Facets of Inquiry-based Learning: the role of Information Literacy, collaboration and reflection in the support and development of inquiry-based pedagogies in Higher Education

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Abstract

This thesis presents my scholarship into Inquiry-based Learning (IBL), and related support structures and pedagogical approaches, in Higher Education. Research in teaching has come to be labelled as the "Scholarship of Teaching and Learning" (SoTL), this thesis and the papers presented in it, present a broad and wide-ranging example of SoTL. This commentary summarises five peer-reviewed journal papers that were published over an eight-year period, and distil the learning from my 13-year exploration of IBL, and the specific strategies that can be used to support and develop the use of inquiry in Higher Education, not least of which is the development of Information Literacy (IL) and inquiry-based pedagogies for teaching IL. The commentary outlines the two contexts of the research, and describes the process that led to the creation of each paper and my role in that process.

This commentary presents the research worldviews and methodologies that have been used in the five papers. Two papers use Theory of Change impact evaluation methodology and feature both qualitative and quantitative data analysis, with data drawn from a range of IBL curriculum development projects. The remaining three papers are qualitative studies, and feature a range of approaches including thematic analysis, Situational Analysis and the draw and write methodology. Data in these papers is drawn from assessed student reflective writing and student-created drawings.

I discuss my work in relation to research in conceptions of IL and models of IL, and state the role of my research in advancing understanding of inquiry-based pedagogy for IL, and in developing new understandings of the nature of IL and IL teaching in Higher Education. I discuss the value of reflective writing for supporting and assessing IBL, and demonstrate how models of reflection and models of IL can be combined to analyse reflective writing about IL development. I discuss the use of two different methodologies with reflective and drawn data to illuminate how students work together in groups, revealing new conceptions of group work, and challenging existing models of group functioning.

I reflect on my development as a researcher and present a summary of the impact of my research. I discuss the central contribution to knowledge of the five papers, situated within

a broad reflective pedagogical and research environment. Theoretical contributions include defining the relationship between inquiry-based learning and Information Literacy, the value of the Seven Pillars model for IL research, and developing new understandings of how students work together in groups. Methodological contributions including demonstrating the value of Theory of Change for impact evaluation in HE, and extending the use of Situational Analysis and the Draw and Write methodology in this context. Practical contributions include a range of pedagogical approaches for teaching Information Literacy through inquiry, and evidence of the value of librarians/academic/educational developer partnerships.

Summary of publications

Publication	Authorship	Corresponding author	Permission received from co-authors	Publisher copyright policies
Paper 1 McKinney P.A., Jones M. & Turkington S. (2011) Information Literacy through inquiry: A Level One psychology module at the University of Sheffield. *Aslib Proceedings: new information perspectives* 63 (2/3) 221-240	1st of 3 authors	Yes	Yes	Author can archive post-print final draft post-refereeing
Paper 2 McKinney P.A. (2013) Information literacy and inquiry-based learning: evaluation of a 5 year programme of curriculum development. *Journal of Librarianship and Information Science*. 46 (2) 148-166	Sole author	Yes	N/A	Author can archive post-print final draft post-refereeing
Paper 3 McKinney P.A. & Sen B.A. (2012) Reflection for learning: understanding the value of reflective writing for information literacy development. *Journal of Information Literacy,* 6(2), 110-129	1st of 2 authors	Yes	Yes	Author can archive post-print final draft post-refereeing
Paper 4 McKinney, P.A. and Sen, B. (2016) The use of technology in group-work: A Situational Analysis of students' reflective writing. *Education for Information*. 32 (4) 375-396	1st of 2 authors	Yes	Yes	Author can archive post-print final draft post-refereeing

Paper 5 McKinney, PA. & Cook, C. (in press) Student conceptions of group work: visual research into LIS student group work using the draw and write technique. *Journal of Education for Library and information science.*	1st of 2 authors	Yes	Yes	Author can archive post-print final draft post-refereeing

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Abbreviations

ACRL: Association of College and Research Libraries

CILASS: Centre for Inquiry-based learning in the Arts and Social Sciences

HEFCE: Higher Education Funding Council for England

HE: Higher Education

IBL: Inquiry-based Learning

IL: Information Literacy

ILN: Information Literacy Network

LDRA: Learning Development and Research Associate

LILAC: Librarians' Information Literacy Annual Conference

LIS: Library and Information Science

PBL: Problem-based Learning

SA: Situational Analysis

SCONUL: Society of College, National and University Libraries

SoTL: The Scholarship of Teaching and Learning

ToC: Theory of Change

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1. Introduction

In this thesis I present and discuss a series of studies that were undertaken at the University of Sheffield that explore and extend understanding of the relationship between Inquiry-based Learning (IBL), Information Literacy (IL), reflection and collaborative inquiry. In doing so I contribute to the development of Scholarship of Teaching and Learning for IBL, and influence the debate around the nature of IL, pedagogy for IL and how IL relates to learning in the Higher Education (HE) context.

The papers included in the thesis were written based on scholarship and research undertaken in two roles at the University of Sheffield; firstly as a Learning Developer with CILASS: Centre for Inquiry-based Learning in the Arts and Social Sciences where I was employed from 2005-2010, and secondly as a Lecturer in the Information School where I have been employed from 2010 to the present day.

IBL has been described as an "umbrella" term (B. Hutchings, 2007) for a variety of pedagogical approaches (e.g. fieldwork, problem scenarios, research projects and experiential learning) that place the student at the centre of the learning experience (Levy & Petrulis, 2012), and aim to provide opportunities for students to pursue their own subjects and ways of learning. This highly constructivist mode of learning and teaching is seen to be an essential feature of university education (Boyer Commission on educating undergraduates in the research university, 1999).

In order to be effective inquirers, students have to be adept at finding, using, evaluating and managing information, the skills and capabilities that are at the heart of the concept of "Information Literacy" (IL). My role in CILASS involved trying to develop understanding of the synergies between IBL and IL, how the development of IL could support student inquiries, and the use of inquiry-based pedagogies to teach IL. In addition to IL, CILASS had two further foci for the development and support of IBL, namely collaborative inquiry i.e. students working in groups to pursue IBL, and

the use of Technology Enhanced Learning to support IBL, and both of these have influenced my ongoing research into IBL.

I first introduce the theoretical background for the central themes of the thesis, and define key terms and concepts. I further outline the paradigmatic landscape of my research and the epistemological assumptions underlying the different projects, and give a brief outline of the research context. I provide background information about how each paper was written, and my role in the research, and reflect on the ethical issues in the research. I present a discussion of the central themes of the five papers, and place my research in the context of the wider research in both the IL field and the broader field of education research. I discuss the changes and developments that have taken since my papers were published, the impact of my research, and also discuss the limitations of my research. I offer some reflections on my personal development as a researcher; and I outline implications for practice for Information Literacy educators, and LIS education. I present my contribution to practical, theoretical and methodological knowledge, and I present my overall conclusions.

The papers included in this thesis have all been published in Library and Information Science (LIS) subject-focused or teaching-focused journals. Papers 1, 2 and 3 focus on the development of approaches to the teaching of IL, and even though this takes place in many subject contexts, it is probably of most interest to IL teaching practitioners (i.e. librarians) who would be more likely to access material through LIS journals. This is particularly true for the Journal of Information Literacy which is positioned as a key resource for librarians who teach IL, and draws on a rich tradition of sharing teaching practice facilitated by the LILAC conference. A further aim of this publishing strategy was to position myself as researcher of IL within the LIS field. My research into how students work together in groups would be of interest to the wider learning and teaching educational development community, and also to academic staff in many disciplines. However, I chose to publish papers 4 and 5 in LIS education-specific journals in order to reach an audience of educators in LIS. Furthermore, I wanted to position my work as advancing knowledge of teaching in the LIS field, and to position myself as an active researcher in LIS education. All my

publications are available open access through the White Rose Repository and are discoverable through internet search engines and multidisciplinary databases.

2. Theoretical background

In this chapter I outline the theoretical background of the core themes of IBL, IL, reflection and collaborative inquiry that are discussed in this thesis. I position my work as an aspect of the Scholarship of Teaching and Learning, and explain how theory from the Education and Library and Information Science fields has informed and provided a focus for my scholarship.

2.1. The Scholarship of Teaching and Learning

In his seminal work Scholarship Reconsidered, Boyer (The Boyer Commission, 1998) opened up debate about the meaning of scholarship in the academy, and stated that there were four overlapping areas of scholarship, one of which being the Scholarship of Teaching and Learning (SoTL). SoTL is defined as

> "Problem posing about an issue of teaching or learning, study of the problem through methods appropriate to the disciplinary epistemologies, applications of results to practice, communication of results, self-reflection, and peer review" (Cambridge, 2001 p.3)

Scholarship is an "essential practical bond between teaching and research"(Ramsden, 2008 p.14). Some researchers feel that scholarship and research are the same thing, others see scholarship as an aspect of the professional role of academics, but these are not easy distinctions to unpick (P. Hutchings & Shulman, 1999). Trigwell, Martin, Benjamin, & Prosser, (2000) state that there are four central features of SoTL: it is public, it is open to review and critique, it is presented in a way that allows others to build on it, and involves a process of inquiry and research, particularly focusing on student learning. SoTL goes beyond simply teaching excellently, it involves developing understanding of student learning. Trigwell & Prosser (2004) present five conceptions of SoTL drawn from phenomenographic research with Australian academics, it is not possible to describe them in detail here, however it is noted that they incorporate ideas of "reflection, inquiry, evaluation, documentation and communication" (p. 156).

This thesis, and the papers presented here, can be seen as an enactment of the Scholarship of Teaching and Learning. Brew (2010) argues that scholarship must be central to academic life, in developing knowledge of the institutions and students that frame the work of academics; and that a reflexive approach is needed in order for academics to make sense of a supercomplex world. I view this scholarship as a defining feature of my role as an academic, and this thesis and the research that led to the writing of the five papers I present as a substantial contribution to the SoTL relating to IBL, IL, reflective writing, and collaborative student working in Higher Education.

2.2. Inquiry-based Learning

IBL incorporates a spectrum of pedagogical approaches that facilitate open-ended student exploration, investigation and research (B. Hutchings, 2007). IBL is based on constructivist and sociocultural theories of learning, and involves students explicitly in the disciplinary and academic process of knowledge-creation (Spronken-smith, Walker, Batchelor, O'Steen, & Angelo, 2011), and is identified as a means to strengthen the links between research and teaching in HE (Brew & Boud, 1995). IBL requires students to actively engage with the knowledge-base of their discipline, and also support students in the creation of genuinely new knowledge and insights (CILASS, 2010a). Constructivism is a theory of knowledge and learning that defines knowledge not as a truth that can be transmitted from teacher to student, but instead is inherently constructed by the individual based on their experiences and previous knowledge (Twomey Fosnot, 2005). Constructivist theory is enacted as a practice in inquiry-based pedagogy (Justice et al., 2007).

This contrasts with transmissive theories of education, which are based on the premise that information can be transferred from the expert to the learner (Dewey, 1938). In this view of education, learning is "mechanistic" and is seen to be a series of steps to climb, and teaching is driven by the need to achieve "results" (Thomas & Seely Brown, 2011). The development of inquiry-based pedagogies was stimulated by thinkers such as Boyer (The Boyer Commission, 1998), and his report highlighted

the failings of didactic, transmissive styles of teaching to prepare students for either further study or their professional careers (Levy & Petrulis, 2012). In the UK, a policy recommendation from the Higher Education Academy calls for new models of undergraduate curriculum that should all incorporate "research-based study" in order to "cultivate awareness of research careers, to train students in research skills for employment, and to sustain the advantages of a research–teaching connection in a mass or universal system" (Ramsden, 2008 p.11).

