson, 2005). Collaborative strategies used to introduce and reinforce IL competencies in the classroom are discussed (Birmingham, Chinwongs, Flaspohler, Hearn, *et al*, 2008). Discussion of library-run workshops to train the teachers in the requisite IL skills was also found (Miller, O'Donnell, Pomea, Rawson, *et al*, 2010).

2.1.2 Information Literacy: the Pedagogical Perspective

A search of twenty-nine discipline-specific pedagogical journals in an educational database (ERIC), and a further page-by-page review of thirteen subject discipline-specific pedagogic journals revealed that IL was not often mentioned in the pedagogical literature (Still, 1998). A paper from the perspective of two psychology lecturers about the benefits of integrating IL skills into one of their courses, but published in the library and information science literature is of interest (Larkin & Pines, 2005). Academic teachers (as opposed to researchers), who are often forced to publish in order to obtain or retain tenure, may choose expediency over advocacy in their attempts to publish. The choice by psychology lecturers of a library and information science journal for publication therefore suggests that it is not so much that academics believe the subject of IL skills irrelevant to their teaching practice, but rather that pedagogical journal editors may not perceive articles about IL to be relevant.

There is little discussion on the impact of IL initiatives on student learning from a pedagogical perspective. There is, however, some small indication that educators are starting to realize the potential for improving student outcomes by embedding IL into their courses (Cochrane, 2006).

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It is contended that librarians do not tend to publish much in disciplinary journals outside the field of library and information science (Still, 1998; Hardesty, 1995). Stevens (2007) argues convincingly that the transferability of general teaching concepts and strategies, in addition to the problem-based focus of many pedagogical journals, make them a natural place for librarians to reach out to faculty and promote IL within the subject-specific disciplines. While educators are often disconnected from the process of student research, seeing only the final research product and problems inherent in these papers, librarians deal with the common day-to-day issues that students grapple with in terms of their lack of information skills. These problem-based case studies would often be candidates for publication in the pedagogical literature if the issue of a common language to describe the same processes could be overcome (Gullikson, 2006).

Some articles about collaborative teaching of IL skills written by librarians were found however in the pedagogical or discipline-specialist literature (Mackey and Jacobson, 2005; Brasley, 2008; Floyd, Colvin & Bodur, 2008; Jacob & Heisel, 2008; Stevens & Campbell, 2008; Freeman & Lynd-Balta, 2010). Alliances are noted particularly in regard to writing skill courses, where language composition teachers are described as "the natural partners of librarians" (Hlavaty & Townsend, 2010). Collaborative teaching to improve scientific writing also receives some attention (Jacob & Hesiel, 2008). Changing teacher practice in order to incorporate IL skills into the classroom requires not only recognition of its value, but also the motivation to do so (Hara, 2006), and meeting accreditation standards seems to be a particularly strong motivation for educators to partner with librarians (Birch, Greenfield, Janke, Schaeffer, *et al*, 2008).

Educators' experiences of IL report that while aspects of IL are generic, others are context specific to the subject discipline (Lupton, 2008). Informal information gathering was found to be relatively common amongst educators who were not confident about their own IL skills, and who were not comfortable about asking questions regarding sources of information, particularly regarding the newer electronic resources. Information overload was also suggested as a factor in the lack of more formal information gathering methodologies (Jirojwong & Wallin, 2001). Lack of IL skills amongst teachers is suggested as a possible reason for the difficulty of embedding IL skills into content teaching (Stevens, 2007; Kong, 2007). "Train-the-trainer" outreach programmes, where teachers are taught about IL skills and how these can be incorporated successfully into various discipline-specific curricula, are suggested to overcome this deficiency (Miller, O'Donnell, Pomea, Rawson, *et al*, 2010).

Despite recognition of the value of IL skills on the part of educators, little activity was found on the part of academic staff to either teach or assess this, or to develop programmes through student-centred learning activities (Weetman, 2005). There was not a lot of agreement on the academic level

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at which IL outcomes are expected by educators. Where there was agreement, it tended to be with regard to outcomes expected in the first year of university (Gullikson, 2006). This might explain the emphasis of many large first year programmes in tertiary education internationally in which IL competencies play a part, such as general "First Year Experience" skills programmes.

The fact that more attention has not been paid to IL skills from a pedagogical perspective may be because librarians have not been proactive enough in promoting the benefits of collaborative teaching in this regard (Stevens, 2007). Several other sources elaborate various barriers to faculty-librarian collaboration (Badke, 2005; Given & Julien, 2005; Hrycaj & Russo, 2007), as well as ways to overcome these difficulties (Chiste, Glover & Westwood, 2000; Cunningham & Lanning, 2002; Lampert, 2005; Manuel, Beck & Molloy, 2005; Travis, 2008; Cousins & Perris, 2009). A substantial barrier to faculty-librarian collaboration might be teachers' lack of internalization of the role of information in their own professional learning. If there is a tension between IL in theory and the real world information experience of teachers, this may translate into difficulties in modeling good practice for their own students (Oker-Blom, 1998; McGuinness, 2006; Williams & Coles, 2007). Entrenched disciplinary-based beliefs and perceptions may adversely affect the potential for collaboration and prevent inclusion of IL skills in undergraduate curricula (McGuinness, 2006). The variation between different disciplines with regard to how IL is conceptualized by academics negates to a large extent the notion that all IL skills are somehow generic and transferable (Grafstein, 2002; Owusu-Ansah, 2004). Another tension occurs as a result of seeming "infiltration" by librarians who are often not considered legitimate members of the subject faculties, even when they have been granted academic status. The consequent unease for librarians, university administrators and conventional teaching staff remains a hurdle to be overcome (Owusu-Ansah, 2004).

Departmental and institutional culture is thought to play a major role in the readiness of teachers to accept IL programmes as part of a more holistic approach, instead of the isolated "silo" model where IL skills are seen as peripheral (rather than critical) to learning outcomes. The move towards student-centred approaches of learning in many institutions of higher education, as well as greater emphasis on interdisciplinary and cross-modular studies, thus holds potential for greater integration of IL programmes in the various curricula (Travis, 2008).

2.1.3 Information Literacy in the Curricula of the Health Sciences

Conceptualization of IL skills does seem to be different in the field of the health sciences, compared to other disciplines. Evidence-based medicine (EBM) requires the integration of clinical knowledge and skills with the ability to search the literature to retrieve evidence needed to support a clinical decision (Rosenberg & Donald, 1995). The need to teach EBM has thus made educators in the health

sciences more cognisant of the need for IL competencies to be integrated into clinical teaching, often within a problem-based learning (PBL) curriculum (Gruppen, Rana & Arndt, 2005; Kingsley & Kingsley, 2009).

The EBM synthesis of subject knowledge with information-seeking suggests that the health sciences are a natural arena for teaching partnerships between clinical teachers and librarians. Thus the teaching of evidence-based information-seeking skills, and assessment and evaluation methodologies for evidence-based practice, has afforded opportunities for the librarian to become a partner in the health care process itself (McKibbon & Bayley, 2004). The librarian often assists with problem-based tutorial facilitation within evidence-based practice (Eldredge, 2004).

Medical librarians were forerunners in introducing IL initiatives (Burrows, Ginn, Love & Williams, 1989; Burrows & Tylman, 1999; Brown & Nelson, 2003), and were no doubt influenced by the need to provide IL skills to students engaged in problem-based learning (PBL) activities (Rankin, 1992, 1996; Eldredge, 1993; Marshall, Fitzgerald, Busby & Heaton, 1993; Fitzgerald, 1996; Oker-Blom, 1998) as a result of the adoption of this form of instruction in international medical curricula (Norman & Schmidt, 1992). “Clinical” librarians are an integral part of the interdisciplinary health care team involved in ward rounds to answer clinical information needs (Cimpl, 1985; Kesselman & Watstein, 2009).

Teaching EBM saw collaborative initiatives between medical educators and librarians (Vogel, Block & Wallingford, 2002; Dorsch, Aiyer & Lynne, 2004; Kroth, Phillips & Eldredge, 2009). However, despite a suggestion that the rise in popularity of many PBL-based medical curricula was in fact a response to a concurrent explosion in the biomedical literature (Epstein, 2004), very few studies on IL skills teaching could be found in journals in the clinical or medical education fields (Oberprieler, Masters & Gibbs, 2005; Hamilton, 2008; Morris & McKimm, 2009; Shanahan, 2009). Interestingly, the nursing (as opposed to medical) literature has more examples of curriculum-integrated IL skills and faculty-library partnerships (Verhey 1999; Dorner, Taylor & Hodson-Carlton, 2001; Shorten, Wallace & Crookes, 2001; Jacobs, Rosenfeld & Haber, 2003; Barnard, Nash & O’Brien, 2005; Klem & Weiss, 2005; Hightower, Rawl & Schutt, 2007; Innes, 2008; Schutt & Hightower, 2009; Miller, Jones, Graves & Sievert, 2010; Phillips & Bonsteel, 2010). The reasons for such differences in subject-domain collaboration in health sciences education is outside the scope of this Research Report, and should form part of further research.

It may be that a lack of commitment on the part of medical educators to embedding IL skills into the curriculum is due in part to the need for professional development of educators in terms of improving their own IL skills (Williams & Coles, 2007). It may also be that professional development is

required for medical educators to translate an understanding of EBM into their own teaching practice (Ulvenes, Aasland, Nylenna & Kristiansen, 2009). The lack of an acceptable theoretical pedagogical framework into which collaborative teaching of IL skills can be placed may exacerbate the issue. A model for collaborative teaching of IL skills in a theoretical pedagogical perspective, termed Dynamic Purposeful Learning (DPL) (Kenedy & Monty, 2008) holds promise for the integration of IL skills into the clinical medical curriculum.

2.2 Summary

The IL literature was surveyed generally, and from library and pedagogical perspectives. The concept of integrated IL was examined with reference to curricula in the health professions. The literature from three separate fields was searched: that of library and information science; pedagogy; and the medical and health-related literature.

Chapter 3 discusses the methodology used in this study. A predominantly qualitative research paradigm using an interpretive case study analysis was adopted. A qualitative log was employed to analyse curriculum content, and a rubric devised to assess the levels of IL integration into the curriculum. A questionnaire, including open-ended comment, was sent to educators in GEMP 1 and 2 to ascertain self-reported information-seeking practice and attitudes towards the teaching of IL skills within an evidence-based framework.

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Chapter 3
METHODOLOGY

The methodological approach comprises a single site interpretative case study within a qualitative research paradigm.

3.1 Rationale for Methodology Selected

A qualitative methodology was selected to keep the approach as flexible and open-ended as possible in an attempt to understand the views held by educators within GEMP 1 and 2 (Miller & Salkind, 2002:145). As modern research practice lies on a continuum between quantitative and qualitative approaches (Creswell, 2002:4), a qualitative log was used to analyse the GEMP 1 and 2 curriculum, but basic quantitative statistical calculations (average or arithmetic mean, and mode) were employed to interpret data from the qualitative log. The term "mixed methods" is sometimes used fairly broadly to describe studies with some elements of both qualitative and quantitative research, but it is recommended that a mixed methods approach should be reserved for studies with extensive elements of both qualitative and quantitative research (McMillan & Schumacher, 2006:402). As only basic statistical calculation was used in this study, the research design remains predominantly qualitative in approach.

A case study in educational research is defined as a bounded entity or unit (Merriam, 1998:27), which in this instance is a specific curriculum, within a single organisation, taught by a specific group of educators. An interpretative case study is further defined as being used to support and/or challenge assumptions held prior to the collection of data (Merriam, 1998:38). This approach was used in order to evaluate the readiness of educators within GEMP 1 and 2 to collaborate with librarians on embedding IL skills into the curriculum. In addition to the curriculum analysis, insight was also sought by means of a questionnaire with regard to these educators' understanding of evidence-based information-seeking resources, and whether this understanding could be developed so as to inform teaching practice with regard to IL skills.

The pedagogical framework in which this study is anchored is that of Dynamic Purposeful Learning (DPL), which is largely constructivist in nature, and heavily reliant on active learning as a pedagogic strategy, together with cognitive scaffolding and collaborative apprenticeship (Kenedy & Monty, 2008). "Dynamic" in the term DPL refers to the duality of the teaching process itself (that is, collaborative teaching by the subject specialist alongside the librarian in the classroom). "Purposeful" relates to the active learning strategies embraced. Active learning is defined as the process whereby students engage in an activity that forces reflection, and which requires them to assess their own

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understanding of particular concepts and problems on a regular basis (Michael, 2006). Active learning derives from two fundamental assumptions: that learning is intrinsically active, and that people learn differently (Meyers & Jones, 1993:xi). Thus students learn best when applying subject matter, that is, they learn by "doing". As a corollary, teachers need to use a variety of approaches in order to stimulate the active learning process. When "we involve students in activities that lead them to discuss, question, clarify, and write about course content, we not only foster better retention of subject matter but help to expand students' thinking abilities as well" (Meyers & Jones, 1993:xii). These learning strategies are inherent in the problem-based learning (PBL) used in the GEMP 1 and 2 curriculum, where PBL is intended to be constructivist, self-directed, and contextual (Dolmans, Snellen-Balendong, Wolfhagen, & Van der Vleuten, 1997).

Within the DPL framework, the librarian is a "dynamic" partner in delivery. This is achieved by teaching the student how to access, integrate and cite information required for a specific assignment, and even co-assessing the assignment. Thus the resources and the librarian become "embedded" in the teaching process itself alongside the teacher. The concept of "embedded librarianship" takes the librarian out of the library and into the classroom, where the librarian is able to become an active partner in the knowledge-sharing conversations that occur between teachers and students (Shumaker, 2009).

As DPL relies on active learning as a pedagogic strategy, together with cognitive scaffolding and apprenticeship, it was judged a relevant constructivist pedagogical theory for the present study, given the process of PBL within the GEMP. Furthermore, the collaborative, dualist nature of the teaching process inherent in DPL lends itself well to the concept of embedding IL skills into teaching practice. The interpretative case study within a qualitative paradigm, adopted as the methodological approach for this study, is an intuitive lens through which to examine the pedagogical framework of DPL, as it will be used to confirm or challenge prior assumptions about the extent to which IL is embedded in the GEMP curriculum, together with educators' perceptions about evidence-based IL and collaborative teaching.

3.2 Study Population and Sampling

The population sample can be characterized as a non-probability convenience sample. Convenience samples often do not provide data that can be generalized. However, extrapolation from this particular study might in any event not be applicable or particularly relevant to years 3 and 4 of the GEMP curriculum, because the nature of the two groups of educators involved varies to a large

WitsETD

degree. Whereas much teaching in GEMP 1 and 2 takes place in the classroom, GEMP 3 and 4 places greater emphasis on teaching in the clinical setting.

Extrapolation of research findings from this case study to other generalized populations would only be relevant in a medical education setting with a similar problem-based learning approach, and where evidence-based practice is taught. Generalization of research findings on a wide scale are therefore unlikely, but was not considered a limiting factor as the research question and the sub-problems under investigation are specific to one particular case study, and only to the medical education field.

3.3 Research Instruments

Unlike other research methods, the case study does not claim any particular method for either data collection or analysis (Merriam, 1998:28), and a variety of data collection methods can be used (Stake, 1995). The instruments used for data collection in this study are discussed in the following sections in the context for which they were employed.

3.3.1 Analysis of the GEMP 1 and 2 Curriculum

The curriculum itself was examined and analysed for evidence of IL skills integration on the part of the educators responsible for course content. A qualitative log of the GEMP 1 and 2 curriculum was kept, using an Excel spreadsheet, to document every listed lecture, learning topic, theme session and clinical skills practical tutorial, together with the names of those responsible for content of each segment. A total of 63 weekly cases (30 cases for GEMP 1 and 33 for GEMP 2) in blocks 2 to 11 were analysed for evidence of existing IL skills integration. In all, a total of 186 lectures, 203 learning topics, 113 theme sessions and 24 clinical skills practical tutorials were analysed in the GEMP 1 curriculum, while 186 lectures, 194 learning topics, 118 theme sessions and 34 clinical skills practical tutorials were analysed in GEMP 2.