Pedagogies based on student inquiry are perceived to offer the potential to engage 'deep' learning and to support the development of capabilities and dispositions - such as critical reflexivity, initiative and social responsibility - that are identified as fundamental not only to academic practice and to engaging in academic communities of practice (Brew, 2003; Healey, 2005). Through inquiry, students have opportunities to engage directly with open-ended problems arising out of their academic discipline or professional practice, thereby entering into fuller participation in relevant research communities and becoming better equipped to engage with a world that Barnett (2000) has characterised as inherently 'supercomplex'. Hodge, Haynes, LePore, Pasquesi, & Hirsh, (2008) argue that inquiry-based pedagogies are essential in developing in students the intellectual stance and attitudes associated with 'self-authorship' - a central goal, they suggest, of undergraduate higher education. Baxter Magolder & King (2004) define self-authorship, broadly, as awareness of the nature of knowledge as constructed, fluid and contested, and a belief in the possession of the capability to create new knowledge, and the ability to participate in the community of knowledge production. IBL encourages learners to let their curiosity and their urge to develop their understanding lead their explorations in their subject (Justice et al., 2007). IBL is characterised by a belief in student autonomy, student ownership and student responsibility for the learning process.

Research conducted in the University of Sheffield with 1st year undergraduate students (Levy & Petrulis, 2012) led to the development of the following conceptualization of IBL:

***Authoring*:** Inquiry tasks are designed to encourage students to explore their own open questions, problems, scenarios or lines of inquiry, in interaction with a knowledge base ('how can I answer my open question?').

***Producing*:** Inquiry tasks are designed to encourage students to explore open questions, problems, scenarios or lines of inquiry, framed by teachers, or others such as an external 'client', in interaction with a knowledge base ('how can I answer this open question?').

Pursuing: Inquiry tasks are designed to encourage students to explore a knowledge base actively by pursuing their own questions, problems, scenarios or lines of inquiry ('what is the existing answer/response to my question?').

Identifying: Inquiry tasks are designed to encourage students to explore a knowledge base actively in response to questions, problems, scenarios or lines of inquiry framed by teachers ('what is the existing answer/response to this question?').

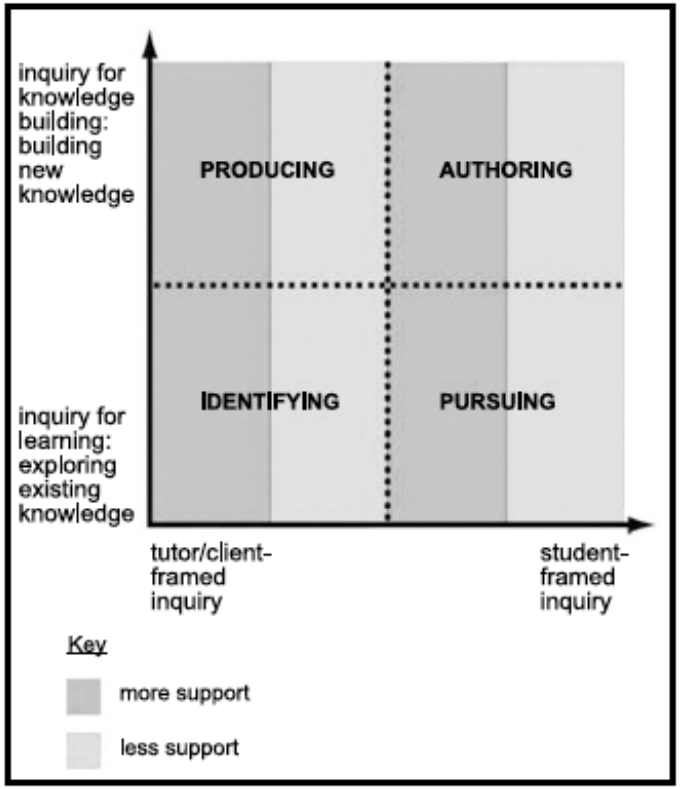


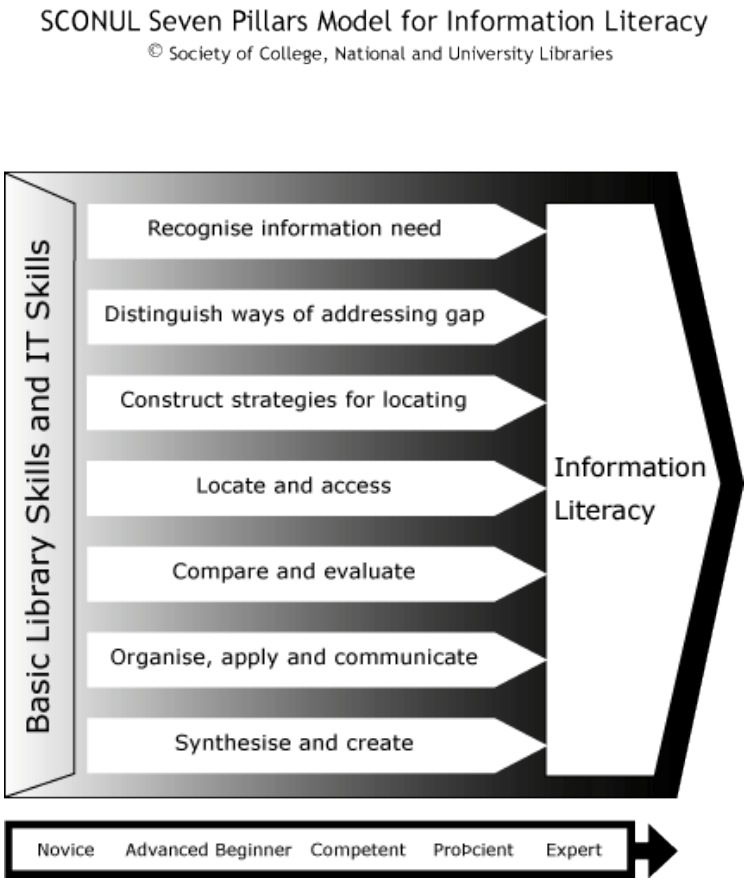
Figure 1: Modes of Inquiry-based learning (Levy & Petrulis, 2012)

IBL therefore is a vital aspect of education in Universities, and as can be seen from this model, it always involves student-led interaction with information and knowledge. The importance of engaging with information in IBL leads to the need develop IL competencies in students.

2.3. Information Literacy

Many stakeholders in different contexts have produced definitions of IL, and library and information professional bodies have sought to define the competencies, skills and abilities that people should have in order to be 'information literate'. One focus of my thesis is in exploring and understanding IL in the HE context, although IL has been identified as key to participation in the information society, and to being a lifelong leaner. It is a basic human right, and is linked to reducing inequality, participatory citizenship, and closing the digital divide (UNESCO, 2003, 2005).

In education, particularly HE, a number of models, standards and frameworks for IL have been developed, for example the SCONUL "Seven Pillars" of information literacy (SCONUL, 1999). In the US the Association of College and Research Libraries produced IL standards in 2000 (ACRL, 2000), and more recently framework for IL (ACRL, 2016). Much of the reported use of the Seven Pillars model appears in practitioner literature rather than in empirical research. The model has been used to provide a basis for IL programme design; to inform strategy and policy documents; as the base for an institutional IL framework; to design learning outcomes; as a framework for online IL teaching; as a point of departure for discussion and debate; and to create IL quizzes (Gallacher, 2009). The Seven Pillars model was revised and updated in 2011, and reflected the changing and developing terminology used to describe IL based on feedback from UK universities (Webber & Johnston, 2017). A crucial difference in the revised model was the creation of a new visual model which placed the seven pillars in a circular landscape, rather presenting them in a linear way:



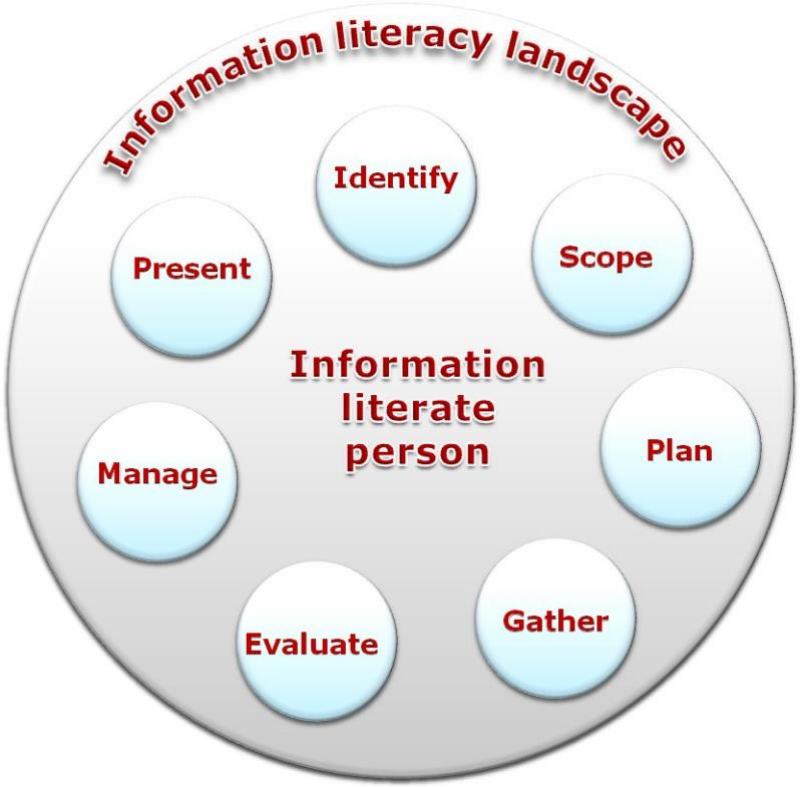


Figure 2: Original (SCONUL, 1999)and revised (SCONUL 2011) SCONUL Seven Pillars models of IL

There is a small body of research where IL models and standards and have been used to inform empirical research and provide frameworks for analysis of data (Diekema, Holliday, & Leary, 2011; Gumulak & Webber, 2011; Han, 2012; Lahlafi, Rushton, & Stretton, 2012), and these examples combined with my own research in paper 3 indicate that there is value in using these practitioner-oriented models in research.

Models and standards of IL are used to support the development of approaches to teaching IL, and have shaped conceptions of IL (Pilerot, 2016). Notwithstanding this drive to standardise and define IL, phenomenography has emerged as a research approach to understanding the qualitatively different ways in which IL is understood by people (Webber & Johnston, 2017). Bruce's (1997) influential study of the "Seven Faces" of IL has been followed by further studies to understand the conceptions of academics in various disciplines (Webber, Boon, & Johnston, 2005); students (e.g. Diehm and Lupton, 2012) and in everyday life contexts (e.g. Yates et al., 2012).This body of research indicates that IL is a "multifaceted and multidimensional" concept (Spiranec & Zorica, 2010).

Bruce (2008) asserts that there is a fundamental link between information and learning; in the modern information society it is impossible to learning without interacting with the information environment. As a result, information professionals are convinced of the need to integrate IL development into University education (Fister, 2017; Markless & Streatfield, 2007). The CILASS programme was undertaken with the premise that strong IL capabilities are fundamental to the success of IBL, as students need to be able to confidently access, evaluate, synthesise and apply information from their discipline area to support their inquiry (McKinney & Levy, 2006). This focus on IL to support students in their inquiries led to the creation of my post as learning developer with a specific responsibility for research, evaluation and educational development with respect to IL and IBL (McKinney, Wood, & Little, 2009).

The synergies between IL and the reflective and collaborative aspects of IBL is recognized in the revised ACRL definition of IL:

> "Information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning." (ACRL, 2016)

It is this definition of IL that is most relevant to this thesis as it encapsulates ideas around reflection and collaboration (explored in papers 1, 2 and 3), and the idea of people as knowledge creators which is similarly expressed in models of IBL (figure 1).

2.4. Group work and collaborative inquiry

Learning through collaboration and the social negotiation of meaning is an essential characteristic of constructivism (Grabinger & Dunlap, 1989). This underlying theoretical background provides a commonality with IBL, and is the reason why much IBL involves students working in groups. As Lambert et al. (2002) state "Learning is a social activity that is enhanced by shared inquiry" p. 26). The development of theories such as the 'Communities of practice' (Lave & Wenger, 1991) are based on this premise that learning is a social process and requires interaction and collaboration, and that meaning is socially constructed. Theories of collaborative and cooperative learning assert that people working in groups have higher productivity and higher levels of achievement than people working independently (Johnson & Johnson, 1999). Cooperative learning rejects the "social Darwinism" view of education (a dog-eat-dog world) and results in better retention of information, greater use of critical thinking, greater persistence with challenging tasks, and increased ability to transfer learning to new situations than working individually (Johnson, Johnson, & Smith, 2007).

Educational theorists such as Dewey have long recognized the role of collaboration for IBL (Dewey, 1916). The Boyer report (The Boyer Commission, 1998) highlighted the link between IBL and the need for "open intellectual horizons" with "opportunities for learning by inquiry in a collaborative environment" (p.20). A key

aim of the CILASS programme was to develop greater understanding of collaborative inquiry, responding to institutional graduate attributes around the importance of teamwork (The University of Sheffield, 2005). However, despite positive perception of collaborative pedagogies by academics (as noted in papers 4 and 5), students can have very negative perceptions and experiences of group work. My research into group work is prompted in part by this disconnect between the views of students and academics. Scholars of IL have highlighted the importance of collaborative learning for IL pedagogies (Diehm & Lupton, 2012), as learners can share knowledge and experiences with their peers, however this aspect of IL pedagogy could be developed further (Coonan, Secker, Wrathall, & Webster, 2012). I explore collaboration and group work as an aspect of IBL and IL in CILASS projects in paper 2. My interest in how students work together, and the processes of student group work when learning through inquiry prompted the research that led to papers 4 and 5.

2.5. Reflection

Reflection can be defined as:

> "The process of engaging with learning and/or professional practice that provides an opportunity to critically analyse and evaluate that learning or practice. The purpose is to develop professional knowledge, understanding and practice that incorporates a deeper form of learning which is transformational in nature and is empowering, enlightening and ultimately emancipatory." (Black & Plowright, 2010) (p.246).

Freire (1970) links reflection and reflective practice of both teachers and students to inquiry and problem-based educational theories, through engaging in reflection learners can come to see the world as a transformative rather than a static reality. Reflective writing requires students to be self-questioning, self-critical and acknowledge a messy reality (Wharton, 2012). Self-evaluation and reflection are essential aspects of IBL (Spronken-smith et al., 2011), and the CILASS bid document states a key outcome of the programme to develop critical reflection as a key student capability (The University of Sheffield, 2005).

Not only is reflection an important aspect of student learning, but it is an important aspect of professional practice of educators, and also information professionals (Corrall, 2017; Sen, 2010). Furthermore, the process of CILASS evaluation (discussed below) is informed by a "reflective practitioner model" involving critical reflection by a project team of interventions and their effects on learning and other desired organisational outcomes (Hart, Diercks-O'Brien, & Powell, 2009).

The strong relationship between reflection and IBL is mirrored in the strong relationship between reflection and IL. Bruce (2008) places reflective used of information at the heart of her vision of "informed learning". Secker & Coonan (2011), in their "New Curriculum for Information Literacy" also centralise the role of reflection in supporting students to develop understanding their information environment, and identify the role of reflection in the curriculum. The ACRL framework for IL (ACRL, 2016) defines IL as a reflective process of the discovery of information, and the understanding of the production, value and use of information.

Thus reflection is an important conceptual issue explored in this thesis at many levels: as an aspect of inquiry-based pedagogy (papers 1 and 2, 3 and 4); an aspect of IL and pedagogy for IL (papers 1, 2, 3), and as an aspect of the Scholarship of Teaching and Learning, and my professional praxis as an educator. My research takes place in a reflective environment, characterized by both staff and student reflection, with SoTL providing the context for my research activities.

As briefly explored in paper 4, there are some who question whether it is good practice to use reflective writing as a means of assessment in Higher Education (Creme, 2005), and there is a view that assessed reflective writing simply presents what students know tutors wish to read (Wharton, 2012), or cannot be independently verified (Braun, Gill, Teal, & Morrison, 2013). However, as a result of own research in papers 3 and 4, I would argue that students are able to be self-critical, and judging from the accounts provided by the different group members and from my observations in the classroom, students have been honest in their reflections. I feel that the reflective writing has facilitated learning, and has enabled

constructive alignment (Biggs & Tang, 2011) between the process-oriented learning outcomes of IBL, and the assessment of the module. Initial journal peer reviews for paper 4 questioned the legitimacy of using reflective writing as data to understand the student experience, however, there is a rich tradition of using reflective diaries and journals to understand the experience of educators (e.g. den Outer, Handley, & Price, 2013). There are many examples of research that has used students' non-assessed reflections as data (e.g Lee, Williams, Shaw, & Jie, 2014; Moate & Sullivan, 2015), and a similarly large body of research where assessed student reflections have been used as research data (e.g. Braun, Gill, Teal, & Morrison, 2013; Carson & Fisher, 2006; Mayne, 2012; Rai, 2006). Where other forms of data (e.g. interviews, questionnaires, focus groups) have been collected in a research project to understand aspects of student learning, reflective writing has been preferred because it was the most "interesting and representative" data in the study (Nevalainen, Mantyranta, & Pitkala, 2010). This research has all been published in peer reviewed journals, indicating that for the most part, the academy views the use of this type of data as a valid way to research the learning experience of students.

2.6. Terminology and discoverability

Although I have consistently used the term "Information Literacy" in my publications, it is worth acknowledging that there are a number of interrelated and overlapping domains of knowledge and resulting terminology that could affect the discoverability of my work. Stordy, (2015) in his review of the literature landscape of "literacies" in education found 35 different types of literacy represented. Digital literacy, defined as "the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process" (Martin, 2006), has a core similarity with IL, and is often used interchangeably in the HE sector. Media Literacy is defined as the ability to access media, to understand and critically engage with media content and institutions, and

to create communication through media, (McDougall, Berger, Fraser, & Zezulkova, 2015) and is seen as distinct from the combined term Media and Information Literacy, which highlights the importance of understanding media bias, and the role media plays in our information landscapes (UNESCO, 2018). However, despite their distinctive features both concepts are closely aligned with central conceptions of IL. Therefore, it is unsurprising that there is confusion about which term is most appropriate in any given situation, and which may be the preferred search term for those wishing to discover research. Mackey & Jacobson (2011) discuss the varying concepts of digital literacy, media literacy, visual literacy and information technology fluency, and argue that IL is an overarching "metaliteracy" for the information age, as the competencies it encompasses are core to successful engagement in the digital world. Secker & Coonan (2011) produced a conceptual map of the "Information literacy landscape", placing IL at the centre of four related concepts of academic literacies, new literacies, media literacy and digital literacy and highlighted the specific areas of overlap. This model clearly indicates that IL can be viewed as the "core" competency, and these two publications, and my disciplinary and professional background in IL (Not least my job role as Learning Development and Research Associate: Information Literacy) informed my decision to use the term "Information Literacy" in my work.

Similarly, there are issues to do with the terminology surrounding Inquiry-based learning, including a disagreement about the correct spelling of "inquiry" with many using the spelling "enquiry". Although there is no difference in meaning, the existence of two competing spellings affects discoverability of material. In addition, there is also terminology used in the general field that is overlapping and to a certain extent, competing. For example, many find the distinction between Problem-based Learning (PBL) and IBL challenging, however, PBL is driven by a specific problem that students must attempt to solve, and employs a far more rigid and structured approach, featuring a series of steps that must be undertaken. IBL in contrast is more open, in that the "trigger" for inquiry may not necessarily be a problem, it could be a picture or a piece of research, and IBL invites a range of modes of engagement from students with the subject of inquiry (B. Hutchings, 2007). Other

terms that are often used synonomously with IBL include “Research-oriented Teaching”, or “Research-based teaching” which both emphasise learning about and through research, although it is “research-based teaching” that is most closely linked with IBL (Healey, 2005). Despite the somewhat murky landacape of terminology around IBL, again I have decided to use the spelling “Inquiry” and the term IBL in part to link my research with its originating organisation: CILASS, and in part because one must choose a term, and it is helpful to be consistent.

3. Research context

3.1. CILASS

The CETL initiative was the largest ever single investment in teaching development funded by the Higher Education Funding Council for England (HEFCE) with over £315m of funding distributed amongst 74 CETLS in England and Northern Ireland over a 5 year period 2005-2010 (Higher Education Funding Council For England, 2011). The CILASS bid was developed concurrently with the University of Sheffield's 2005 Learning Teaching and Assessment Strategy which outlined a strategic focus on research-led teaching and inquiry. This strategy defined the attributes of the Sheffield graduate, which included attributes related to both IL and IBL (The University of Sheffield 2005).

More than £5m was granted to CILASS, and an ambitious programme of curriculum development projects, research and scholarship was planned to impact on over 10,000 students over the lifetime of the project. Over the 5-year period, CILASS funded 119 curriculum development and SoTL projects. In my role as Learning Development and Research Associate (LDRA) I provided pedagogical support on IBL for projects, and also provided more specialist advice on the support and development of IL as part of student inquiry activities. I facilitated the management of the Information Literacy Network (ILN), an institutional network of IL practitioners, academics and researchers, that complemented the work of CILASS. The ILN provided development and training opportunities for staff, and a coordinated research and evaluation-based approach to IL development at the University.

Comprehensive evaluation of the impact of the CETLs was a key aspect of the national programme, each CETL devised its own impact evaluation framework. The CILASS team worked closely with the University's Learning Development and Media Unit and to design the Theory of Change (ToC) evaluation procedure adopted at the CETL, and this is described in more detail below, and also in papers 1 and 2.

CILASS was a member of the "Learning Through Enquiry Alliance" (LTEA), a group of 7 CETLs which included student inquiry as a central theme of their development activities[1]. An annual conference hosted by each LTEA member in turn (in Sheffield: "Inquiry in a Networked world" Levy & McKinney, 2008) provided opportunities for creative and critical exploration of IBL, and for networking and community-building among the educational developers and academic staff involved in the CETLs. Although CILASS and the LTEA were disbanded in 2010 when the CETL funding ceased, the research, evaluation and educational development that took place has had far-reaching impact on Higher Education in the UK through the extensive dissemination activity and publications derived from CILASS and LTEA activity (e.g. (CILASS, 2010b, 2010c; LTEA, 2010). It is hard to quantify the institutional influence of CILASS, although the Theory of Change framework that was used at programme and project level would facilitate this longitudinal analysis. Nevertheless, the central student competencies that the CILASS programme aimed to develop (collaborative inquiry, information literacy, reflection, lifelong learning) are included in the current Sheffield Graduate Attributes (The University of Sheffield, 2018). However, the focus on inquiry-based pedagogy in the current Learning and Teaching strategy is much more muted, although there is still reference to the importance of self-directed learning, and students acting as co-producers of new knowledge (The University of Sheffield, 2016).

3.2. The Information School

I joined the Information School (then the Department of Information Studies) in January 2010 and took over the teaching of the two Business Intelligence modules (UG and PGT). Given my background in curriculum development, evaluation and

[1] CEAL: Centre for Active Learning: University of Gloucestershire
CEEBL: Centre for Excellence in Enquiry-based Learning, University of Manchester
CETL-AURS: Centre for Applied Undergraduate Research Skills, University of Reading
CPLA: Centre for promoting Learner Autonomy, Sheffield Hallam University
SCEPTrE: Surrey Centre for Excellence in Professional Training and Education
The Reinvention Centre for Undergraduate Research, University of Warwick and Oxford Brookes

pedagogical research it was natural for me to use my teaching as a site of scholarship and research. My interest in IBL and the related and interlinked concepts of IL, collaborative inquiry and Technology Enhanced Learning prompted me to undertake scholarship in my own teaching (papers 3 & 4), and led to the research presented in paper 5.