Each lecture, learning topic, theme session and clinical skills practical is uniquely numbered in the electronic curriculum. Thus, for example, in Block 3 (*Cardiovascular System*), lecture 1 of case 1 is numbered L03.01.01. Learning topics are numbered similarly (LT03.01.01), and theme sessions and clinical skills practical tutorials are designated TS and CSP respectively, with similar numbering. IL skills that emerged were related to each element of every case by unique number.

The log was annotated to keep track of any emergent themes. In particular, this log tracked patterns of resource integration on the part of specific authors and teachers of course content, in order to

WitsETD

determine actual teaching practice. The level of integration of IL resources in every segment listed was graded according to an Embedded Information Literacy Skills Assessment Rubric that was devised for this purpose (Table 4.3 in the following Chapter).

3.3.2 Embedded Information Literacy Skills Assessment Rubric

A rubric for the assessment of the levels if IL integration was devised using a scale of 1 to 4 in Table 4.3 (shown in the next Chapter) as follows:

- **1** *"no embedding"*
- **2** *"almost no embedding"*
- **3** *"moderate embedding"*
- **4** *"fully embedded"*

The rubric was subjected to peer-evaluation, and determined appropriate for the purpose. The distinction between scoring **3** and **4** on the rubric is quite fine in terms of IL skills integration. A score of **3** indicates that although the student was directed to a library catalogue entry in order to find information, the student does not experience this to be "woven into the learning experience" (Bruce, 2002). In spite of the long-standing use of reading lists in higher education, educator and student perceptions diverge considerably in respect of the use of these bibliographies (McGuinness, 2006). Technology that is seamlessly interwoven with pedagogy and practice in ways that will add value to the learning experience needs to be employed to maximize student use of such resources (Stokes & Martin, 2008). This is easily accomplished, for example, by hyperlinking directly to e-book or e-journal content, rather than directing the student to material via a library visit. A score of **4** indicates that the lecturer was aware of the capabilities of hyperlinking for self-directed active learning, and could direct students to appropriately "scaffolded" URLs or other electronic material, allowing immediate exploration of content to support learning.

Once scores were assigned to every segment, basic quantitative statistical procedures were used to gain an overall impression of the existing level of IL skills integration, with these levels of integration depicted graphically in the next Chapter as Figures 4.1 to 4.5 and Tables 4.4 and 4.7. Data emerging from the qualitative log and the level of integrated IL skills rubric are analysed in the following Chapter in Section 4.1.1, and Subsections 4.1.1.1 (GEMP 1) and 4.1.1.2 (GEMP 2).

3.3.3 Questionnaire Sent to GEMP 1 and 2 Educators

Data obtained from the curriculum analysis was correlated against answers obtained from an online questionnaire sent to GEMP 1 and 2 educators. This questionnaire aimed to ascertain

- Educators' perceptions of their own information-seeking practices

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- The format of additional material or types of resource provided to students as additional study material
- The purpose for which these resources were provided (whether they were of central importance ["core"] or peripheral ["for interest"] to the curriculum)
- Educators' views on evidence-based information-seeking practice
- Educators' knowledge of EBM resources
- Educators' beliefs whether students in GEMP 1 and 2 should be taught evidence-based IL skills
- Educators' views on collaborative teaching of evidence-based IL skills

The online questionnaire was distributed as an attachment to participants by means of e-mail. Online surveys can be designated "electronic surveys, e-surveys, e-mail surveys, or Internet surveys" (McMillan & Schumacher, 2006:238). From the two types of Internet surveys available, one is "Web-based" and the other "e-mail". An "e-mail survey" uses electronic mail to deliver the survey, either in the body of the e-mail or as an attachment (McMillan & Schumacher, 2006:238). This study used an attached e-mail survey instrument.

The merits of online versus paper-based surveys, and the benefits and disadvantages of the personal interview versus the survey are well-documented (Evans & Mathur, 2005). Response representativeness is considered more important than response rate (Cook, Heath & Thompson, 2010). Response rates are sometimes greater and sometimes lower for e-mail surveys, largely due to the chosen sample and the topic, but response times are shorter (Sheehan, 2001). Response rates improve if a survey is short, relevant and of interest to the respondent, and can improve if the time and effort required to complete the survey is minimal (Evans & Mathur, 2005). If constructed properly, online surveys have significant advantages over other formats, such as speed, convenience, ease of data entry and analysis, low administration cost, ease of follow-up, and ease of required completion of answers on the part of the respondent. These advantages should be taken into account along with certain disadvantages of this survey format, such as perception of the survey as junk mail, and a possible low response rate (Evans & Mathur, 2005). Online questionnaires are often methodologically and financially more viable, especially in a University setting, where respondents can complete the questionnaire more conveniently, thus increasing the response rate (Sax, Gilmartin & Bryant, 2003). Thus online surveys can be a viable alternative to face-to-face surveys if time, cost restraints and geographic boundaries are factors (Curasi, 2001).

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The Faculty of Health Sciences campus at the University of the Witwatersrand is highly decentralized, with staff located at seven teaching hospitals and the Medical School building itself, at some considerable distance from each other. Many "joint" staff members work for organizations other than the University, such as the National Health Laboratory Service (NHLS), or the hospital service. The NHLS campus itself is also decentralized, consisting of different national research institutions and branches. Given the prevalence and use of e-mail for communication purposes within this Faculty, it was determined that the best option for all concerned would be to survey educators in GEMP 1 and 2 using an e-mailed electronic survey instrument, rather than attempting to interview teachers and clinicians in their respective workspaces. Interviewer interaction with respondents was not necessarily considered advantageous, as the presence of the interviewer (the librarian) in this case might constrain answers to questions about teacher readiness for the concept of "embedded librarianship", or about information-seeking practices of respondents (Evans & Mathur, 2005). Concerns with regard to these topics on the part of respondents might be more freely expressed anonymously by e-mail.

An e-mail list of addresses was compiled from the in-house University Global Contacts database. Not all educators who teach GEMP 1 and 2 have the University as their primary e-mail address, particularly those staff attached to the NHLS or the various clinical academic departments within the teaching hospitals. Where the University e-mail address "bounced" (that is, it did not reach its intended recipient), an alternative e-mail address was sought.

Two options for the electronic questionnaire survey instrument were available. The first was the commercial *Survey Monkey*; the second was an in-house survey instrument available through the University (*Survey Manager*). At the time the questionnaire was developed, the University site was down, and it was therefore decided to use *Survey Monkey*. *Survey Monkey* (available at http://www.surveymonkey.com) is an easy to use tool for the creation of online surveys. Its primary strength is its intuitive Web interface (Westin, 2005). A limited free version was used to pilot the questionnaire, but this restricted the number of questions that could be asked to only 10. It was decided to upgrade to the "professional" version, which allowed an unlimited number of questions to be posed for a small fee. Although the total number of questions asked was not large, there were too many for the free instrument. It was felt that compression of all facets of the survey instrument into only 10 questions would make the questionnaire either too complicated for respondents to answer, or render results returned too difficult to interpret.

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The questionnaire was partially based on a validated instrument used to assess the knowledge, attitude and behaviour of undergraduates in regard to evidence-based teaching and practice (Johnston, Leung, Fielding, Tin, *et al*, 2003). Although the original validated questionnaire was intended to be administered to students (not teachers), the section on attitudes towards evidence-based practice was deemed relevant to educators as well. A questionnaire comprising fifteen questions was devised, so as to keep the e-mailed questionnaire short and easy to complete (Taylor, Reeves, Mears, Keast, *et al*, 2001; Walonick, 1997-2004). Open-ended comment was invited in 8 of the questions asked, and further opportunity for comment was provided at the end of the questionnaire (Boynton & Greenhalgh, 2004). The survey instrument was e-mailed to a small pilot group, and the questionnaire slightly modified as a result of input from this group (Appendix C).

As time constraints dictated a parsimonious approach to the collection of data, open-ended questions were designed to replace follow-up interviews (Creswell, 2002:16) in the hope that the complete anonymity provided by the e-mailed survey instrument might invite comments in response to the open-ended questions. A deeper understanding of respondents' perceptions and practice would thus be gained.

Ethics approval for this questionnaire was granted by the Wits School of Education (Appendix A Protocol: 2010ECE63), and was accompanied by an information sheet in the body of the e-mail in accordance with University ethical behaviour protocols for research involving human subjects (Appendix B). A separate consent form was incorporated into the electronic questionnaire that was attached to the e-mail sent to participants. Informed consent was indicated by proceeding to the next screen. If consent was withheld, the survey participant had the option to leave the survey at this point, without having to state a reason for so doing. This consent form assured participants of the voluntary nature of participation and complete anonymity (Appendix C).

From the curriculum analysis, a total of 248 unique educators were identified as having contributed course material to GEMP 1 and 2. Valid e-mail addresses were located for 149 educators, representing a 60.08% convenience sample. In order to comply with the ethical requirement for complete anonymity, a "blind copy" (Bcc) distribution list was compiled, so that the distribution list was withheld from public view and respondents did not know who else was approached to answer the questionnaire. The *SurveyMonkey* instrument that was used also blinds respondents to the researcher, as only the IP (Internet Protocol) address of the respondent is identified. As the University of the Witwatersrand does not use fixed IP addresses, no respondent could be identified from respondents' IP addresses.

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Two follow up requests were made at two week intervals after the initial e-mail request was sent. A response rate of 42% was obtained (63 respondents).

Results obtained from educators' responses were examined in the light of previous in-depth analysis on student approaches to learning in GEMP 1 and 2 by Manning (2007), and evidence obtained from the literature.

3.4 Summary

The methodological approach taken was that of a single site interpretive case study within a predominantly qualitative research paradigm. Various survey instruments were used to collect data: an analysis of curriculum content, a qualitative log to assess patterns emerging from the data collected; a rubric to score the extent of IL skills integration into the curriculum; and an e-mail questionnaire with both closed- and open-ended questions. Chapter 4 describes the results obtained from the various survey instruments.

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Chapter 4
RESEARCH DATA, ANALYSIS AND INTERPRETATION

4.1 The GEMP 1 and 2 Curriculum

The GEMP 1 and 2 curriculum takes into account an exponential proliferation in the knowledge-base for the various disciplines in the field of medicine. Much of what is taught will become outdated fairly rapidly, and the modern medical student is likely to be burdened by factual overload. Emphasis is now placed on social awareness and the need for a more patient-centred approach, as recommended nationally and internationally. It is recognized that it is better for students to acquire basic principles, and to develop skills related to information literacy in order to update their knowledge continuously throughout their careers as life-long learners (Manning, 2007).

The curriculum integrates content horizontally across disciplines within a single year of study, as well as vertically across levels of study. The learning process is structured around medical problems, presented in the form of weekly case scenarios, which students analyze in problem-based learning (PBL) groups. These weekly cases are organized into blocks around particular human body organ systems. Although the content of the curriculum runs over two years of study, the GEMP 1 and 2 curriculum forms a two year continuum of 11 teaching blocks, as shown by the sequential block numbering in Table 4.1.

GEMP 1	GEMP 2
Block 1: Preliminary Concepts in Medical Science (PCMS)	
Block 2: Life on the Street (LOTS)	**Block 7:** Endocrine System (ENDOCR)
Block 3: Cardiovascular System (CVS)	**Block 8:** Musculoskeletal System (MS)
Block 4: Respiratory System (RESP)	**Block 9:** Gastrointestinal & Digestive System (GIT)
Block 5: Renal System (RENAL)	**Block 10:** Reproductive System (REPRO)
Block 6: Blood & Immunology System (HAEM)	**Block 11:** Neurological System (NEURO)

Table 4.1
Topic Blocks in the GEMP 1 and 2 Curricula

There are two introductory blocks. The first, *Preliminary Concepts in Medical Science* aims to provide fundamental knowledge across several disciplines, and is the only block that does not use a PBL methodology. The second introductory block, *Life on the Street*, introduces the case-based scenario format to the PBL groups, and deals with integrated medical and human sciences issues important in the South African context, such as malnutrition, rape or HIV that can not be isolated from broader psycho-sociological perspectives. The remaining 9 blocks are based on the human body organ systems, with four longitudinal themes running through all four years of the entire curriculum. The first longitudinal theme consists of the basic and clinical sciences. The remaining three themes emphasize the psycho-social elements of medical practice: the patient-doctor-relationship; the

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community-doctor relationship; and personal and professional development (Manning, 2007). Evidence-based medicine and information literacy are taught as part of the personal and professional development theme.

Each block from *Life on the Street* (Block 2) onwards is subdivided into weekly case scenarios, with the number of cases per block dependent on representative cases required for students to acquire the basic principles of each system, and available teaching time. An example of the weekly cases from Block 3: *Cardiovascular System* is shown in Table 4.2.

Block 3: Cardiovascular System		
	Case Title	**Medical Problem/Condition**
Case 1	**Considering Alternatives**	**Fainting – vaso vagal attack**
Case 2	**Going Downhill**	**Heart Failure**
Case 3	**Mr Buthelezi's Funny Term**	**Hypertension Heart Disease**
Case 4	**A Round of Golf**	**Angina Pectoris and Peripheral Vascular Disease**
Case 5	**A Breathless Pregnancy**	**Valvular Disease in Pregnancy**
Case 6	**Thandi and David's Baby**	**Congenital Cardiovascular Defect**

Table 4.2
Representative Example of Weekly Cases from Block 3: Cardiovascular System

The medical conditions or problems in each case are not made explicit initially. Students receive an audiovisual "trigger scenario", and attempt to analyse symptomatic cues to formulate a clear hypothesis. The PBL discovery process attempts to discover underlying physiological and pathophysiological mechanisms of the problem, and the anatomical or pathological structures involved. Further information is provided for the verification of conclusions. Essential facts and issues are confirmed to ensure that all necessary information has been covered (Manning, 2007).

The GEMP is a hybrid curriculum (not purely problem-based), and student learning is further directed by lectures (L), theme sessions (TS), and learning topics (LT). Content is made available progressively on an e-learning platform, so that self-directed learning is ensured. Although students are provided with scaffolded case-related matter, their self-directed learning requires engagement with various information resources. Lectures, learning topics and the various theme sessions are thus supplemented by printed and online information, such as notes, copies of lecture presentations, reading lists with recommendations, and references to relevant or additional information. Multiple copies of core textbooks are provided in each of the PBL seminar rooms for easy reference during the various PBL tutorials.

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Although it is a stated GEMP curriculum goal that students are expected to develop skills related to information literacy, the only formal opportunity afforded for the teaching of IL competencies is 5 contact hours in the first block, *Preliminary Concepts in Medical Sciences*. Despite integration of other content throughout the rest of the curriculum, teaching IL competencies inevitably falls into an isolated silo in this first block. As summative IL assessment is required, an *ad hoc* attempt to find further opportunities for IL teaching has been made allied to the theme of personal and professional development, in which evidence-based medicine (EBM) is taught.

Although not part of the research for this study, 8 years' experience in teaching and examining IL in the GEMP has shown that skills taught in isolation in the first block do not appear to be transferred by students to the rest of their studies, despite opportunities afforded for self-directed learning. Thus IL skills in the GEMP are not perceived to be "woven into" the learning experience itself (ACRL, 2000; Bruce, 2002). In 2007, Manning conducted an extensive evaluation of student approaches to learning within the GEMP. Some of Manning's findings on student learning with respect to IL competencies and self-directed learning are discussed in the analysis which follows, as they provide some corroboration of student use of information, and an alternative lens to their teachers' perceptions.

4.1.1 Analysis of the GEMP 1 and 2 Curriculum Cases for Evidence of Levels of IL integration

Levels of IL integration in the GEMP were established by an analysis of additional resources attached to course content in the curriculum. All lectures (L), learning topics (LT), theme sessions (TS) and clinical skills practical tutorials (CSP) were assessed against an information literacy rubric, depicted in Table 4.3.

1 **No embedding** (no additional resources provided)	**4** **Fully embedded** (where additional resources were given, they were in the form of a hyperlink to a functional website, an e-book or e-book chapter held in the library; or an e-journal article DOI®* or an e-journal portal hyperlink)
2 **Almost no embedding** (print bibliographies; printed notes, slides attached, handouts, or attached PDF journal articles and/or chapters from text books)	**3** **Moderately embedded** (content still taught as a "silo"; some evidence of hyperlinked resources, eg. in the form of a hyperlink to the library book catalogue or e-journal portal)

Table 4.3
Embedded Information Literacy Skills Assessment Rubric

*DOI® is an abbreviation for Digital Object Identifier. This unique number is increasingly assigned by publishers to the article level for all electronic journals, according to an International Standard. It provides a permanent link to a unique electronically available journal article, and follows a specific alpha-numerical format as determined by the International DOI® Foundation (IDF). DOI® links may be resolved by entering the DOI® into the text box at http://www.doi.org/index.html (DOI® System, 2010).

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The finer distinctions regarding scoring in the rubric of hyperlinked resources were explained in Section 3.3.2 in the previous Chapter.

4.1.1.1 GEMP 1

The average (arithmetic mean) of all scores for each block was calculated for GEMP 1 using the rubric depicted in Table 4.3, and graphically represented in Figure 4.1. *No embedding* of IL skills occurred in Blocks 1, 2, 3 and 5, with *almost no embedding* of IL skills occurring in Block 4 (*Renal*). The graph thus depicts very limited amounts of embedding of IL skills, as represented by the average scores for Blocks 2 to 5 of between **1** (*no embedding*) and **2** (*almost no embedding*). The mode for all Blocks is 1, except for the *Renal* Block, where the mode is 2.

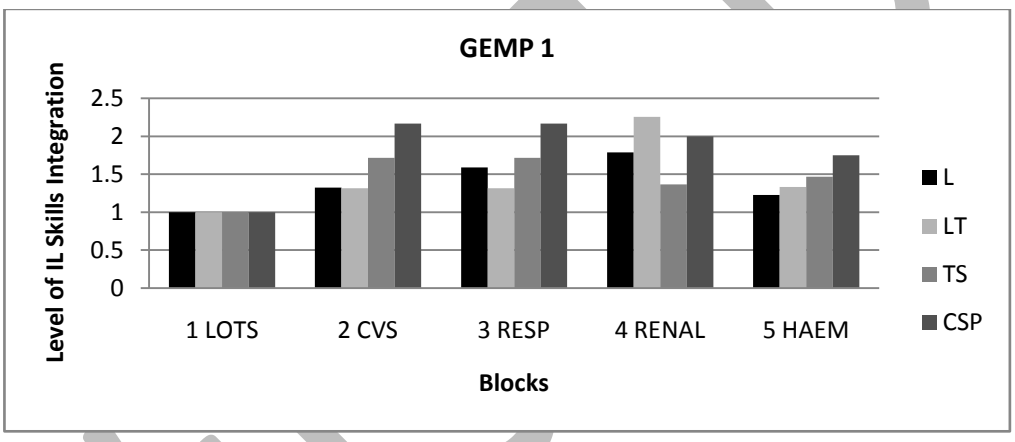
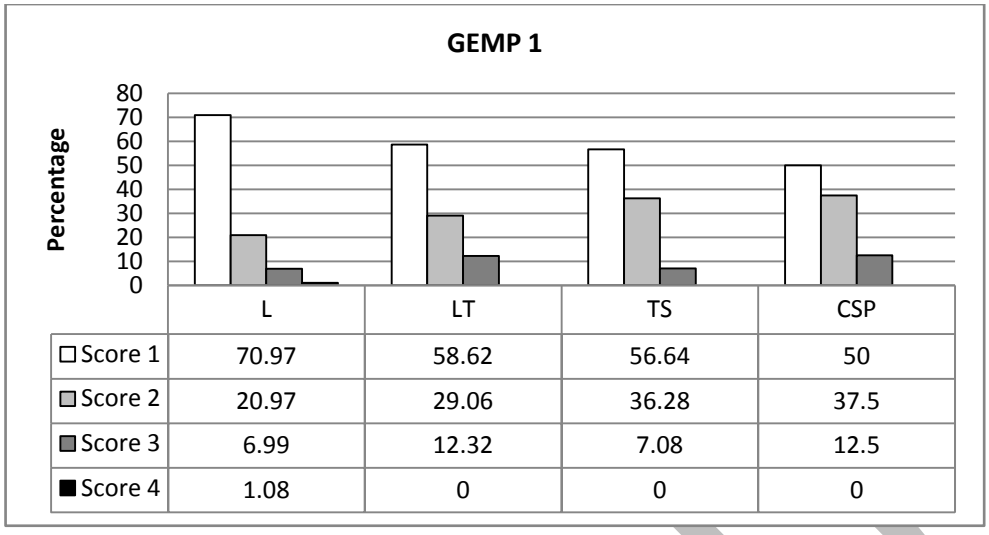


Figure 4.1
Average Score for IL Skills Integration in GEMP 1

Percentages of scores across all blocks were calculated for GEMP 1, and graphically represented in Figure 4.2. The distribution of scores across all types of teaching modality (L, LT, TS and CSP) was 50% or greater for a score of **1** (*no embedding*). Content that received a score of **2** (*almost no embedding*) ranged between 20.97% and 37.5% overall. Content with a score of **3** (*moderately embedded*) ranged from only 6.99 % to 12.5%, whilst content with a score of **4** (*fully embedded*) was negligible (only 1.08%).



	L	LT	TS	CSP
Score 1	70.97	58.62	56.64	50
Score 2	20.97	29.06	36.28	37.5
Score 3	6.99	12.32	7.08	12.5
Score 4	1.08	0	0	0

Figure 4.2
Scores for All Blocks in GEMP 1 Expressed as Percentages

In GEMP 1, overall, only two lecturers (C and D) scored a **4** (*fully embedded*) from a total of 526 opportunities. In the *Renal* Block, lecturer C incorporated functional hyperlinks to chapters in e-books for students to explore; in the *Haematology & Immunology* Block lecturer D required students to perform a literature search themselves in a suggested database in order to find relevant articles. Lecturer C co-authored a paper with the researcher several years ago (Myers, Saunders & Rogers, 2002), in which the power of hyperlinking within an electronic curriculum was demonstrated, and so was fully aware of the possibilities of IL skills integration.

In the *Renal* Block, journal log analysis shows that one lecturer (A) in particular was responsible for almost all the limited amount of embedded IL skills in GEMP 1. Her course content makes some use of hyperlinks to material (as opposed to attaching PDF copies or summarized notes) mainly in the learning topics, thus affording an assessment of **3** (*moderately embedded*) against the rubric for some of the material she provided in this block. Why her observed teaching practice differs from the majority of her colleagues is unclear, as she was exposed to the same level of awareness of available resources as others in the sample, and may be influenced by her personal teaching philosophy. Although there was no opportunity for a formal follow-up interview after the survey, at a meeting of the GEMP 1 and 2 curriculum working party during the course of the data collection phase of this study, she reported in connection with her change of approach, that

"*the students are complaining bitterly, but I refuse to spoon feed them. They are perfectly capable of finding the resources they need for themselves, and I don't believe everything should be handed to them on a plate. They're just lazy. They want actual page numbers of the material to be given to them, not just the chapters or the references.*"

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This comment may indicate teaching practice that is moderated by student evaluation. Other colleagues might be reluctant to deal with student complaint as a result of teaching practice that is perceived to encourage more active student participation. Manning's prior analysis of student approaches to learning (2007) indicated in fact that "…many students are using the unscheduled time which was intended for self-directed learning in unintended ways". This corroborates lecturer A's comment that students were reluctant to explore resources themselves, even when pointed to the source.

Lecturer A's colleague from the same department (lecturer B) was also observed in the journal log to integrate IL skills into her teaching practice in the *Renal* Block. The "gatekeeper effect" found in early adopters of new technologies (Travis, 2008) may help to explain this observed behaviour. The information "gatekeeper-effect" is not new (Lewin, 1947), and contends that social change among a particular group is influenced by various channels. Within these channels, certain areas may function as a "gate". The effect of various forces on each other in the entire change process is largely determined by what happens in this gate region, which is often controlled by a dominant "gatekeeper". The gatekeeper thus plays an extremely important role within informal communication channels, such as those found amongst colleagues in the dynamics that occur in the working relationships of a community of practice (Lave & Wenger, 1991:29; Mork, Hoholm, Ellingsen, Edwin, *et al*, 2010). Lecturer A is therefore acting as the enabling gatekeeper, able to effect change within the department, by exerting influence over the teaching practice of her junior colleague (B).

With the exception of the LOTS block, evidence is seen of greater IL skills integration into the clinical skills practical tutorials (CSP) in all blocks in GEMP 1, than was found in lectures, learning topics, or theme sessions. There is no direct evidence to explain why this occurred. However, in the year prior to this study, a small amount of CSP time was afforded to the librarian for IL skills tutorials. CSP tutors often waited at the back of the room during IL teaching, before beginning their own sessions. Verbal appreciation for a better understanding of how resources could be used was often expressed by tutors at these sessions, and it is possible that this awareness helped to contribute to a deeper level of IL skill integration into the CSP material for the curriculum during the following year (the year in which this study took place).

It is not evident why IL skills integration was so much lower in the *Life on the Street* (LOTS) Block. This is disappointing as this Block reportedly deals with a broader psycho-sociological perspective. These psycho-social aspects afford excellent material for the integration of IL skills, as they are not dependent on clinical knowledge, which is limited for students at this stage of their studies. As LOTS follows immediately after the introductory *Preliminary Concepts in Medical Science* Block, where

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initial information-seeking skills are taught, IL skills integration in this block could reduce the "silo" effect of IL teaching in the GEMP.

4.1.1.2 GEMP 2

The average (arithmetic mean) of all scores for each block was calculated for GEMP 2, using the rubric depicted in Table 4.3, and graphically represented in Figure 4.3. The mode for all Blocks (except *Endocrinology*) is 1. In the *Endocrinology* Block, the mode for lectures (L), learning topics (LT) and clinical skills practical tutorials (CSP) is 2, while the mode for the theme sessions (TS) in this block is 3. In terms of the rubric (Table 4.3), this represents *no embedding* of IL skills at all in Blocks 8, 9, 10 and 11, with *almost no embedding* of IL skills occurring in Block 7 (*Endocrinology*). Theme Sessions (TS) in Block 7 (*Endocrinology*) were the exception, demonstrating *moderate embedding* of IL skills.

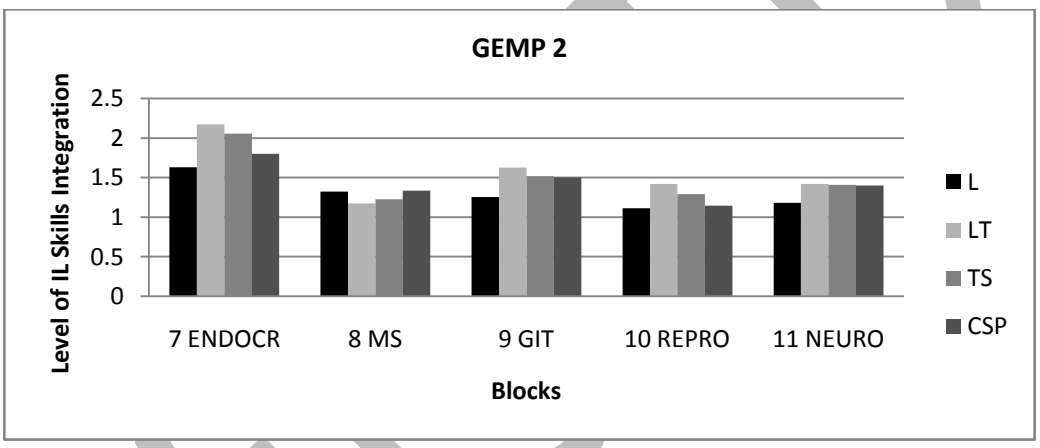


Figure 4.3
Average Scores for IL Skills Integration in GEMP 2

The low level of IL skills integration in GEMP 2 is depicted by a graphic representation of the mode for each Block (Figure 4.4), according to the rubric (Table 4.3). The mode for theme sessions (TS) in Block 7 (*Endocrinology*) is significantly higher than that for all other Blocks in GEMP 2, and higher than all other teaching modalities in GEMP 2.

As two theme session lecturers in the *Endocrinology* Block are known proponents of evidence-based medicine (EBM), it could be that EBM informs their teaching practice with regard to IL skills integration. The effect that EBM has on the integration of new knowledge obtained from the literature into current knowledge has been outlined earlier in Chapter 2, section 2.1.3.

Three different lecturers contributed to the increased use of IL skills integration in the theme sessions of the *Endocrinology* Block. Two were from the same department (lecturers B and E).

Lecturer B was earlier shown to have been influenced by a "senior gatekeeper" (lecturer A) in the *Renal* Block in GEMP 1, and may also have exerted influence regarding teaching practice on her colleague (lecturer E). The third lecturer (F) was from a different School.

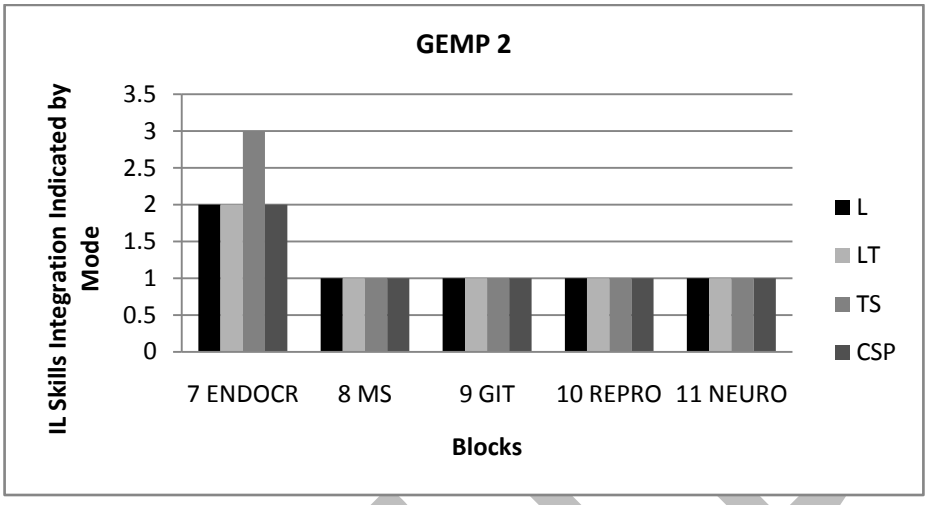
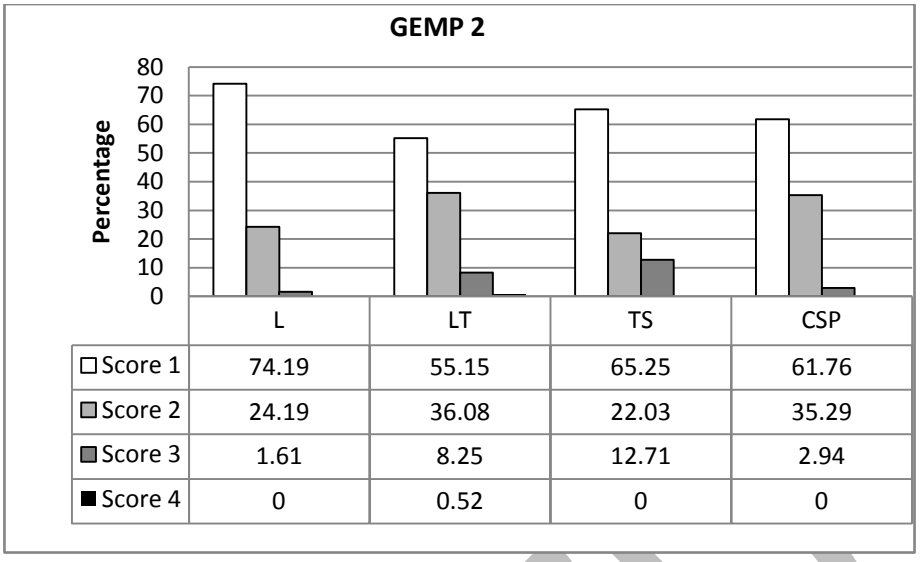


Figure 4.4
Mode for IL Skills Integration in GEMP 2

In addition to observed increased IL skills integration in the Endocrinology theme sessions, only lecturer F fully embedded IL skills into her learning topic material in Block 10 (*Reproduction*). Students were instructed to carry out a literature search in a suggested database in order to locate relevant material themselves. Lecturer F is a member of the School of Allied Health Sciences. As a whole, this School has shown a much deeper awareness of the role of IL skills in student learning compared to the School of Clinical Medicine, in which the GEMP falls. Educators in the School of Allied Health Sciences already co-teach IL skills with the librarian to students in their own disciplines. Lecturer F's teaching practice is therefore consistent for all students, irrespective of the degree for which they have registered.