Figure 3 below is a diagrammatic representation of the timeline of my research

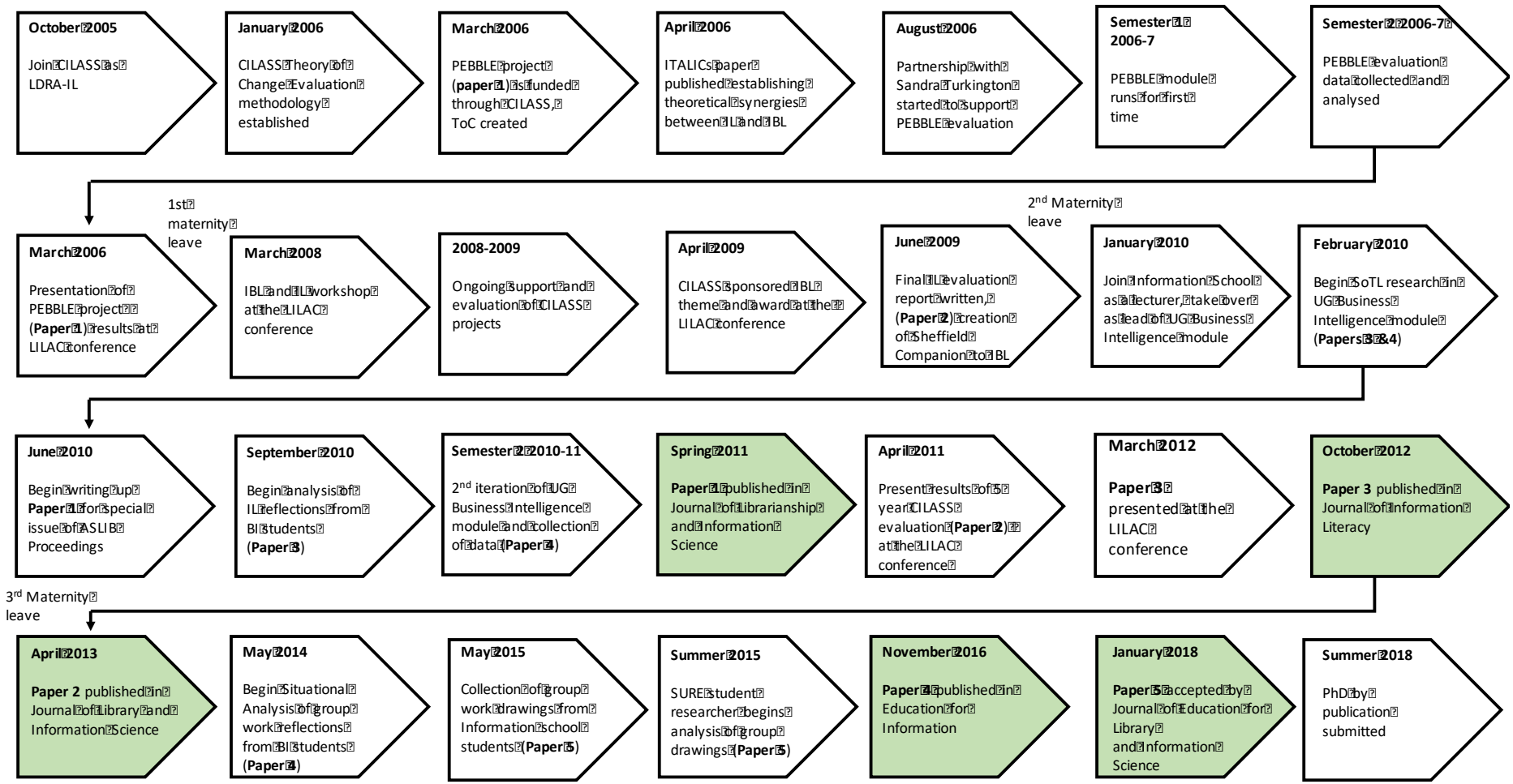


Figure 3: The timeline of my research

4. Research paradigms

Questions about the nature of reality (Ontology), the relationship between the knower and the known (epistemology) and questions that shape how that reality is known and understood (methodology), combine to set the paradigmatic boundaries for research (Pickard, 2013). A paradigm is defined as a "worldview, complete with the assumptions that are associated with that view" (Mertens, 2003 p.139), and is a lens through which the researcher views the world (Kivunja & Kuyini, 2017). A methodology is defined as "a broad approach to scientific inquiry specifying how research questions should be asked and answered", which is distinct from research methods, defined as "specific strategies and procedures for implementing research design, including sampling, data collection, data analysis and interpretation of the findings" (Teddlie and Tashakkori 2009 p.21). During the course of my research I have taken a variety of stances towards the exploration of reality, and my development as a researcher and the impact of developing this worldview is explored more fully in section 7 where I discuss my development as a researcher. The paradigms that underpin the research in each paper are presented below, and are also included in figure 5, section 7 where I summarise my researcher journey and my developing worldview.

4.1. Theory of Change and the pragmatic approach (papers 1 and 2)

Historically it was deemed questionable to mix qualitative and quantitative methods because of fundamental differences in the research paradigms that underpin those methods (N. Denzin & Lincoln, 2011). However, mixed methods researchers proposed a new paradigm of "pragmatism" which stated that qualitative and quantitative methods were in fact compatible (Teddlie & Tashakkori, 2009). Pickard (2013) argues that there is no philosophical underpinning for a pragmatic research paradigm characterized by mixed methods research, instead it is a form of post-positivist research which acknowledges the role of the researcher in interpreting the data. However, an alternative view is that mixed methods allows the researcher to accept that there are both singular and multiple realities, and to choose research methods that are appropriate for the question or problem, with the aim of simply

discovering what the researcher wishes to understand (Feilzer, 2010). Pragmatism is concerned with discovering solutions to problems through the use of multiple methods (Creswell, 2009) and is driven by a desire for utility (Feilzer, 2010).

The CILASS 'Theory of Change' (ToC) approach to impact evaluation follows a model developed at the University of Sheffield for evaluation of learning and teaching enhancement projects (Connell & Kubisch, 1998). This is an adaptation of *Theories of Change* programme evaluation (Helsby & Saunders, 1993) combined with the use of *EPO (Enabling, Process and Outcome) Performance Indicators* (Hart et al., 2009). A key aim of this theory-based and participative approach, as implemented in this context, was to provide accountability to funders (HEFCE). However, it also serves to inform improvement, and make connections between interventions and student outcomes. The methodology involves the creation of a "consistent and credible narrative" for the changes expected through the project as a way to causally link the project with the outcomes (Hart et al., 2009 p. 292). The data that was used to write both papers 1 and 2 was collected under the auspices of a defined process of *evaluation*, rather than a specific research project. The difference between *evaluation* and *research* is discussed below.

The creation of ToC posters was a mediated and participatory process whereby a LDRA attempted to capture the essential features of the project in conjunction with stakeholders, which are mapped onto the ToC framework. Therefore, there are some inherent restrictions on my role as researcher in the overall design and control of the data collection methods. There were four CILASS LDRAs who supported project level evaluation and who mediated the ToC creation process, and each person brought their own nuances of opinion and experiences to the table. While I was the sole Research Associate involved in supporting the Psychology Department's PEBBLE project (Paper 1); the CILASS projects that were analysed in Paper 2 involved contributions from all four CILASS LDRAs, plus a range of project stakeholders. This variation in ToC mediator and contributors influenced the creation of the ToC criteria, and subsequent data collection. Decisions on the evaluation data collected for each project are driven by the ToC framework and the criteria it defines i.e. the

research question is of primary importance, consistent with the pragmatic worldview (Ma, 2012). Constraints such as availability of contributors and the time cost of certain data collection methods affected the choices of data collection methods. However, a key feature of the ToC process as implemented in CILASS was the gathering of reflective data from project leaders which helped give consistency in approach across projects. As an LDRA, my role was to negotiate a suitable pathway to evaluation with the project leader based on "what worked" for the project overall. This lack of control on the part of the researcher might be seen to be problematic, however Lincoln, Lynham, & Guba(2011) state this is not an issue as long as the genuine participation of stakeholders and participants is sought, which is true for these projects.

The definition of "evaluation" is a contested area, although it is generally agreed that it is a distinct genre of inquiry. Evaluation and research both incorporate an empirical aspect, i.e. the collection of data, however evaluation includes a normative element of 'judgment' of value, and it is this that distinguishes evaluation from research (D. Mertens, 2015). Evaluation is by its nature selective and systematic in attempting to assess progress made towards a defined outcome (Hart et al., 2009). Evaluation in the context of educational development both informs organisational policy/learning, and provides evidence for and accountability to funding providers, in this case HEFCE (N. Denzin & Lincoln, 2011). Papers 1 and 2 derive research from evaluation data.

4.2. The constructivist approach (Papers 3 and 5)

Qualitative research is situated in the constructivist paradigm, or the belief that meaning is socially constructed by people as they make sense of the word they live and engage in. (Creswell, 2009). The ontological stance can be described as 'relativist' i.e. that reality is local, constructed or co-constructed (Ma, 2012). There are multiple realities: mental constructions that can be socially created or created by the individual (Lincoln et al., 2011). The epistemological stance is that all knowledge is a product of the interaction between the researcher and what is being researched

(Pickard 2013).The constructivist research paradigm is closely aligned with constructivist theoretical underpinnings of IBL and the use of group work pedagogies, which have informed my teaching and scholarship. The qualitative researcher can be seen as a "bricoleur" or quilt maker, using whatever variety or combination of tools and techniques to create an understanding of the situation of inquiry, there are no set methods in qualitative research (N. Denzin & Lincoln, 2011). In the case of paper 3, qualitative thematic analysis was used to interpret the data (reflective writing) in order to answer the research questions. The SCONUL "7 pillars" model of IL was used as a framework for understanding the IL development of the students, and the module learning outcomes provided a secondary framework for the critically reflective scholarship undertaken in this study.

In Paper 5 I use visual data to understand student conceptions of group work, and the research falls broadly into a qualitative, constructivist paradigm. There is not one global research paradigm or epistemology for image-based research, this type of research is subject to the same debate around epistemology and ontology as research that uses numerical or spoken/textual data (Stanczak, 2007). Qualitative researchers have favoured methodologies based on the interpretation of words and this has marginalized and undervalued research based on images. Visual data has been seen to play only a supporting role to other data, in part because of the challenges faced in interpreting and analysing it (Prosser, 1998; Prosser & Loxley, 2008). This research, and the research that informed my implementation of the draw and write methodology (Dean, 2015; Hartel, 2014a, 2014b; Weber & Mitchell, 1996) seeks to challenge this view. My view is aligned with Weber & Mitchell (1996) who argue that images are as strongly communicative as written or spoken data. Guillemin (2004) asserts that while the drawings themselves can be seen as visual products, but at the same time they are also constructions of meaning.

This research is interpretivist in nature, in that it is an attempt to understand how the social world is experienced and understood (Backett-Milburn & McKie, 1999). I adopt a relativist ontology, in acknowledgement of the multiple constructed realities of the individual (Pickard, 2013). Drawings cannot be seen as a 'true' representation

of reality, they are influenced by the images people see in the world around them and the sociotechnical views of the drawer (Backett-Milburn & McKie, 1999; Guillemin, 2004). Drawings reflect the views, ideas understandings of a person at a particular point in time, rather than representing fixed ideas or opinions (Guillemin, 2004). I recognise that my viewpoints and experiences affect interpretations of the drawn data (Weber, 2008), and this is consistent with a subjectivist epistemology, where research is inherently value laden (Teddlie & Tashakkori, 2009). In the research I quantify elements of the pictures, which is a common practice in the draw and write methodology (Backett-Milburn & McKie, 1999; Hartel, 2014a), however the overall approach is qualitative. Following Hartel (2014b), I used qualitative thematic analysis to understand the drawn data, using a deductive theoretical approach, taking into account theories and models of group working.