Percentages of scores across all blocks were calculated for GEMP 2, and graphically represented in Figure 4.5. The distribution of scores across all types of teaching modality (L, LT, TS and CSP) was 62% or greater for score **1** (*no embedding*), Content that received a score of **2** (*almost no embedding*) fell between 22.03% and 36.08%. Content with a score of **3** (*moderately embedded*) ranged from only 1.61 % to 12.71%, whilst content with a score of **4** (*fully embedded*) was negligible (0.52%).



	L	LT	TS	CSP
Score 1	74.19	55.15	65.25	61.76
Score 2	24.19	36.08	22.03	35.29
Score 3	1.61	8.25	12.71	2.94
Score 4	0	0.52	0	0

Figure 4.5
Scores for All Blocks in GEMP 2 Expressed as Percentages

4.1.2 Comparison of IL Skills Embedding in GEMP 1 and GEMP 2

Using the same rubric for scoring as shown in Table 4.3, the average (arithmetic mean) scores for IL skills embedding for both years of the GEMP curriculum were calculated, and compared in Table 4.4.

GEMP 1		GEMP 2	
1 No embedding **59.06%**	4 Fully embedded **0.27%**	1 No embedding **64.08%**	4 Fully embedded **0.13%**
2 Almost no embedding **30.95%**	3 Moderately embedded **9.72%**	2 Almost no embedding **29.40%**	3 Moderately embedded **6.38%**

Table 4.4
Comparison of Average Scores for IL Skills Integration in GEMP 1 and 2

From this comparison it is clear that integration of IL skills into curriculum content of GEMP 1 and 2 is small. Exceptions are limited to certain individuals, who show consistency in their teaching practice.

4.2 Educators' Perceptions of their Information-Seeking Practices

In order to match perceptions of teaching practice with the reality observed in the analysis of the GEMP 1 and 2 curriculum as reflected above, a questionnaire (Appendix C) exploring educators'

perceived practice and attitudes towards IL skills embedding was devised. This questionnaire attempted to ascertain the readiness of educators towards the use of evidence-based information-seeking skills. A response rate of 42% was obtained (63 respondents).

Results obtained from the responses to the questionnaire are shown in the following Sections.

4.2.1 Educators' Information-Seeking Practice and Frequency

The majority of respondents (98.4%) indicated that they searched for information related to the subjects that they taught. Most (34.4%) searched for information every week; 26.2% indicated that they searched daily; while 24.6% indicated that they searched every couple of months. The balance (13.2%) indicated that they searched for material at the point of need

- *"As needed – when I am preparing a lecture, presentation, workshop, etc. or when I am writing an article. Varies from every few days to every couple of months depending on what is going on"*
- *"Do not teach frequently, but look up the website every time I do"*

4.2.2 Importance of Resources Used for Teaching

Respondents were asked to rate the order of importance of the different information resources used for teaching. Although eight sources were suggested, respondents were given considerable leeway (from 1 = high importance to 10 = low importance) in their rating of these resources rendered in Table 4.5 into a 5-point Likert scale. Leeway was allowed to avoid a forced ranking of resources, which might have obscured patterns in the choices made by respondents. Results are tabulated in Table 4.5.

The most important rated resource (very important or important) for teaching was electronic journals (86.9%) followed closely by subject specific databases (86.7%). Print journals were rated as very important or important by 66% of respondents. Use of journals by educators in teaching was therefore rated very highly.

Several respondents commented on the availability of electronic journals in the biomedical disciplines

- *"I very seldom consult a printed journal. All the print journals I use are also available electronically and that's how I access them."*
- *"I only use electronically available journals. Nevertheless, most good journals are also available in print. Conversely the content of most electronic only journals is not yet good enough to make them worthwhile."*

This last comment indicates a bias that may indicate lack of awareness of the need for EBM resources. New e-journals are proliferating rapidly in many biomedical areas, with fast growing

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impact factors and peer-review processes that enable rapid publication, to satisfy EBM requirements for current information.

	Very Important	Important	Doesn't Matter	Unimportant	Completely Unimportant	N/A
Print Journals	30%	33%	23%	6%	8%	0%
Print Textbooks	24.6%	24.6%	42%	8.8%	0%	0%
E-Journals	73.8%	13.1%	3.3%	1.6%	8.2%	0%
E-Textbooks	23%	21.2%	40.4%	5.8%	9.6%	0%
Subject Specific Websites	34.5%	36.3%	22.4%	3.4%	3.4%	0%
Subject Specific e-Databases	73.3%	13.4%	1.7%	0%	11.6%	0%
Blogs	7.4%	1.9%	5.6%	24%	42.6%	18.5%
Wikipedia	7%	8.8%	12.3%	31.6%	29.8%	10.5%
Other	10.3%	0%	3.4%	0%	0%	86.3%

Table 4.5
Importance of Resources Used for Teaching

After journals, subject-specific web sites (70.8%) were rated next in importance. Importance of textbooks for educators for teaching purposes was rated fairly low, with 49.2% rating print textbooks as very important or important, while electronic textbooks rated slightly lower (44.2%). Other sources of information used for teaching were listed variously as

- *" lecture notes from other universities e.g.[sic] Harvard"*
- *"Google scholar"*
- *"evidence based guidelines from specialist societies"*

The last comment is indicative of evidence-based practice used in teaching; the first comment may include EBM material, as Harvard Medical School is known for its endorsement of EBM (Tosteson, 1990; McMahon & Dluhy, 2006). It would seem therefore that there are some champions of evidence-based practice amongst educators who responded to the survey, and who may well be emerging as EBM "gatekeepers" within teaching and clinical practice The need to keep up to date in respective subject fields is indicated by the importance attributed to electronic sources of information, such as journals, subject specific databases and websites.

The use of Wikipedia as a source of information for teaching and learning is a controversial topic, and so it was interesting to see that while the greatest number of respondents (84.2%) rated this information source as unimportant or not applicable for teaching, 15.8% were in fact using Wikipedia as a source in their teaching practice.

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4.2.3 Source of Resources Used for Teaching

The majority of respondents (93.5%) reported using their own personal collections as a source from which they obtained subject information used in teaching. Internet Web sites were used by 87.1% of the respondents, and the University Library collections by 85.5%. Attendance at conferences, workshops and symposia were listed as a source of information by 79%. Assumptions regarding the importance of keeping up to date in subject matter, as discussed in Section 4.2.2, were thus confirmed.

4.2.4 Perceived Levels of Educators' IL Skills Integration into the Curriculum

Analysis of items 8 and 9 in the questionnaire revealed some interesting findings regarding perceived levels of IL skills' integration into the curriculum

- *Do you incorporate additional resources (in addition to your own lectures and handouts) into your students' courses?*
- *In what form do you incorporate these additional resources into the GEMP 1 and 2 curriculum?*

Copies of lecture presentations comprised 79.4% of material perceived to be additional material; 58.7% were recommendations to use the "core" print textbooks available in the PBL seminar rooms; while 55.6% were bibliographies of suggested additional reading (without hyperlinks). Notes (defined as summaries of educators' own readings) were given by 59.6% of respondents, and 41.3% reported attaching relevant journal articles in the form of PDF files. One respondent reported integration of "study guides", but no evidence of such guides was found in the curriculum content analysis. Only two respondents reported that they made reference to relevant Web sites.

While 43.9% expected students to find material in the Library or on the Internet themselves as part of their self-directed learning, a further 15.8% stated that it was not necessary for students to know more than what was core to the subject content in the subject/s taught, or what had already been provided as lectures, learning topics, theme sessions or clinical skills sessions. Five respondents (7.9%) did not feel it was necessary for students to use resources other than what was prescribed or recommended. Some form of hyperlinking to resources was reported by 61.9% of respondents, with the majority of this reported linking (56.2%) being to either the library catalogue, or journal articles.

As the majority of respondents (43.9%) expected students to find material in the Library or on the Internet themselves as part of their self-directed learning, types of resources reported by educators were classified in Table 4.6 as "active" or "passive". An "active" classification suggests that incorporation of this type of resource would lead to self-directed exploration by students. "Passive"

WitsETD

suggests that the resource was not likely to be explored actively. The following table shows that the resources used most often by educators are those least likely to lead to active learning, or to encourage IL competency. The greatest number of resources used by educators in the GEMP fell under the category of "passive".

Resources Recommended to Students	Percentage Educators Using Resource	Active Learning Resources	Passive Learning Resources
Power Point Slides of Lectures	79.4%		x
Notes	59.6%		x
"Core" PBL Seminar Room Textbool	58.7%		x
Bibliographies	55.6%		x
PDF Copies of Print and E-Journal Articles	41.3%		x
Hyperlinks to e-Textbooks	11.1%	x	
Web Sites	3.2%	x	
Subject Specific Databases	3.2%	x	

Table 4.6
Active and Passive Learning Resources

One respondent noted difficulty with using the e-Wits Library catalogue for hyperlinked resources

"I provide in my printed notes the URLs that I used to access the library's electronic text books that I used to prepare my lectures. Unfortunately they (the URLs) change with time."

While aware that IL skills do need to be integrated into the curriculum, the respondent highlights a lack of understanding about how hyperlinks are intended to be used. If the URLs reported were embedded into the electronic curriculum (as opposed to being included in "printed notes"), these could be easily updated when change occurs. Use of DOIs could also alleviate the problem.

Only two respondents made mention of web sites being incorporated into the content of the material being taught

- *"Reference to selected websites I have found"*
- *"Hyperlinks to relevant Web sites"*

The first comment suggests that websites were incorporated as a reading list; the second indicates an awareness of how embedded hyperlinks can assist active learning.

One respondent indicated that resources consulted were already integrated into lecture content, so students do not have to consult these sources themselves

"I incorporate the information into my lecture"

WitsETD

This can be construed as another form of “active lecturing”, as opposed to facilitating active learning on the part of the students.

Although 91.9% of respondents reported that they incorporated resources in addition to lectures and handouts in course material, this was in fact not corroborated by the analysis of the curriculum. Respondents were asked to report all instances of perceived use of embedded resources. These are contrasted with actual observed occurrences in Table 4.7, calculated according to the rubric shown in Table 4.3. Table 4.7 shows that reported embedding was far higher than observed levels of embedding. The level of “no embedding” (a score of **1** on the rubric in Table 4.3) was perceived to be lower than was observed.

Observed Integration (GEMP 1 and 2)		**Reported Integration (GEMP 1 and 2)**	
1 **No embedding** **61.57%**	**4** **Fully embedded** **0.2%**	**1** **No embedding** • *No extra resources required* **22.22%**	**4** **Fully embedded** • *Hyperlinks to websites* **3.17%** • *Hyperlinks to e-books* **11.11%** • *Hyperlinks to e-journals* **28.57%**
2 **Almost no embedding** **30.18%**	**3** **Moderate embedding** **8.05%**	**2** **Almost no embedding** • *Print bibliographies* **55.56%** • *Notes or handouts* **53.97%** • *Power Point slides of lectures* **79.37%** • *Attached PDF journal articles* **41.27%** • *Attached PDF chapters from print textbooks* **25.4%** • *PBL Seminar Room “core” textbooks* **58.73%**	**3** **Moderate embedding** • *Hyperlinks to Library catalogue* **22.22%**

Table 4.7
Comparison of Observed and Reported Levels of Resource Integration

4.3 Educators’ Perceptions of Evidence-Based Practice

Educators in GEMP 1 and 2 from all disciplines were asked to indicate if they used evidence-based practice. Although evidence-based practice is widely used in clinical medicine, it is also being adopted in other subject disciplines allied to the health sciences (Pravikoff, Tanner & Pierce, 2005; Michael, 2006).

All respondents indicated they were aware of evidence-based practice. Responses indicated that 46.8% were medical practitioners who used evidence-based information-seeking in their own

WitsETD

teaching and research; while 14.5% were medical practitioners not currently active in clinical practice, and consequently did not use evidence-based practice. Of the remaining respondents, 30.6% indicated that they were not medical practitioners, but did use evidence-based information-seeking practices in their teaching and research; while only 7.9% of respondents indicated that they did not need to use evidence-based information-seeking as they were not medical practitioners. No respondent indicated that they found evidence-based practices too time-consuming to use, a frequently reported bias (Scott, Heyworth & Fairweather, 2000).

Thus 77.4% of respondents used evidence-based practice, indicating that there was a high degree of awareness about evidence-based medicine and evidence-based information-seeking practice amongst educators at the University of the Witwatersrand, based on this sample.

4.3.1 Educators' Awareness of Evidence-Based Sources of Information

Item 12 on the questionnaire asked educators to rate sources they considered important for evidence-based information, using a 5-point Likert scale, from very important to completely unimportant. The results are tabulated in Table 4.8.

	Very Important	Important	Doesn't Matter	Unimportant	Completely Unimportant	N/A
Print Text Books	9.7%	58.1%	22.6%	6.5%	1.6%	1.5%
E-Text Books	12.9%	50.0%	27.4%	4.8%	1.6%	3.3%
Print Journal Articles	50.0%	38.7%	6.5%	0.0%	1.6%	3.2%
E-Journal Articles	69.4%	29.0%	0.0%	0.0%	1.6%	0.0%
Print or E-Reviews	54.8%	37.1%	4.8%	3.3%	0.0%	0.0%
Systematic Reviews	80.6%	16.2%	1.6%	1.6%	0.0%	0.0%
Evidence-Based Specialist Databases	36.5%	38.7%	19.4%	1.6%	0.0%	3.8%
Consultation with Colleagues	6.5%	62.9%	14.5%	12.9%	3.2%	0.0%

Table 4.8
Sources Considered Important by Educators for Evidence-Based Information-seeking Practice

Levels of awareness about evidence-based medicine resources were corroborated by the literature (McColl, Smith, White & Field, 1998). Although 96.8% of respondents regarded systematic reviews as very important or important, 91.9% of educators in this study still consider traditional reviews as very

WiSETD

important or important in the context of evidence-based information-seeking. Ordinary review articles (traditional overviews of the literature) have been largely replaced by systematic reviews, which limit bias by the use of rigorous objective methodological approaches not only to identify and synthesize, but also critically appraise, high-quality research evidence (Mulrow, 1987; Cook, Mulrow & Haynes, 1997; Mulrow, Cook & Davidoff, 1997; Kaczorowski, 2009).