4.3. The postmodern approach – Paper 4

Situational Analysis comes from the symbolic interactionist school of thought, which focuses on meaning making in social groups (Clarke, 2003). It is an extension of the grounded theory method which has an constructionist, interpretivist epistemology (Clarke & Friese, 2007). This is consistent with a relativist ontology, a belief that there is no one single reality (Pickard, 2013). Constructivism assumes that meaning is constructed by people and by their interactions with each other; and that these meanings are coloured by the historical and social perspectives of individuals and groups (Creswell, 2009). The Chicago School attempted to formalize and provide a framework for interpretivist research (Pickard, 2013). Grounded Theory enables the researcher to step beyond the known and enter the world of participants, to see the world from their perspective (Clarke, 2005). Situational Analysis is said to take grounded theory "around the postmodern turn" (Clarke, 2003). Postmodernism is a complex set of beliefs and assumptions that acknowledges the messy complexity of life, and the almost ungraspable nature of reality, with an ontology that this complexity has to be central to understanding of the world. postmodernism emphasises "partialities, positionalities, complications, tenuousness, instabilities, irregularities, contradictions, heterogeneities, situatedness and fragmentation"

(Clarke & Friese, 2007). It requires the researcher to be reflexive about their role in the research. Where most previous methods have sought out commonalities in the data, postmodern approaches acknowledge "multiplicities, ambivalences, contradictions, and the very relationalities through which we negotiate social life itself" (Clarke, 2003 p.556)

Qualitative research allows an emergent design of data collection methods and analysis, based on the idea that we cannot know what we do not know, so the way in which the unknown emerges over the course of the study is subject to change and adaptation (Pickard, 2013). Through the course of the situational analysis mapping and memoing, the use of technology (identified as "actants") by students to support their group work became the primary site of interest, and this then led to the focus selected for paper 4.

4.4. Positionality

Research takes place in a space shared by the participants and the researcher, and the identities, beliefs, roles and values of each impact on the research process. Examining one's positionality in the research process is an important aspect of reflexivity (Bourke, 2014). In the CILASS project I was positioned as an "expert" in IL for the academics who were project leaders and research partners. This would have impacted on the way in which the projects were designed and carried out, and as noted in 4.1, my expertise, biases and interests would have influenced on the design of the ToC created for each project, and hence the evaluation criteria and subsequent data collection.

There is an inherent power differential between academic staff and students, (Herr & Anderson, 2015) and this influences the data that we as academic staff are able to collect from students. It is noted in both papers 3 and 4 that reflective writing can be problematic in that students can write simply what they know the academic who is assessing their work wants to read (Wharton, 2012). My position as a white middle class female has influenced the data I have collected and analysed from students,

particularly for paper 5 where the majority of the participants were from outside the UK. I specifically sought to involve a student and the international student support officer in the data analysis to address positionality issues in this research.

4.5. Research ethics

In papers 1 and 2, no ethical approval was sought for the original data collection which took place as part of the CILASS evaluation process. This was guided by the University's Learning Development and Media Unit who advised that the evaluation of CILASS projects did not need individual ethical approval. This decision was consistent with the overall approach to the evaluation of curriculum development projects and other evaluation activities (e.g. module and course evaluation) that took place at the university at that time. As far as possible though it was the stated intent of CILASS to proceed with evaluation activities in an ethical manner. This meant that, where possible, informed consent was gained from every participant in the evaluations, the anonymity of participants was preserved and ethical storage of the data was sought. However, views on whether pedagogic research, scholarship and evaluation should be subject the same ethical approval are under discussion in the wider HE community (Hack, 2018), and certainly it is *now* the case that pedagogic research at the University of Sheffield requires the same process of ethical approval as any other type of research.

Papers 3, 4 and 5 were developed from research that took place in the University of Sheffield Information School, and the ethical procedures of the School, and the University of Sheffield more widely, were followed. Ethical approval was granted following the standard procedures, which require researchers to consider the process by which informed consent is obtained from participants, the process of anonymization of the data and the ethical storage and re-use of the data.

5. Summaries of included publications

This section comprises brief summaries of the five papers that are included in this thesis. I discuss the context for each paper, comment on the methodologies used and state my role in the research and the writing of the paper. The papers are presented in order of publication and reflect my personal journey in developing my roles as librarian, educational developer, lecturer and researcher, and my journey through research methods.

The papers were selected from the full range of my journal publications for inclusion in this thesis because they are united by a common theme of SoTL in relation to IBL. Other papers were rejected because they fell outside of the 8-year time limit (McKinney & Levy, 2006; McKinney et al., 2009); because they were co-authored with students, based on masters dissertation research conducted by those students, and therefore were not truly "my" work (Brooke, McKinney, & Donoghue, 2013; Wheeler & McKinney, 2015); because the first draft was written by a co-author (Sen & McKinney, 2014); or because they were not closely aligned with the central themes of the thesis (A.M. Cox, McKinney, & Goodale, 2017). Nevertheless, the experience I gained from the activities of research, journal paper writing, submission and responding to peer review for the papers not included in the thesis has been as important for my personal development as a researcher as for the included papers.

A link to a full list of my publications can be found in Appendix 7.

5.1. Paper 1: Information literacy through inquiry: A Level One psychology module at the University of Sheffield

This paper reports on the evaluation of one of the CILASS curriculum development projects that took place in the Department of Psychology. I was the LDRA assigned to the Psychology Department, and as part of this work I provided support for the creation of the "Theory of Change" for the project. In order to evaluate the project, a number of data collection methods were planned and implemented, and data from all of these was incorporated into paper 1:

- A reflective focus group with Postgraduate tutors which I conducted and analysed.
- A series of 3 reflective interviews at 6 monthly intervals with Jones, the module leader which I conducted and transcribed.
- A quantitative module evaluation questionnaire at the end of the module, administered by the Psychology department.
- I conducted a content analysis of the student-created reflective PowerPoints to understand the development of information literacy competencies.

One aim of the CILASS programme was to foster collaboration between academic staff, educational developers, librarians and students. Co-author Turkington was at the time working in the University Library while undertaking a Masters study in Librarianship via distance learning at the University of Aberystwyth. She approached me about the possibility of using the module as a site of research for her dissertation, and proposed the use of a pre-and post-intervention IL test developed to measure students' IL competencies. The use of the test was incorporated into the overall evaluation plan for the module, and the results (gathered and analysed by (Turkington, 2008) used as data in paper 1.

The biggest challenge in writing the paper was in synthesising and making sense of the mass of evaluation data acquired during the project. I gathered the disparate data sources together and devised an overall structure and approach for the paper, I wrote the first draft and then my co-authors provided comment and suggestions for change which I incorporated into subsequent drafts.

The contribution to knowledge of this paper is in defining an inquiry-based approach to teaching IL that has been proven to be successful in terms of developing students' IL through the use of pre-and post-tests of IL competency. The contribution to practice is in the evidence of a successful partnership between academic developer, librarians and academic to support IL, and to engage in SoTL for IL. The contribution

to methods is the use of the ToC methodology, incorporating a variety of data sources, including reflective data from tutors and students, combined to provide evidence of the impact of curriculum development for IL and IBL.

5.2. Paper 2: Information Literacy and inquiry-based learning: Evaluation of a five-year programme of curriculum development

This paper reports on a meta-analysis of evaluation data from twelve CILASS projects and is a distillation of an evaluation report I prepared for the CILASS overall programme evaluation which took place in 2009-10. A core of twelve projects were identified as being key to the IL strand of activities, where there had been significant focus on the development of information literacy competencies and/or pedagogies. The data set for the analysis comprised all CILASS documentation relating to the projects, including funding application forms and interim and final monitoring and evaluation reports; all evaluation data collected through the ToC evaluation process, including project leader reflections; and any relevant data collected through the overall CILASS programme evaluation process. The process of supporting this range of projects across the University required me to develop significant research design skills, as the discussion with project leaders of the methods by which evaluation data were gathered was a key activity. I had to mediate and negotiate with many project leaders to ensure that both their aims of project evaluation and impact were met, and also that the impact evaluation of the CILASS project as a whole progressed appropriately.

I undertook a thematic analysis of the data in Atlas-ti, guided by the evaluation questions drawn from the overarching ToC for the Information Literacy strand of CILASS activities. Emerging themes were also identified and recorded. I created a report which summarised what had been learnt about information literacy and the relationship between information literacy and inquiry-based learning during the lifetime of CILASS (McKinney, 2010). Editing and condensing of the original report into a much shorter journal paper was challenging. My aim was to select the most

relevant insights for an external audience and surface the most important learning that we had achieved about IBL and IL. This has led to the central practical contribution of this paper in outlining a range of concrete strategies that could be adopted across a range of subject contexts by educators in HE.

The literature review for this paper demonstrates my skill in mastering and synthesising a wide range of literature from both the education and IL fields, and presenting it for an audience of IL practitioners. The contribution to knowledge is empirical evidence of a range of IBL pedagogical approaches that have been proven to be effective in teaching IL; surfacing in particular the value of reflection; group work and peer support as key themes in successful IL teaching that is embedded within the subject curriculum. This paper provides a further contribution to methods in demonstrating the flexible nature of the ToC methodology in an education context to support SoTL.

5.2.1. Basis for subsequent research and teaching

The overall evaluation of the IL themed CILASS projects, and the value placed on collaboration, peer support, reflection and using Inquiry-based pedagogies to teach IL, are themes that I have carried forward in further scholarship and research embodied in papers 3, 4 and 5; and this PhD by publication commentary. In addition the findings regarding librarian involvement in teaching and learning development stimulated student research in librarians' conceptions of themselves as teachers (Wheeler & McKinney, 2015). Paper 2 is used to stimulate student discussion of inquiry-based pedagogies for IL in the two "Information Literacy" modules, core for the MA Librarianship and MA Library and Information Services Management programmes at the Information School. These modules have also formed the site of further SoTL action-research (Webber & McKinney, in press), where we reflect on how teaching ability and awareness of pedagogy fostered in these students.

5.3. Paper 3: Reflection for Learning: Understanding the value of reflective writing for information literacy development

When I joined the Information School in January 2010, I took over the coordination of the Business Intelligence module offered to level 3 Undergraduate students. I was keen to develop my own IBL pedagogical approach, using my experiences as a CILASS LDRA to inform my curriculum development. I involved local businesses, entrepreneurs and charities in the module as to enable the students to engage with "real world" problems that would take them beyond the classroom (McKinney, 2017). I designed this a group task, building on the knowledge I had gained about the value of collaborative inquiry.

University regulations preclude a 100% group-based assessment for students, so there had to be an individual assignment that complemented the inquiry-based ethos of the module. I knew from the CILASS evaluation (Paper 2) that reflection was very valuable for students who had learnt through inquiry as a means to come to terms with the sometimes difficult and challenging learning experience, and to recognise the value of what they had learnt. I developed an individual assignment for this undergraduate module featuring two pieces of reflective writing, one about experiences of working in a group and one about IL development. This assessment was designed to assess the *process* of inquiry, the *product* of the inquiry was assessed in the group project. The module outline, which includes the assessment briefing, can be found in appendix 6, section 11.6.