Less reliance by questionnaire respondents seems to be placed on the specialist evidence-based databases (rated very important or important by 75.2%) than on print or e-journal articles (rated very important or important by 98.4% in the case of e-journal articles and very important or important by 88.7% in the case of print journals). However, evidence-based databases help to synthesize evidence reported in the literature, and have been introduced to contain the information overload that arises from the necessity to read widely (Kaczorowski, 2009). This may indicate a need to increase awareness amongst educators of the intent and use of such products.

It is also interesting that 69.4% of respondents still see consultation with colleagues as a very important or important source of evidence-based information. Consultation with colleagues is an acknowledged source of information for medical practitioners (Smith, 1996; Olatunbosun, Edouard & Pierson, 1998). However, colleagues who are consulted need to be authoritative and well versed in the latest accepted evidence, otherwise there is a danger that information transmitted in this manner is outdated and no longer relevant (Schaafsma, Verbeek, Hulshof & Van Dijk, 2005).

E-textbooks are rated as very important or important for EBM by 62.9% of respondents. As only a slightly more (67.8%) think this way with regard to print textbooks, this is surprising, given the observed lack of use of e-textbooks in the curriculum (see Table 4.7). While the idea of e-textbooks that can accommodate rapidly changing information is acknowledged, it appears from the results of this survey that use of these textbooks in teaching practice still lags behind. E-textbook use at undergraduate level (as opposed to e-journal article use, where content is often highly specialised) is a way to incorporate new material into fundamental knowledge, while demonstrating the practice of EBM to students in a very meaningful way.

4.3.2 Educators' Expectations of GEMP 1 and 2 Students with Regard to Evidence-Based Information-Seeking

An overwhelming 93.5% of respondents feel that evidence-based information-seeking skills should be taught to GEMP 1 and 2 students. Of the remainder, reservations were expressed in terms of students' lack of clinical knowledge

- *"They don't have enough clinical knowledge to apply the evidence"*

- *"They do not yet know enough to assess the quality of the evidence"*

Despite the question referring specifically to information-seeking skills, in the minds of some educators, the practice of evidence-based medicine is evidently confused with evidence-based information-seeking. Evidence-based information-seeking requires the breakdown of the problem at hand (the search statement) into keywords that can be searched in a relevant database, whilst evidence based medicine includes this preliminary step together with a further critical analysis of the material that is found. Both processes can be used to instill principles of critical thinking in terms of Bloom's Taxonomy (Keene, Colvin & Sissons, 2010), albeit at different cognitive levels. Students in GEMP 1 and 2 may not yet possess sufficient clinical knowledge to analyse content for validity, reliability or patient use, but they can certainly begin the analytical process that allow for effective information-seeking. Content to which students could be directed at this stage would constitute answers to "background" queries, so important to the process of novice learning. "Foreground" queries, as used in the clinical information-seeking context, could follow once the student has acquired the requisite clinical skill needed to analyse clinical content.

Corroboration of this lack of clarity is seen in further comment

- *"Rather teach critical thinking. At student level, they are trying to familiarize themselves with the fundamentals. Much of medicine is clinical judgement; evidence based medicine can be destructive and time consuming and detracts from acquiring fundamental knowledge".*
- *"I think it is more important for them to be first very familiar with exactly what constitutes EBM and why it is so important. Furthermore, EBM is not the be all and end all for medical practise* [sic].*Whilst it works in theory, it does not work for all patients all the time. Furthermore EBM is sometimes seen as a cost cutting measure. Whilst GEMP 1 and 2 students should be familiarised with EBM, I don't think it is necessary to integrate this in actual 'document searches' till the students are older".*

The latter comment indicates that IL skills teaching has been incorrectly placed in the first two years of the GEMP curriculum and should be moved to years 3 and 4. However, it is noted that allocated time in the curriculum raises issues of ownership (Manning, 2007:54), and that for those who plan and coordinate the activities of a curriculum, time is a key area of decision making. Clinical educators are unlikely to relinquish clinical teaching time (Trelstad & Raskova, 1992), and as much of the teaching in GEMP 3 and 4 takes place in the wards or out-patient clinics, practicalities of teaching evidence-based information-seeking to large classes under these conditions would be impossible.

Placing these comments within context, the debate amongst educators involved in the GEMP curriculum with regard to what is regarded as "core" or essential is fierce and unlikely to be resolved

WitsETD

within the near future. Educators were thus asked to confirm their expectations of what students were expected to do with additional resources, if they were supplied. Again, there was no forced ranking, as respondents could select all options they felt were applicable. The majority of educators (83.9%) wanted students to use additional resources as background reading for a better understanding of the systems or conditions under study; or to be integrated into core knowledge about the systems or conditions taught (74.2%). Many respondents (72.6%) wanted these resources to be used to supplement essential or core information about systems or conditions that could not be covered in teaching sessions owing to time constraints.

It was therefore somewhat surprising that just under half (45.2%) of the respondents indicated they would like students to use additional resources supplied to add to what they were being taught ("non-core" information). Cynicism about student learning was expressed by only 19.4% of educators in regard to the additional information being used for interest by only the top students in the class. Few respondents (9.7%) expected that additional resources would be used by students unless it was a stated requirement for assessment, while 4.8% supplied no additional resources.

4.3.3 Educators' Perceptions of Who should Teach Evidence-Based Information-Seeking Skills

Tensions between Faculty and Librarians with regard to in-curriculum teaching of IL skills, as discussed in the literature (Chapter 2, Section 2.1.2) were not evident in this study. The majority of respondents (69.4%) indicted that librarians, in conjunction with both medical practitioners as well as pre-clinical scientists, should be involved in co-teaching IL skills to students in the Faculty of Health Sciences, University of the Witwatersrand, while a further 21% thought that librarians together with medical practitioners (no pre-clinical scientists) should be responsible for such teaching. Only 6.4% thought these skills should be taught by a medical practitioner alone; 1.6% by a librarian alone, and 1.6% by a medical practitioner in collaboration with a preclinical scientist (with no library involvement). No one thought that IL skills should be taught to medical students by a librarian together with a preclinical scientist, without the involvement of a medical practitioner.

4.4 Comparison of Used and Recommended Resources for Teaching and Practice

When educators' top rated resources for personal use in teaching were ranked overall with their recommendations to students, together with their knowledge of resources used for evidence-based information-seeking, interesting results emerged, as shown in Table 4.9. Rankings were obtained by adding together resources rated as either very important or important in the case of material used by educators for their teaching or for evidence-based information-seeking. Rankings for

WitsETD

recommendations to students were obtained from educators' reports in response to item 10 in the questionnaire *(In what form do you incorporate these additional resources into the GEMP 1 and 2 curriculum?)*

Ranking	Used by Educators for Teaching	Recommended to Students	Important for Evidence-Based Information-Seeking
1	E-journals	Power Point Slides of Lectures	E-journals
2	Subject Specific Databases	"Core" PBL Seminar Room Textbooks	Systematic Reviews
3	Subject Specific Websites	Bibliographies	Reviews
4	Print Journals	Notes	Print Journals
5	Print Textbooks	Print and E-Journal Articles	Evidence-Based Databases
6	E-Textbooks	Hyperlinks to e-Textbooks	Consultation with Colleagues
7	Wikipedia	Web Sites	E-Textbooks
8	Other (eg. Google Scholar; Evidence-Based Practice Guidelines)	Subject Specific Databases	Print Textbooks

Table 4.9
Comparison of Top-Ranked Resources Used in Educators' Own Teaching, Recommended to Students and Believed Important for Evidence-Based Information-Seeking

Educators' recommendations of resources to students thus correlate neither to their own information-seeking practice, nor to their understanding of which resources are important for evidence-based information-seeking.

4.5 Summary

Observed levels of embedding of resources into GEMP 1 and 2 was found to be low (Table 4.4). Educators' perceptions of levels of IL skills integration were higher than that observed (Table 4.7). It was shown that the resources educators recommended most frequently as additional material for students (Table 4.6) were those least likely to foster active learning, despite the fact that just under half of the respondents (45.2%) indicated they would like students to use the additional resources supplied to add to what they were being taught ("non-core" information), and 43.9% expected students to find material in the Library or on the Internet themselves as part of their self-directed learning.

Awareness of evidence-based practice amongst educators involved in teaching the GEMP 1 and 2 curriculum was found to be sufficiently developed to recognize the opportunities that exist for the teaching of IL skills within the practice of evidence-based medicine (EBM). All respondents understood the meaning of evidence-based practice, and 77.4% incorporated evidence-based practice into their own professional practice. Despite some confusion with regard to the teaching of evidence-based medicine and evidence-based information-seeking practice for students at this level of study, 93.5% of respondents agreed that evidence-based information-seeking skills should be taught to students in the GEMP 1 and 2. Overall, educators showed high awareness as to the nature

WitsETD

of evidence-based resources. However, consultations with colleagues were still perceived to be important in evidence-based practice, as were overviews (reviews) of the literature.

In the following Chapter these results will be discussed within the framework of the various elements comprising the research question and sub-problems posed in this study. Barriers and opportunities that exist in respect of embedding (or further embedding) IL skills programmes into the GEMP 1 and 2 curriculum are classified in Chapter 5 into broad themes for further discussion. The question as to whether or not Dynamic Purposeful Learning (DPL) could be used successfully as a pedagogic framework for the integration of IL skills into the GEMP 1 and 2 programme will also be addressed in Chapter 5.

WitsETD

Chapter 5
DISCUSSION

The various elements of the research question regarding attitudes of teaching staff at the Faculty of Health Sciences, University of the Witwatersrand towards embedding evidence-based information literacy skills into the GEMP 1 and 2 curriculum are answered by discussion of the findings reported in the previous Chapter. Interpretation of findings draws from Manning's prior research in student learning in the GEMP (2007), as well as from the literature.

5.1 Extent of IL Skills Integration into the GEMP 1 and 2 Curriculum

Analysis of the GEMP 1 and 2 curriculum shows that integration of IL skills into curriculum content is low, as seen in Table 4.4 in the previous Chapter. On the contrary, self-reporting by educators of perceptions of integration of IL skills is much higher, as shown in Table 4.7. Although 91.9% of GEMP educators reported that they embedded additional resources in students' courses, this was not borne out by examination of the GEMP curriculum itself. Analysis shows that 79.4% of resources were copies of lectures; 58.7% were recommendations to use the "core" print textbooks available in the PBL seminar rooms; while 55.6% were bibliographies of suggested additional reading (without hyperlinks).

Despite long-standing use of reading lists in higher education, educator and student perceptions diverge considerably in respect of the use of these bibliographies (McGuinness, 2006). To maximize student use of such resources, technology needs to be seamlessly interwoven with pedagogy and practice in ways that will add value to the learning experience (Stokes & Martin, 2008). It is not simply enough to place an item on a reading list, as students need to understand how these items fit into their overall learning experience (Stubley, 2002). Embedding resources directly into course content in a way that leads to active exploration and discovery can overcome students' reluctance to use bibliographies.

Notes (summaries of educators' own readings) were given by 54% of respondents, and 41.3% reported attaching relevant journal articles in the form of PDF files. Only two respondents reported that they made reference to relevant web sites, and only one of these references was hyperlinked (that is, it used technology woven into course content to enhance the learning experience). Most of the learning resources embedded into course content within the GEMP fall into the category of "passive" resources, in that they do not encourage active discovery by students (Table 4.6).

In Manning's earlier study on student learning (2007:73), 89% of GEMP students reported that they viewed the prescribed "core" print textbooks available to students in the PBL seminar rooms as the "most useful" additional information for their learning. Only 67% of students reported using other library books. In spite of the fact that 41.3% of educators reported that they attached relevant journal

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articles in the form of PDF files to content, just 17% of students in Manning's study (2007:73) actually reported reading these articles, as she notes

"It was of concern … to see a limited use of websites and journal articles reported as sources of information [by students], particularly since there is a series of lectures and exercises on evidence based medicine which is specifically aimed at teaching students how to assess and evaluate information".

Students clearly value guidance from their lecturers in respect of when and how to use sources of additional information. However, as the majority of the recommendations to students in the GEMP provide lists of "core" textbooks or other library books, with limited reference to different information sources (see Table 4.9), it is hardly surprising that students are making use of little other than prescribed textbooks, as reported by Manning (2007). Lack of use of attached journal articles is a further indication that students are unable to transfer knowledge about critical analysis of journal content, as taught in the EBM modules, to learning in other contexts.

These findings in the GEMP are corroborated by McGuinness (2006), who found widespread *"belief* [amongst Faculty] *… that the prevailing instructional paradigm … is fundamentally designed to encourage the development of information skills among students, although no formal IL structures were found to exist".*

5.2 Opportunities and Barriers Regarding IL Skills Integration into the GEMP 1 and 2 Curriculum

Manning (2007:60) asserts

"A key intention of an integrated curriculum is that students develop the ability to see the interconnectedness of the different disciplines, to make links between related topics and think more holistically."

However, Manning (2007:73) found that although students were able to forge these "links" with regard to the subject knowledge, they were unable to "think more holistically" in the case of their information-seeking practices. The concern expressed about the limited use of information sources and the inability to transfer IL skills may in part be caused by some of the themes outlined below, which emerged both from analysis of the curriculum and the questionnaire sent to educators in the present study. Themes have been classified broadly as either "barrier" or "opportunity" in order to answer the research sub-problem about barriers and opportunities that exist regarding IL skills integration into the GEMP 1 and 2. Five barriers and six opportunities were identified.

5.2.1 Barrier: The "Silo" Effect

Although educators in the present study clearly believe that IL skills are integrated in the GEMP curriculum, evidence from the curriculum content analysis shows that this is not the case. Manning's findings (2007:73) suggest strongly that students do not see the IL skills they are taught as part of the integrated learning process. Experience in teaching and assessing IL to students subsequent to

WitsETD

Manning's study suggests that the situation has not changed in the intervening years. This lack of ability to integrate IL skills into all aspects of learning might be exacerbated by the students' perception of the theme session in which EBM practice is taught, as the "fluffy" or the "warm and fuzzy stuff", as opposed to the "hard science" of "real medicine" (Manning, 2007:78). This attitude could be reinforced by some opinions about evidence-based practice, as revealed in the present study

"…EBM is not the be all and end all for medical practise [sic]*."*

There is a perception that critical thinking is a skill that can only be taught as part of undergraduate medical education once fundamental knowledge has been acquired.

"Much of medicine is clinical judgement; evidence based medicine can be destructive and time consuming and detracts from acquiring fundamental knowledge."

There appears to be little value for critical thinking outside of professional judgement, and no recognition of information literacy's potential to transform dependent learners into lifelong learners in all areas (Bruce, 2002). These standpoints are at odds with the GEMP's formal curriculum goal to "develop competence in the use of electronic media and information technology and skills in information retrieval, analysis and evaluation" (Manning, 1007:104) and exacerbates the isolationist stance towards the teaching of IL skills in the GEMP curriculum.

Students may not be able to see IL skills that are isolated from the rest of the curriculum as part of the integrated learning process because of the placement of the IL modules in the curriculum

"…Whilst GEMP 1 and 2 students should be familiarised with EBM, I don't think it is necessary to integrate this in actual 'document searches' till the students are older".

It has been difficult to find an appropriate isolated "home" for teaching IL in the GEMP, and the practicalities of teaching IL skills in the later years of the curriculum are extensive. This reinforces the contention that it will remain difficult to situate information literacy in the GEMP curriculum in isolation, and that IL should be firmly embedded into and across the curriculum as a whole.