The collection of reflective writing as research data enabled me to engage with SoTL, and to develop an enhanced understanding of students' IL development. I analysed the reflective writing using the Seven Pillars model, and mapped their reflections against the "pillars" in the model. These reflective comments were also analysed for "depth" of reflection using the Moon (2007) four levels of reflection model. This combination of models to understand both the depth and variety of students' reflection is a key methodological contribution of this paper. Sen proposed mapping the reflective comments against the module learning outcomes as way to understand if they had been achieved.

I wrote the first draft of the paper and devised the visual representation of the students' reflections under each of the seven pillars. The theoretical contribution to knowledge of this paper is in providing empirical evidence of the value of reflective writing to support IL development in students when learning through inquiry. The practical contribution to knowledge is in modelling the use of reflective assignments for IL, which can be adopted for use by IL educators in HE.

5.4. Paper 4: The use of technology in group work: a situational analysis of student's reflective writing

As stated above, the data that led to the creation of paper 4 was collected from the students who studied the undergraduate "Business Intelligence" module. As with paper 3, the data was reflective writings of students, about their experiences of working in a group to respond to the business information needs of a business partner. Research in CILASS (Levy & Petrulis, 2012), and my own experience as a student and educator, had made me aware that working with other students can be problematic, not least because of the logistical issues around working together in shared physical or virtual spaces. This assignment gave students the space in which to surface some of these issues in a constructive way, and gave me as a tutor a rare insight into the mechanics of how these groups actually functioned. Undertaking this research enabled me to develop much deeper understandings of group working processes and engage with SoTL. One practical contribution to knowledge of paper 4 is in modelling the use of reflective writing to assess collaborative IBL, which again could be adopted by educators in any HE subject context.

I wanted to broaden my methodological experience, which led to discussions with my co-author, Sen, about suitability of Situational Analysis (SA) (Clarke, 2003) as an analysis technique for this data. Sen had previously used SA in her research on coping strategies of children with long term health conditions (Sen & Spring, 2013), there was considerable interest in this method in the Information school (Vasconcelos, 2007; Vasconcelos, Sen, Rosa, & Ellis, 2012) I was drawn to SA

because of the way the methodology supports the researcher in forming a holistic view of the situation through the various mapping techniques. I was also interested in the way that actants in the situation are included as a focus of analysis, and the way that "sites of silence" are surfaced for consideration. The use of SA in the HE context, using reflective writing as data, is a key methodological contribution of this paper.

Sen and I separately coded the data, and we met regularly to discuss the emerging findings. I created the ordered situational map, and a number of messy maps of the situation, and this process led to my decision to write a paper focused on the students' use of technology to support their group work. Sen and I discussed potential theoretical models which could explain the variety of technological tools that students were using to support their group work, and I identified most with Illich's (2007) theory of convivial tool, which seemed to offer a substantial reason for the students' use of a variety of tools and platforms when working together in groups. I wrote the first draft, to which Sen contributed the arenas map, and she also provided comments and feedback on the overall content. There is a small body of literature that discusses this theory in relation to digital tools in education (e.g. (Neophytou, 2012; Vukovic, 2015), however there has been little previous use of the theory in empirical research. Paper 4 makes an important contribution to this theoretical discourse, and provides empirical evidence of the application of this theory.

The literature review for this paper presents a detailed and wide-ranging synthesis of the wider educational literature on student group work, and provides an important summary of this for the LIS field.

5.5. Paper 5: Student conceptions of group work: visual research into LIS student group work using the draw and write technique

Paper 5 represents a development on the trajectory of my own conceptions of research, and how it is possible to understand views and opinions of a phenomena

through a medium other than written or spoken language, in this case drawings. The stimulation for this research came from a presentation and workshop given by a visiting scholar to the Information school, Jenna Hartel from the University of Toronto. The presentation focused on the innovative “isquares” project that used the “draw and write technique” to collect understandings and conceptions of the phenomena of “information” (Hartel, 2014a). The draw and write technique facilitates the quick collection of rich data, meaning that it would be possible for me to collect data from students across the Information school without the impact on my times and resources being too great. I was inspired by the variety and richness of the drawings collected by Hartel, and the method offered an exciting and novel methodology to extend my research into how students work together in groups. The methodological contribution of this paper is in demonstrating the value in using the draw and write methodology for SoTL and for understanding the student experience. I demonstrate how Hartel’s data collection protocol can be extended for use in different contexts.

Because of the inherent difficulties in interpreting and analysing the drawings, and the potential for bias and misunderstanding, I thought it would be worthwhile to involve a student in the analysis phase of the research. I successfully applied to the University of Sheffield’s Undergraduate Research Experience scheme (SURE), which paid for a student, Chloe Cook from the department of Economics, to work on the analysis of the drawings for a six week period in the Summer of 2015. Over this period Cook completed the copying and digital management of the drawn data, and we collaborated on a thematic analysis of the drawings. I also invited the Information School’s international student support officer to help with the interpretation of the data, as large numbers of Chinese students had contributed drawings to the study. I selected the focus and themes to report in the paper, and undertook all the writing, Cook, having by this time, graduated from the University.

The theoretical contribution of this paper lies in the deeper understanding of the qualitatively different ways in which LIS students conceive of group work. The practical contribution lies in the potential re-use of the methodology by educators in

any subject context, either to involve students in the creation and discussion of their own group-work drawings, or the use of these existing drawings, as a way to facilitate and support group work in HE. I currently use this data to open up discussion with students in the Information school around the processes and roles of group work, and I have found this useful for the students in devising a communal approach to the group tasks.

6. Discussion

In this section I discuss my work in relation to the research, practice and scholarship surrounding IBL and IL, and reflective and collaborative approaches to learning in these fields. In particular, I will focus on the evolution of these concepts over the period of time spanned by my research and writing.

6.1. The nature of Information Literacy in Higher Education

Papers 1, 2 and 3 focus on the importance of IL in HE, and provide empirical evidence of the value of inquiry-based and reflective pedagogies for IL. All three papers make an important contribution to the discourse on the nature of IL in the HE context. I will now explore this in relation to models, standards and empirical research in the field. The SCONUL Seven Pillars model (1999) and the ACRL IL competency standards (2000) were created at a similar time, and reflect similar skills-based conceptions of IL (Walsh, 2012). Both models highlight partnership working between academics and librarians as a way to improve IL teaching, and this provided a backdrop to the partnership model of working that the CILASS programme aimed to facilitate. Papers 1 and 2 both reflect on the value of partnership between educational developers, librarians and academics for IL development.

There was an opinion that the Seven Pillars model implied that finding and using information was characterised as a series of defined steps, and questions raised as to whether this library-focused and outcome driven conception of IL was an effective support for IL education (Markless & Streatfield, 2007). Certainly in my own experience I found that the original Seven Pillars visual model encouraged academics that I worked with to view IL as a series of steps that had to be undertaken *in sequence*. The model in this format does not support the idea that information search is an *iterative* process: where one searches for information, evaluate it before refining and developing the search strategy, despite the fact it was intended to represent just this conception of IL (Godwin, 2003). The new visual model however

encourages a more holistic and constructivist conception of IL (Walsh, 2012) that includes this iterative model of search.

The original Seven Pillars model was adopted by the University of Sheffield as the default model for framing IL development by the Library and by CILASS during my role as LDRA. Paper 1 uses the Seven Pillars model as a way to connect and present the finding from the varied sources of evaluation data, and to provide a common framework for determining the extent and nature of students' IL development. In paper 2 I reflect on the value of the Seven Pillars model as a basis for discussions of IL with academic project leaders, and the model was used actively to inform design of inquiry-based activities to build IL and strategic departmental approaches to IL. It was also shared with students, in a number of projects, including the PEBBBLE project reported in paper 1, to encourage students to develop a conceptual understanding of IL, and to provide a framework for student reflections. This informed my use of the model to support student reflective writing about their IL in my own teaching context for paper 3.

Paper 3 was developed in the light of the revised 2011 seven Pillars model, which was both presented to students in the course of the module and used as an analysis framework for the data. We note that the higher level of detail of the competencies in each pillar presented in the 2011 model facilitates this detailed analysis and mapping of student competencies. In the conclusion, a critical reflection on the model itself is offered where we identify a conception of IL that is not currently represented in the model:

> "One "understanding" of Information Literacy revealed by the data was that Information Literacy needs can change over time as a research project progresses and in the light of information found. This is not currently expressed in the Seven Pillars model but could be inserted if the model is revised."(p.125)

This paper was cited by (Goldstein, 2015) in a review of the 7 Pillars model, which highlighted the value of the model as an analytical tool as presented in paper 3, and our insight of the changing nature of Information needs.

The discourse around IL when the 7 Pillars model and the ACRL competency standards were developed was very much concerned with IL as a set of skills (for employability) that could be transferred and measured, which responded to neoliberal politics of a "knowledge economy" and digital global competitiveness (Webber & Johnston, 2017). These influential IL practitioners and researchers proposed a more contextual approach to IL informed by the experiences and behaviour of people (Johnston & Webber, 2005; Webber & Johnston, 2000). Models and standards generally for IL have been criticised for not taking account of how people learn, and ignoring trial and error approaches, iteration in searching and reflection; and use language that does not resonate with educators, that is not discipline specific (Markless & Streatfield, 2007). A social constructivist approach to teaching with a significant focus on reflection supported the development of conceptions of IL as being more than just academic skills. The link between reflection and IL is explored further in section 6.2 below. A further criticism of IL models is that they present a description of an ideal in IL, and imply that it is straightforward to describe IL, ignoring the more contextual and personal nature of conceptions of IL (Walsh, 2012) revealed by researchers in the field (e.g. Bruce, 1997; Annemaree Lloyd, 2010; Webber et al., 2005).

Since writing paper 3 my own research has extended into looking at IL in everyday life contexts, in particular the information literacy of using mobile apps for diet and fitness tracking (Cox, McKinney, & Goodale, 2017). In developing the literature review it became apparent to me that models and standards of IL developed for the HE context have little resonance in everyday life information use. Although many "lenses" have been developed for the Seven Pillars model to accompany the core model for HE (research lens; digital literacy lens; open educational resources lens, evidence-based practice healthcare lens), these are still largely concerned with academic information. Research on IL in everyday contexts has shown that peoples' information practices are more contextual complex, fluid and dynamic than can be expressed in a simple list of skills and competencies (Marshall et al., 2009; Marshall, Henwood, & Guy, 2012). Researchers (Lipponen, 2010; Tuominen, Savolainen, &

Talja, 2005) have recast IL as a sociotechnical practice, where use of information is inherently linked to the technologies used to access it. This represents a move from behavioural to sociocultural conceptions of IL (Spiranec & Zorica, 2010). Practice theory has also informed the extensive work of Lloyd (2006, 2009, 2010, 2017; Lloyd, Bonner, & Dawson-Rose, 2014) who presents a view of IL as a practice or set of activities combined with a set of skills that are specific to a particular setting. In a recent review of the literature on everyday life IL research, Martzoukou & Abdi, (2017) identified this as an emerging research area, and identified four domains (leisure and community activities; citizenship and the fulfilment of social roles; public health and critical life situations) where research has investigated IL practices, the support of IL development and the flavour of IL in that context. They state categorically that IL research development must not be limited to academic or work situations, but must extend into a holistic understanding of information in our lives. Furthermore, it is argued that as IL is so contextual, in order for people to transfer IL from one situation to another they needs to develop a critical approach to information labelled an "Information literacy mindset".

Furthermore models and standards have been criticised for only considering information literacy in the individual, rather than as a competency developed through collaboration and communication with others (Lipponen, 2010; Markless & Streatfield, 2007; Marshall et al., 2012). In a workplace context, collaboration and knowledge sharing are prized personal attributes, and Tuominen et al. (2005) assert that definitions or models of information literacy should incorporate communal and collaborative aspects of information creation and sharing. In papers 3 and 4, the students who contributed their reflections were undertaking a group project, and while the collaborative nature of IL was not found to be a significant aspect of students' reflections on their IL development in paper 3, information sharing and synthesis within the group emerged as a theme in the analysis of reflective writing about experiences of group work in paper 4.

The ACRL Framework for Information Literacy in Higher Education (ACRL, 2016) was designed to reflect IL as an educational movement with a "more complex set of core

ideas" (p.2) which recognises the student as information producer, which is a key aspect of IBL. The framework differs from previous models and standards for IL in that it does not prescriptively define a set of skills, rather it defines a set of competencies to do with information use that are inherent in the process of scholarship, and draws heavily on the theory of threshold concepts (Meyer & Land, 2003). The framework is designed to facilitate discussions between librarians and other teaching and learning professionals around learning pedagogy and scholarship, both with themselves and also with students. It is much more closely linked with learning, teaching and pedagogy than the previous ACRL standards, or either incarnation of the 7 Pillars model. It reflects a social-constructivist conception of learning, and a non-linear, iterative process view of learning.

The most recent definition of IL was released in 2018 by CILIP (CILIP, 2018):

> "Information literacy is the ability to think critically and make balanced judgements about any information we find and use. It empowers us as citizens to reach and express informed views and to engage fully with society."

This definition encapsulates the development of conceptions of IL as a pathway to citizenship identified by UNESCO, although it does not capture the reflective and collaborative aspects of IL included in the ACRL definition. The CILIP definition is accompanied by a much more detailed secondary statement which outlines the value of IL in workplace, education everyday life and health contexts, and states that IL is particularly relevant for learners involved in IBL.

SoTL in relation to IL is also growing as a field, moving discussions of IL from a teaching practice perspective to a more theoretical level, drawing more explicitly on the SoTL discourse for publications such as the forthcoming "The Grounded Instruction Librarian: Participating in The Scholarship of Teaching and Learning" which will feature a chapter on the pedagogical approach taken in the Information Literacy modules (Webber & McKinney, in press). Both the new ACRL framework and the revised CILIP definition of IL incorporate new understandings of IL to involve reflection, collaboration and touch on the value of IL for supporting IBL. My research

foreshadows these latest developments in IL, and plays an important role in establishing an empirical base for the revisions.

Papers 3 and 4, when examined together, offer a novel perspective on Information and digital literacies, featuring as they do reflective writing about both IL development and the use of digital technologies in the same collaborative learning context. Digital literacies are defined as "capabilities which fit an individual for living, learning and working in a digital society" (JISC, 2015). Although I do not explicitly link the concept of digital literacy to the research carried out in paper 4, the research that has informed the writing of this section of the commentary has encouraged me to reflect on the students' use of technology as an aspect of digital literacy. Both papers reflect on the social and collaborative development of these literacies in students.

6.1. Inquiry-based learning and information literacy

The influence of the CILASS programme and of developments in the Learning Through Enquiry Alliance of CETLs with a particular focus on IBL can be seen in the continuing prominence of authors related to these CETLs in contemporary publications on IBL. In particular the role of CILASS in making explicit the research-teaching nexus that is a feature of IBL (Prendergast, 2014); and the recognition of the role of critical thinking, reflection, team work and lifelong learning in IBL promoted by CILASS (Bachman, 2014).

Many researchers have discussed the symbiotic relationship between IL and IBL for learning and the connections between IL and IBL are apparent from models of both concepts. In figure 4 below I have reproduced the widely used model of the inquiry process produced by (Justice et al., 2007), and the SCONUL Seven Pillars diagram side by side to highlight the similarities in the two concepts. This is a teaching resource that I use in the Information Literacy modules to open up discussion about the relationship between IL and IBL.

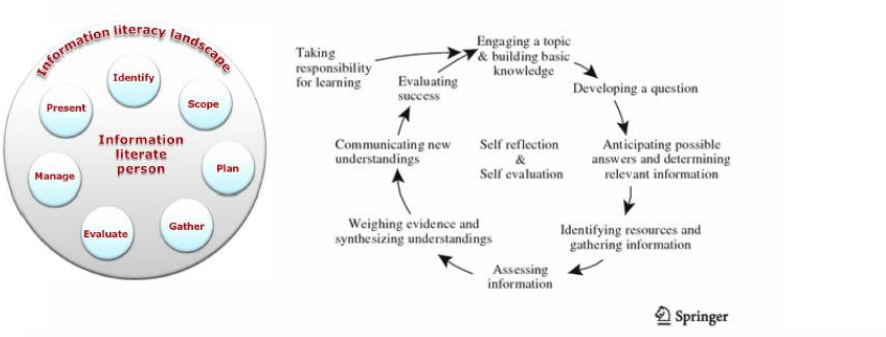


Figure 4: The Seven Pillars model (SCONUL, 2011) and Justice et al.'s (2007) model of the inquiry process

Much of the learning and teaching literature on IBL includes definitions of inquiry that focus on students' abilities to find and use information effectively as part of the inquiry process (e.g. Bachman, 2014). For example Chiapatta Swanson, Ahmad, & Radisevic (2014) state that IBL involves "conducting research (library, internet), assessing evidence, writing up and presenting the results"(p.55), yet few authors specifically refer to the term "Information Literacy". This is indicative of the difficulties information professionals have faced in developing awareness of IL with academic staff, and perceived barriers to collaboration (McGuinness, 2006). Librarians need to have greater confidence to become involved in the conversation around teaching and learning in their institutions (Saunders, 2012). The Library at the University of Sheffield included pedagogical development for librarians as part of their CILASS funded activity, and the perceived benefits of this are discussed in paper 2. In this paper I reflect on the involvement if librarians as a key partner in CILASS projects, and how this facilitated the embedding of IL in IBL-themed curriculum development projects.

The practitioner librarian literature around pedagogy for IL, and the relationship between inquiry and IL, seems more comfortable linking the two concepts together. For example the ANCIL framework (Secker & Coonan, 2011) states "Active or inquiry-based learning is a vital part of developing information literacy." (p.6) and lists CILASS as one example of "good practice in Information literacy" (p.33). Ashley, Jarman, Varga-Atkins, & Hassan (2012) present an IBL approach to teach learning

literacies that featured both collaborative inquiry, and also a team-based approach to curriculum development. Academic staff, learning technologists and academics worked together to design and support an assignment that involved students collaboratively creating a wiki. The book by Hepworth & Walton (2009) which features strategies to teach IL using IBL pedagogies is testament to the emerging interest in this area. Webber (2010) is an example of a (CILASS funded) exploration of teaching IL through IBL. The ACRL (2016) framework include the concept of "research as inquiry" which focuses on the "process" of inquiry, and the role of IL in this process. Developing understanding this process, and attempting to provide better support for it has been a guiding principle in my own research. As noted earlier the new CILIP IL definition (CILIP, 2018) explicitly links IL to learning through inquiry.

Papers 1 and 2 have an important role in bridging the librarian and HE education worlds, and in establishing the role that IL can and should play in the support of IBL pedagogies. Both papers demonstrate the value and success of using inquiry-based approaches to teach IL, and how partnership between educational developers, librarians and academics can lead to exceptional teaching and scholarship. Papers 1, 2 and 3 offer distinctive examples of IBL approaches to teach IL that could be easily adopted in an HE context across a range of subject areas. In my own teaching on the Information Literacy module, where the aim is to develop awareness of pedagogy in future IL educators, papers 1 and 2 facilitate the development of awareness about IBL and IL, and how IL can be taught using inquiry-based methods. The discussion of this research in class encourages students to think about their future roles as teachers, and combined with other activities, to think critically about the kind of teacher they want to be. This module is a site of further SoTL activity (Webber & McKinney, in press).

6.2. Reflection and reflective writing

Corrall's (2017) extensive review of reflective practice in IL educators, and the place of reflection in IL pedagogy is indicative of the interest in practice and research in the

relationship between IL and reflection. Blanchett, Powis, & Webb (2012) state that "encouraging reflection is a major aim of information literacy teaching" (p. 36), as a route to facilitating lifelong learning. Reflection is a central feature of the ACRL IL framework, and is central to Bruce's (2008) vision of "informed learning" for IL. A number of IL researchers and practitioners have published about the importance of reflection to IL. McCulley & Jones (2014) discuss the use of a reflective journal to support IL development, and McNicol & Shields (2014) present a model of IL education for schools that supported what they call the "five features of 21st Century learning" including both reflection and collaborative working. Reflection has been identified as a way to encourage students to engage not only with IL but also criticality towards ideology, and is an example of how IL can be embedded effectively in the higher level educational discourse (Critten, 2015). Reflection was shown to facilitate the development of student's epistemology of the contextual nature of knowledge (Barnhisel & Rapchak, 2014). Practitioners often conclude as I do in papers 2 and 3, that reflective writing from students can provide evidence for educators of the development of IL competencies. Furthermore papers 2 and 3 conclude that writing reflectively about IL and supports students in understanding the value of IL to their studies and for the future (Lahlafi et al., 2012).

While some researchers do analyse the reflective writing of their students as data (e.g. Barnhisel & Rapchak, 2014; Lahlafi et al., 2012), this is unusual, and I did not find any further examples of researchers using IL models or frameworks as way to understand the breadth of students' reflections. Lundgren & Poell (2016) review the literature on research in reflection for human resource development and find that many studies use reflective writing as data, and also that theoretical models featuring levels of reflection (e.g. Mezirow) are used to interpret reflections. Paper 3 is innovative in that it uses both a model of reflection (Moon, 2007) and a subject-based model (The SCONUL Seven Pillars) to assess both depth and subject of reflection. Paper 3 demonstrates that these models have value in being combined to assess reflective writing on IL development, and this practice could be adopted by IL educators in the HE context.

6.3. Collaborative inquiry and student group working in Higher Education

The research that led to papers 4 and 5 aimed to discover how students work together in groups. The literature on teaching in HE is far larger and more diverse than the literature on IL. Not only are there dedicated journals for SoTL in HE generally, but there are also a great number of subject-specific journals that publish research on teaching and learning in a subject field, such as the two LIS-specific journals I have published in. This makes it challenging to review my research in field of Higher Education teaching in general, but also highlights the value of the comprehensive literature reviews provided in both these papers that summarise the central features of models and understandings of collaborative student work in HE.

While the data in Paper 4 reveals many interesting aspects of how students work together in groups, as evidenced by the ordered situational map, the focus of the paper is the technologies that students use to support their group work, which can be seen as an aspect of "Digital Literacy". There is growing body of research commenting on how students use social media and other technologies to work collaboratively e.g. (Doolan & Gilbert, 2016; Greenhow & Lewin, 2016; Heflin, Shewmaker, & Nguyen, 2017) , and recently (Henderson, Selwyn, & Aston, 2017; Selwyn, 2016) have published results of a large scale survey into Australian students perceptions of learning technologies. Students reported assigning significant value in technology to support the practicalities and logistics of working, and to support communication and collaboration with each other. It is interesting that one of the quotes chosen to illustrate this specifically identifies the choice of Facebook over the VLE (Moodle) to provide a platform for this collaboration, supporting my reflection on students use of convivial tools (Illich, 2007). Further research by (Doolan & Gilbert, 2016) also found that students' choice of collaborative platform was social media, rather than a VLE, even though they had been provided with a group working space on this platform. Henderson et al. (2017) challenge the idea that technologies are useful for learning (as opposed to simply "logistics") however I would argue that there is a substantial need for students to develop their digital literacy, and learn how to use technology to support interaction and learning while at university. I

assert that this is at least as important as developing subject knowledge which is in greater danger of becoming obsolete.