Extensive comments from Manning's focus groups (2007:81) reveal that students value authentic tasks in which "cognitive apprenticeship" (Brown, Collins & Duguid, 1989) embeds the learning in activity. While practical sessions given to students as a part of their IL skills' modules are valued by students, they are unable to transfer this experience into learning in other areas. The theory of evidence-based practice taught in the theme sessions is thus memorised only for the purpose of completing an EBM assignment, and not for the inherent value of the knowledge required for practice. The "silo effect"

WitsETD

caused by lack of embedding of IL skills into all areas of the curriculum, is again apparent in this "means-end instrumentalism" (Stokes & Martin, 2008).

In contrast to observed practice in the GEMP, the literature from all subject domains suggests there is considerable evidence that best results in terms of student outcomes arise from IL programmes that are integrated into the curriculum (Cochrane, 2006; Reed, Kinder & Farnum, 2007; Bent & Stockdale, 2009). This reinforces the standpoint that as information literacy underpins academic and professional practice, it needs to be brought directly into the curriculum of the subject discipline, rather than being taught as an isolated entity (Bruce, 2002). Achieving IL competence "requires an understanding that this cluster of abilities is not extraneous to the curriculum but is woven into the curriculum's content, structure, and sequence" (ACRL, 2000). This is not explicit in the GEMP curriculum, nor does it seem to have been considered in the curriculum design.

5.2.2 Barrier: The Conflict of "Core" and Self-Directed Learning

An intended design goal of the GEMP was that that content should be reduced to the essential "core" material in order to reduce factual overload. Despite this, Manning (2007:56) found that nearly half the respondents in her study were still unable to manage the volume of work required, and this concern is noted by one comment from the questionnaire that

> *"The students cannot cope with the demands put on them…"*

The debate concerning what is regarded as "core" is fiercely contested in the Faculty of Health Sciences, and has lead to inevitable tensions regarding the amount of self-directed learning expected from students. One of the casualties of this conflict is confusion amongst educators regarding the extent and type of resources that they expect students to employ for self-directed study. In the present study, 43.9% of educators expected their students to find material in the Library or on the Internet for themselves as part of their self-directed learning. However, a further 23.7% did not expect students to do so, believing either that it was not necessary for students to know more than the "core" already provided to them in curriculum content, or that students did not need to use resources other than the prescribed or recommended textbooks. The students in Manning's study (2007) are clearly reflecting these beliefs on the part of their lecturers with regard to the extent of self-directed learning required. "Core" is translated by students as "sufficient to pass the examination", and not in the sense in which it was intended – that which is essential for a minimal knowledge of the subject-discipline.

The concept of individual responsibility for self-development and learning is a powerful academic belief (McGuinness, 2006), but despite the fact that just under half the educators (43.9%) expected students

WitsETD

to find material themselves in the library or on the Internet as part of their self-directed learning, Manning (2007:57) found that students were in fact not making use of the generous allocation of unscheduled time (40%) in the curriculum for self-directed learning. Nor were students using the facilities afforded to them "to access the information from the books and websites as intended" (Manning, 2007:57). Only 58% of the students in the GEMP reported being able to find information for themselves as self-directed learning in order to meet course objectives, and only 45% were stimulated to read outside of the course objectives in Manning's study (2007:74). The mixed message that is being transmitted to students as a result of the debate regarding "core" versus self-directed learning is evident in the students' reported behaviour with regard to their learning (Manning, 2007), and there is a sense that students and educators are on different journeys in the GEMP.

5.2.3 Barrier: The Reading List

Reading lists are often viewed by students as an expedient minimalist mechanism for a particular purpose, such as to pass an examination or to prepare an assignment. This "prejudices against the ethos of wider reading, or reading around a subject area" in the traditional sense of reading for a degree, and is a particular problem concerning "essential" or "core text" approaches (Stokes & Martin, 2008). The inclusion of textbooks at the expense of more varied resources in reading lists has been ascribed to educators' belief that students are reluctant to read more than is required to achieve a pass grade (McGuinness, 2006). In educators' self-reporting in the present study however, only 19.4% felt that additional resources would be used by only the top few students, and a mere 9.7% felt that additional resources would not be used at all. Some other explanation is thus required for the large number of educators in this study who refer students to textbooks as a recommended source of additional information.

Educators' awareness of EBM resources is shown in Table 4.8, but this is not reflected in the recommendations reportedly made to students (Table 4.9). The conventional "prepackaged" and "predigested" information from lectures and textbooks (Breivik, 1998:127-128) that have always been recommended in traditional didactic teaching continue to be used. These are familiar to educators as experts in their respective disciplines, having used the same resources in their own studies (McGuinness, 2006), suggesting a lack of internalization of the role of information in educators' own professional learning. If there is a tension between information literacy in theory and the real world information experience of educators, this may translate into difficulties in modeling good practice for their own students (Oker-Blom, 1998; McGuinness, 2006; Williams & Coles, 2007). Unless a new paradigm for learning is wholeheartedly adopted, educators' own experience of dominant learning models will continue to influence IL skills integration into the curriculum (McGuinness, 2006). Thus, in the GEMP,

WiSETD

while there is verbal consensus for pedagogic methods such as PBL, the emphasis on models of "traditional" learning still evident in the hybrid curriculum undermines the move to active learning. The hybrid curriculum thus continues to exacerbate tensions between what is regarded as "core" and self-directed learning.

Some form of hyperlinking to resources was reported by 61.9% of respondents, but the majority of this reported linking (56.2%) was to either the library catalogue, or relevant journal articles. In the few instances of hyperlinking that were observed in the curriculum, many of the links were found to be "dead" (that is, the web site or resource was no longer found). The practice of preparing a set of lectures and using them unchanged for the life of the course no longer applies in the context of e-learning. As the GEMP curriculum needs to reflect the rapidly changing knowledge of the medical sciences, the evidence-based practice in medicine (used to overcome the lag in incorporating new evidence into practice) needs to be incorporated into teaching practice as well. The difficulties experienced in maintaining an e-curriculum that was written by different expert authors, not all of whom are still involved in the teaching of their content, is also evident, and "ownership" of the curriculum by Block Coordinators has become somewhat like the curate's egg – good only in parts.

The extremely low level of hyperlinking within the curriculum content to relevant e-texts is not supportive of the concept of an integrated curriculum, as outlined by Manning (2007:60). It would seem that there is a need for educators to develop a deeper understanding of how the technologies inherent in e-resources and hyperlinking to material can be seamlessly interwoven into pedagogical practice, in ways which add value to learning (Stokes & Martin, 2008). It may be that the lack of embedding of IL skills into the curriculum found in this study is due in part to the need for professional development of educators in terms of improving their own IL skills (Williams & Coles, 2007). It may also be that professional development is required for medical educators to translate an understanding of EBM into their own teaching practice (Ulvenes, Aasland, Nylenna & Kristiansen, 2009).

5.2.4 Barrier: Resources for Novice and Expert Learning

There is also a sense that some educators may have unreasonable expectations regarding the nature of sources they feel students should be consulting. Academics, many of whom have advanced degrees, are regarded as experts in their respective subject disciplines. As such, they have become accustomed to particular information-seeking strategies, which may not necessarily be appropriate for the novice student (McGuinness, 2006). Most educators reported that they used journal articles to prepare for teaching (86.9% used e-journals and 66% used print articles, as reported in Table 4.5). PDF copies of journal articles were attached to curriculum content by 41.3% of educators, but only 17% of the

WitsETD

students in Manning's study (2007:73) actually read these articles. Unless carefully selected, references to journal articles may not necessarily be the best source of additional information for students.

Indications are that only a very small percentage of modern students prefer to learn by reading long passages of text (Weiler, 2005). Concerns about the appropriate use of material for novice learning (Bransford, Brown & Cocking, 2000:31), refer directly again to the conflict emerging from the "core" versus self-directed learning debate. Educators in this study were asked about their expectations about the use students would make of additional resources, if supplied. The majority of educators (83.9%) wanted students to use additional resources as background reading for a better understanding of the systems or conditions under study, or to be integrated into core knowledge about the systems or conditions taught (74.2%). Many educators wanted these resources to be used to supplement essential or core information about systems or conditions that could not be covered in teaching sessions owing to time constraints (72.6%). In these instances, textbooks or notes (given by 59.6% of respondents, and defined as summaries of educators' own readings) would be an appropriate additional resource.

However, just under half (45.2%) of the respondents indicated they would like students to use additional resources supplied to add to what they were being taught ("non-core" information). Specialized journal articles may not necessarily be the best source in the medical sciences for this purpose. Students are unlikely to use additional resources to which they are referred if the level of information contained in this source is beyond their level of comprehension.

It is not at all clear from the mixed message emerging from the findings in this study as to when, how, and at what level students should be finding their own information as part of their self-directed learning, and when (and how, or even if) educators should be "predigesting" expert information into their own teaching. The segregated IL skills component of the GEMP curriculum only serves to exacerbate the sense that students and educators are on different journeys, and may explain why students report a preference for predictable textbook content as a useful source of information.

5.2.5 Barrier: Terminological Confusion

A stated goal of the GEMP PBL curriculum is to "develop competence in the use of electronic media and information technology and skills in information retrieval, analysis and evaluation" (Manning, 2007: 104). The wording of this goal serves to highlight the confusion in terminology in the Faculty of Health Sciences with regard to Information Technology (IT or ICT), Information Retrieval (IR), and Information Literacy (IL), and may possibly exacerbate the lack of connections made by students between their

WitsETD

isolated IL skills modules and the rest of the curriculum. This confusion is reflected in the GEMP timetable by the naming of IL skills modules, and in the “stations” of the OSCE (Objective Structured Clinical Examinations), in which students’ IL skills are assessed.

Information literacy is in fact an intellectual framework for understanding, finding, evaluating and using information-related activities throughout life, and while IL may use information technology to achieve these ends, IL is ultimately independent of the technologies (ACRL, 2000). Information technology (ICT) "fluency" focuses on an understanding of technology and the graduated, increasingly skilled use of it. Information Retrieval (IR) relates only to the “finding” aspect in the IL framework.

“Simply put, access to technology and content is only a first and relatively low level step in the information literacy process” (Bertot, 2003). If a common language to describe the same processes could be negotiated, educators and librarians might make more progress in the collaborative teaching of IL skills (Gullikson, 2006).

5.2.6 Opportunity: Changing Pedagogical Practice

Though slight, evidence of changing pedagogical practice is noted from log analysis of the curriculum. Lecturer C incorporated functional hyperlinks to chapters in e-books for students to explore on their own. Lecturers D and F required students to perform a literature search in a suggested database in order to find relevant articles. The literature searches were structured in such a way that while students were expected to gather and interpret information for themselves, keywords and databases were suggested, so that students were guided to the correct material. Lecturer A was observed to exert a positive “gatekeeper” effect over more junior colleagues (lecturers B and E) in one department. Why her observed teaching practice differed from that of the majority of her colleagues is unclear, and could have much to do with her personal teaching philosophy. However, the influences at work in a community of practice with regard to changing teaching practice may be in evidence (Lave & Wenger, 1991:29).

Two further lecturers are known proponents of evidence-based medicine (EBM), and it could be that EBM information-seeking practice informs the deeper awareness of IL skills integration observed in their practice. Although IL in evidence-based information-seeking is not explicit, it is inherent in the methodology employed (Snowball, 1997; Myers, 2002). The use of EBM information-seeking practice in regard to embedded IL skills will be discussed further in Section 5.3.

WiSETD

Changed practice was also observed from Lecturer F, who is a member of the School of Allied Health Sciences. This School as a whole has shown a much deeper awareness of the role that IL skills can play in student learning, as will be further discussed in Section 5.2.7.

Wherever possible, opportunities to introduce IL skills into the classroom should be seized by cooperative teaching with individuals observed to be changing their practice

5.2.7 Opportunity: The Link between E-Learning and IL Skills Integration

The School of Allied Health Sciences is enthusiastically responding to the challenges of e-learning, and this new approach to teaching may have influenced observed teaching practice in the GEMP, in which some staff members also teach. Members of staff of this School already partner frequently with the librarian in order to teach IL skills to students in their own subject disciplines. It is also noteworthy that this School contains the Department of Nursing Education. It was observed in the literature review that nurses seem to have embraced IL skills integration and co-operative teaching with librarians in the teaching of evidence-based practice more readily than their medical counterparts. Both departmental and institutional culture is thought to play a major role in the readiness to accept IL programmes as part of a more holistic approach (Travis, 2008). This factor would seem to be at work in the School of Allied Health Sciences.

The role of IL in e-learning, and links between the embedding of e-resources and changed teaching practice in e-learning, is supported by the literature (Cochrane, 2006; Morris & McKimm; 2009; Tumbleson & Burke, 2010; Xiao, 2010).

5.2.8 Opportunity: The Link between the Librarian and IL Skills Integration

Wherever the librarian has been successful in promoting co-teaching, the level of IL skills integration into curricular material has deepened, as was noted with the clinical skills practical tutorials (CSP) in GEMP 1. It was also noticed in the teaching practice of Lecturer C in GEMP 1 (*Renal* Block), who co-authored a paper with the researcher several years ago (Myers, Saunders & Rogers, 2002). Observations from this study, though minimal, are supported by several case studies in the literature (Donham & Green, 2004; Birmingham, Chinwongs, Flaspohler, Hearn, *et al*, 2008; Drewes & Hoffman, 2010; Miller, 2010; Muir & Heller-Ross, 2010). Librarians have perhaps not been proactive enough in promoting the benefits of collaborative teaching (Stevens, 2006; Schulte & Sherwill-Navarro, 2009), although this seems to be changing as the concept of embedded librarians in academic libraries emerges (Shumaker, 2009; Drewes & Hoffman, 2010; Muir & Heller-Ross, 2010). Reports in the literature about improved student outcomes as a result of increased co-operation between teachers and librarians are beginning to appear (Floyd, Colvin & Bodur, 2008). Partnering with those who are responsive to initiatives in

WitsETD

curriculum reform is an important step, and this approach will be explored further in examining the collaborative framework of Dynamic Purposeful Learning (DPL) as a pedagogic theory.

5.2.9 Opportunity: The Link between the Practice of EBM and IL Skills Integration

The majority (93.5%) of questionnaire respondents felt that evidence-based information-seeking skills should be taught to students, so there is a sense that educators do grasp similarities inherent in IL with a form of IL specific to medicine. Observations from this study, where two of the lecturers in the *Endocrinology* Block are known proponents of EBM and demonstrated a higher level of IL skills integration into specific sessions, imply that educators' own EBM information-seeking practice might underlie deeper IL skills integration.

Nevertheless, despite the close correlation between evidence-based search procedures and information literacy (Snowball, 1997; Myers, 2002), some educators who responded to the questionnaire in this study did not seem to be aware of this relationship, when asked if evidence-based information-seeking skills should be taught to GEMP 1 and 2 students, as shown by the following comments

- *"They don't have enough clinical knowledge to apply the evidence"*
- *"They do not yet know enough to assess the quality of the evidence"*
- *"Rather teach critical thinking. At student level, they are trying to familiarize themselves with the fundamentals. Much of medicine is clinical judgement; evidence based medicine can be destructive and time consuming and detracts from acquiring fundamental knowledge".*

Finding good quality evidence is crucial to the practice of evidence-based medicine. As a result of widespread end user searching in clinical medicine, the evidence-based information search strategy evolved in order to deconstruct the clinical question into a conceptual, analytical framework (the search statement), that can be searched electronically. The composition of the search statement and selection of search terms is critical to the successful outcome of the evidence-based search, and is rendered more understandable by a "translation" of the constructs required for the search into a "search formula" couched in the familiar language of clinical medical (Richardson, Wilson, Nishikawa & Hayward, 1995). Despite its specificity to medicine, this EBM "search-inference" process for clinical problem solving (Aberegg, O'Brien, Lucarelli & Terry, 2008) employs the same underlying processes involved in all information gathering (Kulthau, 1988; 1991). The relationship between evidence-based information-seeking and the principles of information literacy is thus strong, and could be used to good effect when teaching IL skills to medical students.

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Evidence-based practice furthermore separates background questions (asked by novices) from foreground questions (asked by experts), and evidence based resources could to a large extent be used in an information literacy framework to resolve the tensions posed by the use of learning resources more appropriate for experts, as discussed in Section 5.2.4. Background questions in evidence-based practice typically concern topics to which answers are typically found in textbooks or narrative review articles. Foreground questions, on the other hand, are more often posed in respect of patient care (American Medical Association), to which answers are more likely to be found from one of the many evidence-based resources. Thus integrating evidence-based information literacy skills into the curriculum is an ideal mechanism to foster both information literacy and evidence-based practice.

There was little evidence of the use of evidence-based resources in educators' own teaching practice, as can be seen from Table 4.9. Together with the low levels of IL integration into the GEMP curriculum, the assumption is confirmed that this lack may be based on a lack of awareness amongst medical educators of the principles of evidence-based information-seeking, and the need to use appropriate resources other than print textbooks within the context of IL skills training. This may also be ascribed to the lack of role models or gatekeepers using EBM amongst educators themselves (Ulvenes, Aasland, Nylenna & Kristiansen, 2009).

5.2.10 Opportunity: Communities of Practice and IL Skills Integration

Three different lecturers (A, B and E) from the same academic department were shown from the log analysis of the GEMP curriculum to have contributed to the increased use of IL skills integration on a more substantial scale than other educators in this study. Lecturer A is a senior colleague of both lecturers B and E, and may have been acting as a departmental "gatekeeper" with regard to the community of practice in which she and her colleagues are engaged, as discussed in Section 5.2.6. In addition, an entire School (Allied Health Sciences) appears to be changing teaching practice as a result of the introduction of e-learning.

The influences at work in communities of practice are thus evident (Lave & Wenger, 1991:29), and could foster practice change and collaboration amongst colleagues.

5.2.11 Opportunity: Curriculum Review and Accreditation Standards as an Agent for Change

It was observed that the *Endocrinology* Block in GEMP 2 showed a higher level of IL skills integration. It was also noted that much of the content for the *Endocrinology* Block has been revised. The inference is thus that an increasing awareness of the need for more IL skills integration into teaching practice was responsible for the higher levels of IL skills integration in the reviewed content of this Block.

The entire curriculum for GEMP 1 and 2 at the Faculty of Health Sciences is currently under review, as required by the latest Health Professions Council of South Africa (HPCSA) accreditation process. A

WitsETD

valuable opportunity thus exists to inform curriculum change (Kroth, Phillips & Eldredge, 2009), as meeting accreditation standards seems to be a particularly strong motivation for educators (Hara, 2006) at the same time as encouraging partnership with librarians (Birch, Greenfield, Janke, Schaeffer, *et al*, 2008).

5.3 Educators' Attitudes Regarding Evidence-Based Practice and Recognition of Opportunities that Exist for the Teaching of Critical Thinking and IL Skills within the Practice of Evidence-Based Medicine

This study found a high level of awareness about evidence-based medicine and evidence-based information-seeking practice amongst educators within the Faculty of Health Sciences at the University of the Witwatersrand, based on the sample of educators who responded to the questionnaire. All respondents indicated that they understood the meaning of evidence-based practice, with the majority of (77.4%) reporting that they used evidence-based practice in their professional lives. There was also a very high degree of support (93.5%) for the concept of teaching evidence-based information-seeking skills to GEMP 1 and 2 students. However, there was relatively little evidence of use of evidence-based IL resources found in analysis of the curriculum itself, or in resources that were recommended to students (Tables 4.7 and 4.9).

Some confusion was apparent in the understanding of differences between reviews (overviews of the literature) and systematic reviews (rigorous, unbiased methodological approaches to evidence found in the literature), as shown in Table 4.8. The lack of role models using EBM amongst educators themselves may also contribute to the low level of awareness of evidence-bases resources (Ulvenes, Aasland, Nylenna & Kristiansen, 2009).

Some concern about the readiness of students for the practice of EBM is also seen in the comments expressed in Section 5.2.9, although the distinction between the practice of evidence-based information-seeking and that of EBM itself is blurred in these comments. Although views on the development of critical thinking skills in students were not specifically addressed in the questionnaire, this cognitive aspect was mentioned in several comments.

- *"Rather teach critical thinking. At student level, they are trying to familiarize themselves with the fundamentals. Much of medicine is clinical judgement; evidence based medicine can be destructive and time consuming and detracts from acquiring fundamental knowledge."*
- *"I think it is more important for them to be first very familiar with exactly what constitutes EBM and why it is so important. Furthermore, EBM is not the be all and end all for medical practise* [sic].*Whilst it works in theory, it does not work for all patients all the time. Furthermore EBM is sometimes seen as a cost cutting measure. Whilst GEMP 1 and 2 students should be familiarised with EBM, I don't think it is necessary to integrate this in actual 'document searches' till the students are older."*

WiSE ID

- *" …Critical thinking is important; but concentrate on basics first; other wise* [sic] *the time spent trying to decipher the undercurrents in medical science(& drug companies manipulate the literature) is beyond students, awareness is fine. Critical thinking is important at the bedside (ie interpreting and applying clinical acumen)."*

Those who expressed these comments did not seem to perceive the connection between evidence-based information-seeking skills and critical thinking. Information literacy is inherent in the "5-A" approach to EBM (assessing, asking, acquiring, appraising and applying). While students may not possess the fundamental clinical knowledge to assess the patient or problem adequately at this stage in their studies, the evidence-based search processes that apply to information gathering in respect of the problem can inform students' critical thinking in all areas. Students' IL skills have been matched against Bloom's taxonomy of cognitive skills with the conclusion that it is possible to embed IL into the problem solving cycle (Keene, Colvin & Sissons, 2010). Further empirical research, outside the scope of this study, would be required to assess the extent of evidence-based skill transfer to other areas of students' critical thinking, as Manning's study (2007) shows that transfer of learning with respect to IL is minimal.

Although some negativity was expressed towards teaching students' the practices of EBM, positive attitudes towards evidence-based information-seeking skills were also reflected

- *"*[T]*his is an important part of medicine.* [W]*e need to consider teaching the old hacks the methods of evidence-based practice."*
- "[E]*vidence based medicine should be reinforced throughout the GEMP (1-4). There should be a great effort to get all clinicians involved in teaching to improve their own abilities in EBM and the application therof* [sic]. *All case reports during GEMP 3,4 should be evidence based."*

The "case reports" in GEMP 3 and 4 refer to the authentic assessments used in these years of the curriculum.

5.4 The Possibility of Using Dynamic Purposeful Learning (DPL) as a Pedagogical Framework to Integrate IL skills into the GEMP Curriculum

Despite the fact that academics in the literature are reported to be unwilling to commit to collaborative teaching with librarians (Badke, 2005; McGuinness, 2006), 90.4% of GEMP educators indicated that they thought that IL skills should be taught collaboratively (by medical practitioners, basic clinical science educators and librarians). It would seem therefore, that GEMP 1 and 2 educators would welcome an acceptable theoretical pedagogical framework into which collaborative teaching of IL skills could be placed.

Dynamic Purposeful Learning (DPL) (Kenedy & Monty, 2008) has been proposed in this study as such a collaborative framework for the introduction of IL skills into teaching. As discussed, DPL draws on various pedagogical strategies, such as active learning, cognitive scaffolding and collaborative learning, as well as cognitive apprenticeship (Brown, Collins & Duguid, 1989). These pedagogical theories are

WiSETD

particularly suited to the PBL model in medical education. The interactive nature of EBM, whereby clinical knowledge needs to be synthesized with retrieval and analytical skills, suggests that the health sciences are a natural arena for teaching partnerships between clinical teachers and librarians.

It is noted that that the partnership between librarian and educator begins with development of the curriculum, and the impending curriculum review of GEMP 1 and 2 thus affords a valuable collaborative opportunity to inform curriculum change (Nimon, 2002; Kenedy & Monty, 2008; Kroth, Phillips & Eldredge, 2009). A high level of commitment by all concerned to student learning is a key element of collaboration (Kenedy & Monty, 2008), and collaborative teaching across multiple subject domains has the potential to improve both teaching and learning in specific subject domains through common understandings when developing curricula (Montiel-Overall, 2006; 2008). Differences in the entrenched languages and philosophies of different subject disciplines can be overcome to a large extent by this common understanding, so as to breach the gap between library-centred and academic thinking about information literacy. While the educational goals of librarians and those of academics often overlap, they are not completely aligned. As a basis for building working relationships, clarification of the commonalities and the differences needs to be established, and it is essential to determine each partner's role in the ensuing collaborative effort (Nimon, 2002).

In DPL, the dynamic nature of interaction between lecturer and librarian can encourage higher levels of class participation as students observe the dynamic interplay of IL in relation to content in the classroom. The synergy between the different perspectives offered is able convey the idea of skills being related to form, and content to subject matter, in a way in which isolated IL skills modules are unable to emulate. The "purposeful" or active learning components of the pedagogy are related to the ways in which critical skills are integrated into the exercises that students complete in respect of these skills, using the subject discipline in order to interpret the assigned tasks. "Multistage" assignments, where students receive constructive feedback and are able to improve on earlier iterations of their work, also lend strength to the cognitive effect of scaffolding. Thus DPL emphasizes student learning by connecting transferable skills to course content (Kenedy & Monty, 2008).

In addition, the collaborative planning process in the DPL framework allows for constant informal interaction between academic and librarian, thus affording an opportunity for continuous cross-communication. It is almost impossible to achieve informal interaction regularly in the busy schedule of any academic faculty, as interaction that takes place within the formal committee structure is often constrained by working agendas. Informal information transfer that occurs during collaborative curriculum planning would alleviate tensions amongst those who may not feel confident about their own IL skills, and who are not comfortable about asking questions regarding sources of information

WitsETD

(Jirojwong & Wallin, 2001). In effect, this collaborative planning process therefore affords another opportunity for a community of practice to evolve.

Thus given that 90.4% of educators indicated that IL skills should be taught collaboratively, the consideration of DPL as an acceptable pedagogic framework in order to achieve IL skills integration into GEMP 1 and 2 seems likely.

5.5 Summary

Contrary to educators' perceptions of IL skills integration, analysis showed that 79.4% of "integrated" resources were copies of lectures; 58.7% were recommendations to use the "core" print textbooks available in the PBL seminar rooms; while 55.6% were bibliographies of suggested additional reading (without hyperlinks). To maximize use of reading lists, technology needs to be seamlessly interwoven with pedagogy in ways that will add value to the learning experience, such as by hyperlinking directly to relevant e-resources.

Broad themes emerging from the study with regard to the integration of IL skills were classified as either "barriers" or "opportunities" Five barriers and six opportunities were identified and discussed.

Levels of awareness about evidence-based medicine amongst educators within the Faculty of Health Sciences were found to be high, with the majority (77.4%) reporting use of evidence-based practice in their professional lives. There was also a very high degree of support (93.5%) for the concept of teaching evidence-based information-seeking skills to GEMP 1 and 2 students. However, there was relatively little evidence of use of evidence-based IL resources found in analysis of the curriculum itself, or in resources that were recommended to students. Some concern about the readiness of students for the practice of EBM was noted, and the distinction between the practice of evidence-based information-seeking and that of EBM itself is confused.

As 90.4% of GEMP educators indicated that they thought that IL skills should be taught collaboratively, it seems likely that Dynamic Purposeful Learning could be used as a constructivist collaborative framework for teaching IL skills in the context of PBL in the medical curriculum.

Chapter 6 summarizes study conclusions, and addresses limitation of the study together with recommendations for further research.

WitsETD

Chapter 6

CONCLUSIONS

Key findings are related below in order to answer problems posed in the investigation of attitudes of teaching staff at the Faculty of Health Sciences, University of the Witwatersrand towards embedding evidence-based information literacy skills into the Graduate Entry Medical Programme 1 and 2 curriculum.

6.1 Extent of IL Skills Integration into the GEMP 1 and 2 Curriculum

Overall, educators' integration of IL skills into the curriculum is shown to be limited. The extent of integration is also not as high as is perceived.

6.2 Opportunities and Barriers Regarding IL Skills Integration into the GEMP 1 and 2 Curriculum

Five barriers against integration of IL skills in the GEMP 1 and 2 curriculum were found to exist. Six opportunities were identified for embedding information literacy in the curriculum.

- **Barrier 1: The "Silo Effect"**
  - The inability to find an appropriate isolated "home" for the teaching of information literacy in the curriculum reinforces the contention that IL should be firmly embedded into the curriculum as a whole.
- **Barrier 2: "Core" versus Self-Directed Learning**
  - Confusion regarding educators' expectations of student outcomes in terms of what is "core" to the curriculum, and in consequence how much self-directed learning is expected (and how this should occur), translates into "overload" and confusion for students. The hybrid curriculum continues to exacerbate tensions between what is regarded as "core" and what is regarded as self-directed learning.
  - Educators are not encouraging information literacy practices that promote the self-directed learning of GEMP students, although they may well believe that they do so. This may occur as a result of teachers' lack of internalization of the role of information in their own professional learning.
  - The assumption that PBL would lead automatically to self-directed learning behaviour in respect of the students' information literacy is not being met. The manner in which the PBL sessions are structured, together with the practice of placing "core" textbooks in the PBL seminar rooms for information gathering, afford little opportunity to develop critical thinking skills in the context of IL.
- **Barrier 3: The Reading List**
  - Although educators appear aware of resources other than the journals and textbooks they recommend in traditional didactic teaching (the conventional "prepackaged" and "predigested" information from lectures and textbooks), they are not recommending these resources to students. There is an over reliance on the use of print textbooks and reading lists on the part of both educators and students.

WitsETD

- There is a need for educators to develop a deeper understanding of how the technologies inherent in e-resources and hyperlinking can be seamlessly interwoven into pedagogical practice, in ways which will add value to learning.

- **Barrier 4: Resources for Novice versus Expert Learning**

- Educators' own information-seeking and practice may prejudice the way in which they perceive students should be using additional and recommended resources. Some confusion is noted regarding recommendation of appropriate material for novice and expert learning.

- **Barrier 5: Terminological Confusion**

- Confusion surrounding IL is compounded by the terminology used within the Faculty to describe information literacy. The role of ICT and Information Retrieval within IL is not clearly understood.
- The "web" and the "Internet" are often confused with electronic resources themselves, and there is confusion between free and subscription web-based resources.

- **Opportunity 1: Changing Pedagogical Practice**

- Small changes in pedagocial practice in certain individuals were noted, such as the incorporation of functional hyperlinks; use of "guided" literature searches within course content; and the awareness of IL skills integration as a result of a the adoption of e-learning.

- **Opportunity 2: The Link between E-Learning and IL Skills Integration**

- The role of IL in e-learning was apparent in a change in teaching philosophy in the School of Allied Health Sciences. This School contains the Department of Nursing Education, and it is noted in the literature that nurses seem to have embraced IL skills integration and co-operative teaching with librarians in the teaching of evidence-based practice more readily than their medical counterparts.

- **Opportunity 3: The Link between the Librarian and IL Skills Integration**

- Wherever the librarian has been successful in promoting co-teaching, the level of IL skills integration into curricular material has deepened, as was noted with the clinical skills practical tutorials (CSP) in GEMP 1 and in the teaching practice of Lecturer C in GEMP 1, who co-authored a paper with the researcher.

- **Opportunity 4: The Link between the Practice of EBM and IL Skills Integration**

- The majority (93.5%) of questionnaire respondents felt that evidence based information skills should be taught to students. Findings from this study imply that educators' own EBM information-seeking practice might underlie deeper IL skills integration.

WiSETD

- Evidence-based practice is able to separate background questions (asked by novices) from foreground questions (asked by experts), and could resolve tensions noted in barrier 4, regarding resources appropriate to novice and expert learning.

- **Opportunity 5: Communities of Practice and IL Skills Integration**
- Three different lecturers (A, B and E) from the same academic department were shown to have contributed to the increased use of IL skills integration on a more substantial scale than most other educators in this study. Communities of practice appear to foster practice change, and could lead to a deeper awareness of the need for information literacy to be embedded into the curriculum.

- **Opportunity 6: Curriculum Review and Accreditation Standards as an Agent for Change**
- Content that had been revised in the *Endocrinology* Block in GEMP 2 showed a higher level of IL skills integration than all other Blocks in the same year of the curriculum.
- The review of the GEMP 1 and 2 curriculum affords a valuable opportunity to inform curriculum change, as does the need to meet professional accreditation standards.

6.3 Educators' Attitudes Regarding Evidence-Based Practice and Recognition of Opportunities that Exist for the Teaching of Critical Thinking and IL Skills within the Practice of Evidence-Based Medicine (EBM)

A high level of awareness about EBM was found to exist amongst educators within the Faculty of Health Sciences at the University of the Witwatersrand, based on the sample of educators who responded to the questionnaire.

- All respondents indicated that they understood the meaning of evidence-based practice, with the majority of (77.4%) reporting that they used evidence-based practice in their professional lives.
- There was also a very high degree of support (93.5%) for the concept of teaching evidence-based information-seeking skills to GEMP 1 and 2 students.
- Confusion exists between evidence-based IL skills, as opposed to evidence-based practice.
- There was little evidence of the use of appropriate evidence-based resources in educators' own information-seeking practice, and no recommendations for students to use these resources. This lack of use of EBM resources may be based partly on the relatively few role models using EBM amongst educators themselves.
- Despite some negativity towards teaching students' the practices of EBM, it was encouraging to see positive attitudes towards evidence-based information-seeking skills reflected in some comments.

6.4 The Possibility of Using Dynamic Purposeful Learning (DPL) as a Pedagogical Framework to Integrate IL skills into the GEMP Curriculum

- Tensions expressed in the literature regarding collaborative teaching by educators and librarians are not borne out by the findings of this study.

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- Given that 90.4% of educators indicated that they thought that IL skills should be taught collaboratively, it would seem educators might welcome an acceptable theoretical pedagogical framework into which collaborative teaching of IL skills could be placed in the GEMP.
- The adoption of Dynamic Purposeful Learning (DPL) as an acceptable pedagogic framework to achieve IL skills integration into GEMP 1 and 2 seems likely.
- The interactive nature of EBM, whereby clinical knowledge needs to be synthesized with the retrieval and analytical skills required to find and evaluate the evidence in the literature, suggests that the health sciences are a natural arena for teaching partnerships between clinical teachers and librarians in the area of information literacy.

6.5 Study Limitations

It would have undoubtedly strengthened the research results if follow-up interviews with certain individuals, identified by the curriculum analysis as already using a high level of resource integration into course content, had taken place. Several individuals who demonstrated changed teaching practice are no longer associated with the GEMP, for a variety of reasons. Time constraints also required a parsimonious approach to the collection of data, which necessitated the use of open-ended questions to replace interviews to some extent in the survey instrument. It was hoped that anonymous frankly expressed comments might in some measure lead to a deeper understanding of respondents' perceived IL skills thought and practice. This area could be further addressed in future research.

The anonymity required by ethical considerations, and afforded by the using the *SurveyMonkey* instrument, both strengthened and weakened results obtained. There is no doubt that some of the comments that were expressed extremely freely in the questionnaire might have been constrained by a face-to-face interview. On the other hand, it would have been extremely useful to be able to identify known proponents of evidence-based information-seeking practices in order to promote their "gatekeeping" effect within the Faculty.

Inevitably, with any design incorporating a questionnaire, bias occurs as it is not possible to establish the views of those who did not respond to the questionnaire. However, the response to the questionnaire was reasonably high (42%) from a reasonably sized sample, and so it is hoped that a sufficiently representative group were able adequately to reflect the prevailing views held by educators in GEMP 1 and 2. Bias may also have occurred as a result of listing the resources suggested in the questionnaire.

Triangulation of results from this study against student perceptions of their own information literacies would also have strengthened the research. However, once again, this was not possible within the

WiSETD

constraints of the particular study. Findings from Manning's earlier study (2007) were used in mitigation, to a certain extent. Again this area could be addressed by further research.

6.6 Areas for Further Research

The reasons why certain Schools and Departments within the Faculty of Health Sciences (such the School of Allied Health Sciences) are more predisposed to adopt an integrated approach to IL skills is one which bears further investigation, especially as nursing as a whole has been observed in the literature to be adopting a culture of evidence-based IL skills practice in collaboration with librarians. Institutional, Faculty and School culture obviously play a role here, so it would be useful to identify how cultural forces could be mobilized for effective change management.

The roles of the information gatekeeper and communities of practice is another area that warrants further investigation. Although the observed effect of both was small in the present study, it would be of interest to see how these roles could be strategized in terms of effective pedagogical change management.

A longitudinal study which examines the transfer of learning of integrated IL skills from the "foundation years" (GEMP 1 and 2) through the "clinical years" (GEMP 3 and 4) of the curriculum would also be useful, as would a study of the use of integrated evidence-based resources in the clinical curriculum. Empirical investigation of comparative cohort studies on embedding IL courses in the subject itself, contrasted with generic or stand alone IL courses for students, would be interesting, as would a study of links between IL skills integration and the development of critical thinking, especially within the context of EBM.

It would be useful to investigate in further detail differences that emerged from Manning's earlier research (2007) between reported behaviour with regard to information literacy skills between graduate entrants to the GEMP, and those progressing from the second year of the MBBCh. It would also be of interest to establish current student perceptions of their IL competencies in greater depth.

As collaborative teaching involves theory not normally associated with professional training in Library and Information Science, it would be interesting to assess awareness of pedagogical theory and practice, as well as pedagogical qualifications, amongst academic librarians at the University of the Witwatersrand and further afield.

WitsETD

Information literacy is critical for 21st Century education (Bruce, 2002). However, achieving competency in information literacy "requires an understanding that this cluster of abilities is not extraneous to the curriculum but is woven into the curriculum's content, structure, and sequence" (ACRL, 2000). Information literacy skills are of particular importance and a key outcome in teaching medical students to engage with evidence-based medicine, often within a problem-based learning curriculum (Gruppen, Rana & Arndt, 2005; Kingsley & Kingsley, 2009).

Every opportunity should thus be seized at the Faculty of Health Sciences, University of the Witwatersrand to make active student-centred learning part of the "professional coalitions" (Nimon, 2002) that are required to meet the GEMP curriculum goal of developing information literacy competencies.

WitsETD

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Appendix A: Ethics Protocol 2010ECE63C

Wits School of Education

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STUDENT NUMBER: 0298175
Protocol: 2010ECE63C

30 July 2010

Dr. Glenda Myers
Postnet Suite 106
Private Bag 2600
HOUGHTON
2041

Dear Dr. Myers

Application for Ethics Clearance: Master of Education

I have a pleasure in advising you that the Ethics Committee in Education of the Faculty of Humanities, acting on behalf of the Senate has agreed to approve your application for ethics clearance submitted for your proposal entitled:

Attitudes of teaching staff at the University of the Witwatersrand towards embedding EBM information literacy skills programmes into the Graduate Entry Medical Programme curriculum.

The Protocol Number above should be submitted to the Graduate Studies in Education Committee upon submission of your final research report.

Yours sincerely

M Mabeta

Matsie Mabeta
Wits School of Education

Cc Supervisor: Dr. S Cohen (via email)

Appendix B: Questionnaire Information Sheet

Dear Colleague

Although the Faculty of Health Sciences has been at the forefront of the introduction of information literacy classes for students at the University, these information-seeking skills are mostly taught in an isolated silo by library staff, with little integration into the course material itself. Consequently, students do not see the critical thinking skills fostered by their information-seeking as applicable to other areas of study. I am trying to ascertain if it would be feasible to introduce "embedded" evidence-based information-seeking skills directly into the subject material of the GEMP 1 and 2 curricula in order to reinforce these critical thinking skills. The study forms part of a Research Report for the degree of M Ed (Educational Technology).

I would like to invite you as a contributor to the GEMP 1 and 2 curricula to participate in this study, and would be extremely grateful if you would take a few moments of your valuable time to complete the attached short questionnaire by clicking on http://www.surveymonkey.com/s/5B33GXV.

It should only take about five minutes to complete the questions. The study has received Faculty of Humanities ethics clearance (Protocol: 2010ECE63C). Your formal consent to participate will be given if you open the questionnaire at http://www.surveymonkey.com/s/5B33GXV and agree to proceed, once you have read the consent form. Participation is entirely voluntary, and the study is completely anonymous.

Results of the study will be made available in my M Ed Research Report, which will be freely available on the University's Electronic Theses and Dissertation (ETD) database, and may also be published and/or presented at various conferences and symposia. Should you wish to know the outcome of the results before publication, I will gladly share these with you as soon as possible.

Should you have any concerns, I can be contacted at Glenda.myers@wits.ac.za or (011)717-2050 in the Witwatersrand Health Sciences Library (WHSL).

Your participation in this survey will be of great benefit in shaping the way in which information literacy skills will continue to be taught at the Faculty of Health Sciences, and your contribution will be much appreciated.

Sincerely

Glenda Myers, D Litt et Phil

WITWATERSRAND HEALTH SCIENCES LIBRARIAN

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Appendix C: Questionnaire

1. Ethics Consent Form

You have been selected to participate in this study as a lecturer in the GEMP 1 and 2 programme. The attached questionnaire is entire anonymous, and all demographic information will be used only in the collation of the data. Participation is entirely voluntary and there are no risks or costs attached to participation, other than a few moments of your time. Naturally, no institutional sanctions or adverse consequences will result from your decision not to participate. Should you wish to withdraw from participating in this survey, you may do so at any time without having to explain your withdrawal.

However, your contribution would be of great benefit in the shaping of the next phase of the GEMP 1 and 2 curriculum in terms of the way in which information literacy skills are currently taught at the faculty of Health Sciences.

Your consent to participate in this study will be indicated on the "Next" button in order to proceed to the short questionnaire.

2. Question 1

Please indicate your gender.

a. Male
b. Female

3. Question 2

Please indicate your age range.

a. 20-29
b. 30-39
c. 40-49
d. 50-59
e. 60+

4. Question 3

Do you search for information related to the subject/s you teach?

a. Yes
b. No

5. Question 4

How frequently do you search for web-based or print information related to the subject/s you teach? (*Please select only one answer)*

a. Daily
b. Weekly
c. Monthly
d. Every couple of months
e. Annually
f. I do not search for information related to the subject/s I teach as I do not teach in my primary subject field
g. I am an expert in the subject I teach and so need no further information for teaching
h. Other

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6. **Question 5**
   If you answered *Other* in the previous question, indicate why you chose this option.

7. **Question 6**
   Please rate in order of importance from 1 to 10 (1=high importance; 10=low importance) the sources you would search for subject information related to your teaching (S*elect all that apply)*
   a. Print journals
   b. Print textbooks
   c. Electronic journals
   d. Electronic textbooks
   e. Subject specific web sites
   f. Subject specific electronic databases (eg. *PubMed, MDConsult, Scopus, UptoDate,* etc.)
   g. Blogs
   h. Wikipedia
   i. Other (If other, please explain your answer)

8. **Question 7**
   From where do you obtain the subject information used in your teaching? (S*elect all that apply)*
   a. My own personal collection
   b. Colleagues' or departmental collections
   c. Review copies of textbooks obtained from publishers
   d. Wits Library collections
   e. Other (non-Wits) Library collections
   f. I attend conferences/workshops/symposia
   g. Web sites (Internet)
   h. Other (If other, please explain your answer)

9. **Question 8**
   Do you incorporate additional resources (in addition to your own lectures and handouts) into your students' courses?
   a. Yes
   b. No

10. **Question 9**
    In what form do you incorporate these additional resources into the GEMP 1 and 2 curriculum? (S*elect all that apply)*
    a. Bibliographies (lists) of additional/recommended reading
    b. Recommendations to use the print textbooks from the collection in the PBL rooms
    c. Links to the e-Wits (Library) catalogue records of print books or journals
    d. PDF copies of relevant journal articles
    e. PDF copies of relevant textbook sections
    f. Your own summaries of relevant readings as "Notes"
    g. Copies of Power Point lectures (either printed out or attached electronically to the relevant topic in the GEMP site)
    h. Hyperlinks to relevant e-books
    i. Hyperlinks to relevant e-book sections
    j. Hyperlinks to relevant journal articles
    k. It is not necessary for my students to know more than what is core to the subject content in the subject/s I teach, and what has already been provided in the form of lectures, learning topics, theme sessions, or clinical skills sessions

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l. It is not necessary for my students to use resources other than what is prescribed or recommended
m. I expect my students to find material in the Library or on the Internet themselves as part of their self-directed learning
i. Other (If other, please explain your answer)

11. Question 10

Do you incorporate evidence-based information-seeking in your own practice? (*Please select only one answer)*

a. Yes, I am a medical practitioner (clinician) and use evidence-based information-seeking for my own practice, teaching and/or research
b. Yes, I am not a medical practitioner (clinician), but use evidence-based information-seeking in my teaching, and/or research
c. No, I don't know what evidence-based information-seeking is
d. No, I am not a medical practitioner (clinician) and therefore do not need to use evidence-based information-seeking
e. No, I am a medical practitioner, but do not use evidence-based practice as I am not in clinical practice
f. No, I am a medical practitioner, but do not have the time for evidence-based practices

12. Question 11

Please rate the sources you think might be important for finding evidence-based information *(Please rate all sources as: Very important; Important; Doesn't Matter; Unimportant; Completely Unimportant; N/A)*

a. Print textbooks
b. Electronic textbooks
c. Consultation with colleagues
d. Print journal articles
e. Electronic journal articles
f. Reviews (in print or electronic format)
g. Systematic reviews (in print or electronic format)
h. *FirstConsult, Clinical Evidence, Best Practice, UptoDate, ACP Journal Club*, or similar resources
j. Other (If other, please explain your answer)

13. Question 12

Do you think evidence-based information-seeking skills should be taught to GEMP 1 and 2 students?

a. Yes
b. No

14. Question 13

If you answered "*No"* to Question 11, please indicate why you do not believe GEMP 1 and 2 students need to acquire evidence-based information-seeking skills?

15. Question 14

If evidence-based information-seeking skills are taught to GEMP 1 and 2 students, by whom do you think they should be taught? *(Select one answer only)*

a. Only by a medical practitioner (clinician)
b. Only by a pre-clinical scientist
c. Only by a librarian
d. By all three (medical practitioner, pre-clinical scientist and librarian) in collaboration
e. By a librarian together with a medical practitioner only, in collaboration
f. By a librarian together with a pre-clinical scientist only, in collaboration
g. By a medical practitioner together with a pre-clinical scientist only, with no library collaboration

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16. **Question 15**

If you supply your students with additional resources, what use do you expect them to make of this extra information? (S*elect all that apply)*

a. To be used for background reading for a better understanding of the system/condition/s under study
b. To be used for additional information about the system/condition/s (Non-core information)
c. To be used for essential (core) information about the system/condition/s that can not be covered in the PBL or plenary sessions owing to time constraints
d. To be integrated into core knowledge about the system/condition/s from lectures, learning topics, theme sessions or clinical skills tutorials that you deliver
e. To be used only for interest (probably by only the top few students in the class)
f. Not to be used, even if supplied, as students will not use any additional information given except if required for examination purposes
g. I do not supply additional resources
k. Other (If other, please explain your answer)

17. **Thank you!**

Thank you for taking the time to share your views – it is greatly appreciated! If you would like to share any additional comments, please do so now.

Glenda Myers, D Litt et Phil
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