As noted in paper 4, much of student group work happens outside the classroom, and out of the view of educators. Both paper 4 and paper 5 attempt to understand this hidden world through different research methods. Paper 5 is unique in using the draw and write methodology to understand student *conceptions* of group work, and it has been challenging to discover any other published research that has a similar aim, despite the wealth of research into students' experiences of working collaboratively. There is similarly a lack of theories or models that are specific to the experience of students, and the most cited were either developed for the work place (Belbin, 2010) or do not reflect the messy complexity of real life group working e.g. Tuckman's "Forming Norming, Storming and Performing" model which presents a simplistic sequential view of group formation and functioning (B. Tuckman, 1965). Asgari's (2017) recent research into multicultural groups offers a glimpse into the variety of factors that influence LIS student group work. Many of the drawings in paper 5 showed a detailed "process" model of group work featuring working both alone and together, featuring both face-to-face and distant communication. This insight offers a novel perspective on student group working, and could be explored further.

Papers 2 and 4 identify some of the challenges students face in collaborative inquiry-based learning, and these (and more) are presented in powerful images in paper 5, e.g. freeloading, difficulties in working together and managing time and other commitments. Further logistical challenges presented are around the decisions students make about where and how to work, and whether or not to have a leader. These issues are explored in depth in the literature, however there is little literature on practical methods to mediate some of these issues. Paper 2 identifies the need for multi-professional support for collaborative inquiry projects, while paper 4 identifies the value of reflective writing as a medium to allow students to express the challenges they face and the use of reflective writing to identify solutions to common issues with collaborative working. My own success in using the drawings as

way to encourage discussion and reflection on the *process* of group could have useful applications in many group work situations.

Information literacy educators have also explored the value of collaborative learning in IL teaching. Diehm & Lupton (2012) conclude that “Creating a classroom culture that values participation and sharing of knowledge and experiences also facilitates interaction and encourages learning through exposure to the views of others (p.224).

6.4. Impact

My research and CILASS funded projects that contribute to the knowledge-base of the relationship between IL and IBL have been widely disseminated, and a full list of conference papers and presentations and workshops can be found in Appendix 7, section 11.7. As can be seen from this list, the Librarians’ Information Literacy Annual Conference (LILAC), has been an important forum for the presentation and discussion of my research, and a forum for the discussion of pedagogy for IL. In 2009 CILASS sponsored the theme of “IBL to teach IL”, and there have been numerous presentations since then on broadly inquiry-based approaches to IL teaching. This critical mass of interest in inquiry and IL has influenced the inclusion of IBL in the new CILIP IL definition as discussed above.

As the CETL funding period drew to a close, the focus of activity extended to include the development of legacy resources to support future implementation of IBL at the University, and these resources are still available on the “IBL @ Sheffield” website (https://www.sheffield.ac.uk/ibl/home). A number of the curriculum development projects that were included in the analysis of paper 2 have full case studies available on this website. A key output of this process was the creation of the "Sheffield Companion to IBL", which contained a summary and overview of the design, implementation and conceptualisation of IBL from the CILASS perspective. The Sheffield Companion to IBL was created to provide practical support and guidance for academic staff, educational developers and librarians who are involved in the

design and delivery of IBL in higher education. It draws on the research and evaluation carried out over the course of the CILASS programme, and presents the institutional learning about IBL. The companion includes a section on IL and IBL, which summarises the summative evaluation of the CILASS information literacy strand of activities presented in paper 2. This companion was produced in hard copy and distributed widely both internally and externally, and has been widely cited (39 instances) by HE researchers in publications to do with IBL across a range of subject areas.

Papers 1, 2 and 3 have been largely cited by researchers and practitioners interested in pedagogy for IL. Paper 1 is particularly cited by those interested in pre-and post-testing of IL, and in how to assess IL (e.g. Pinto, García-Marco, Granell, & Sales, 2014), while paper 2 has had an impact in research on peer student support for IL development (e.g. Rowley, Johnson, Sbaffi, & Weist, 2015). Paper 3 has been cited by a range of practitioners and researchers who are interested in reflection and reflective practice of students and LIS professionals (e.g. Corrall, 2017). In addition, the insights regarding the use of the Seven Pillars as an analytical tool are noted by Goldstein (2015) in his review of the model, and the findings that IL needs change over time as a research project progresses are presented. A summary of quantitative citation data for my papers is available in Appendix 8, section 11.8.

My research has had a substantial impact on my own teaching, and by extension the students undertaking programmes of study in the Information School. Papers I and 2 are used to open up discussions with students on the Information Literacy modules about inquiry-based pedagogies for IL teaching, with the expectation that these students will go on to become IL educators themselves. Insights from Papers 3, 4 and 5 paper have been incorporated into the support for reflective writing assignments and support for group work in the Information Literacy modules. I received a "Teaching Excellence in the Social Sciences" award in June 2017 in recognition of my teaching development and scholarship in the field of student group working. The case study that formed my application has been shared with academics in the faculty (appendix 9, section 11.9).

7. Reflections on my personal development as a researcher

In figure 5 below I present a conceptualization of my journey as a researcher, in the context of the five papers included in this thesis. I present a summary of the research paradigm, and underlying epistemological and ontological assumptions (further discussed in section 4) for each paper and reflect on the changes to my researcher worldview, and the development of my role as a researcher and scholar of teaching and learning. I note that my view of IL has moved from a fairly skills-based conception, informed by the Seven Pillars model, to a belief that IL is highly contextual, and this is supported by the development that understanding complexity is central to my research approach. I have strengthened my view that IL is closely linked to effective learning and effective inquiry.

Scholarship is seen to be an essential aspect of being an academic. Trigwell et al. (2000) discuss the premise that teaching and research should be brought closer together, as an aspect of the debate around the nature of scholarship, and states that it is necessary to understand the terms “research” and “scholarship” in greater detail. Brew (2003) identifies four qualitatively different ways of conceptualising research, dependent on variations across the orientation (external or internal focus) and aims (to produce an outcome, or develop understanding). In the journey view “research is interpreted as a personal journey of discovery possibly leading to transformation” (p.7). This very much chimes with my own conceptualisation of the journey that I have undertaken over my professional career as librarian, then educational developer and finally as lecturer and scholar.

I stated in the introduction that this thesis is an enactment of the Scholarship of Teaching and Learning. Trigwell et al. (2000) present five conceptions of SoTL[2], and I identify most with conceptions C & E. Conception C ("Scholarship of teaching is about improving student learning by investigating the learning of one' s own students and one' s own teaching" p.159) I see embodied in papers 3 and 4. These were my students, and I most desired to understand their experience on the modules I taught so that I could be confident that the pedagogical approaches I use are beneficial and effective. Conception E ("The scholarship of teaching is about improving student learning within the discipline generally, by collecting and communicating results of one' s own work on teaching and learning within the discipline"(p.159) is about moving beyond the site of an individual's teaching, and papers 2 and 5 are situated within this conception. I note in figure 6 that my SoTL activities have moved fluidly between general and personal research contexts, with the aim of understanding both specific and more wide ranging aspects of learning. My SoTL activities are ongoing, I see this as a vital aspect of my professional practice as an educator. I am currently taking part in an action research project with my colleague Sheila Webber on our teaching in two information literacy modules (McKinney & Webber, 2017). My development as a researcher is also characterised in the mastery of the presentation and synthesis of literature in my papers which is a key aspect of scholarship. I have combined the challenging breadth and depth of the education literature with the range of IL theoretical and practitioner literature, and the reviews provide an excellent introduction to the field for LIS researchers and students.

Pilerot (2016) and Lloyd (2017) both comment on the disconnect between the professional practice view of IL as an individual measurable and transferrable

[2] A. The scholarship of teaching is about knowing the literature on teaching by collecting and reading that literature.
B. Scholarship of teaching is about improving teaching by collecting and reading the literature on teaching.
C. Scholarship of teaching is about improving student learning by investigating the learning of one' s own students and one' s own teaching.
D. Scholarship of teaching is about improving one' s own students' learning by knowing and relating the literature on teaching and learning to discipline-specific literature and knowledge.
E. The scholarship of teaching is about improving student learning within the discipline generally, by collecting and communicating results of one' s own work on teaching and learning within the discipline.

competency, and the research view of IL as a situated, contextual and socially constructed practice. My own research bridges these two worlds, and reflects my personal journey from practicing librarian to educational developer, to researcher and academic. I have used the Seven Pillars model of IL have been used to structure interventions with students and I have used it to structure analytical approaches to my data. On the other hand, my constructivist and explorative research recognizes the contextual naturel of IL, e.g. for Psychology undergraduates (paper 1); for students undertaking IBL (paper 2); or for students studying Business Intelligence (paper3). As an educator (but not a librarian) and researcher (but about my own teaching practice) I fall outside of Pilerot's categorisations of professional practice/policy making and research. My own conception of IL through my extensive work in the area is this:

> Information literacy is a highly contextual practice distinct to individuals to find, use, manage, evaluate and communicate information that people are largely unaware of. IL development can be supported by collaboration and interaction, and it requires structured reflection to make tacit knowledge, beliefs and practices explicit in order to develop them further.

Lincoln et al. (2011) state "Reflexivity is the process of reflecting critically on the self as researcher…..it is a conscious experiencing of the self as both inquirer and respondent, as teacher and learner, as the one coming to know the self within the processes of research" (p.124). I have engaged in reflexive practice as an educational developer (McKinney et al., 2009), and paper 2 also contains an element of reflexivity towards the role of educational developers.

In figure 5 below, I chart the change in my role, moving from being closely supervised in the LDRA role, to being an independent researcher, to being a research supervisor. As an educational developer I developed significant skills in research and evaluation project management, and worked closely with academic staff across a range of disciplines to design, implement and analyse evaluation data from curriculum development projects. This involved developing awareness of, and negotiating, a range of research worldviews, and I developed a broad knowledge

discipline-specific opinions of pedagogy and research. As an academic I have supervised 24 Masters dissertations, co-supervised 2 PhD students to completion. I have been PI for 2 internally funded research projects and been Co-I on a further 2 projects. I have developed experience of supervising researchers both through these projects, and through the SURE student researcher scheme (paper 5).

	Paper 1	Paper 2	Paper 3	Paper 4	Paper 5
Paradigm	Pragmatism/ postpositivism	Pragmatism/ post-positivsim	Constructivist/interpretivist	Postmodernism/ constructivism	Constructivist/ interpretivist
Epistemology	Impossible to divorce the knower from the known, there is not one objective reality	Impossible to divorce the knower from the known, there is not one objective reality	All knowledge comes from interactions between the knower and the known	All knowledge comes from interactions between the knower and the known. Social reality is messy & complex	All knowledge comes from interactions between the knower and the known. Research is value laden
Ontology	Relativist: There are multiple realities that are co-constructed by individuals	Relativist: There are multiple realities that are co-constructed by individuals	Relativist: There are multiple realities that are co-constructed by individuals	Relativist, but with the understanding that complexity is central to understanding the world	Relativist: There are multiple realities that are co-constructed by individuals. Data does not represent "true" reality & is time dependent
	Increasing belief in messy complexity of everyday life & contextual nature of IL and learning				
Axiology	Research is value-laden, multiple data collection methods enhance validity	Research is value-laden, multiple data collection methods enhance validity	The researcher cannot be separated from the research meaning research is inherently subjective	The researcher cannot be separated from the research meaning research is inherently subjective	The researcher cannot be separated from the research meaning research is inherently subjective
Methodology	Mixed method using Theory of Change framework	Mixed Methods using Theory of Change framework	Qualitative: Thematic analysis	Qualitative: Situational Analysis	Visual methods: Qualitative thematic analysis of drawn data
	Increasing experimentation with qualitative methods, focus on different data as a way to understand phenomena				
SoTL context	Working in partnership to research other's teaching	Working independently to research other's teaching	Working in partnership to research own teaching	Working in partnership to research own teaching	Working independently to develop conceptual understanding of student experience
	Moving between module specific and more general teaching contexts as sites of research				
Contribution to knowledge	An IBL pedagogical approach to teach IL; use of pre- and post test to measure IL; example of partnership for SoTL between Librarians, academics and educational developers	Understanding of the relationship between IL and IBL in multiple contexts; examples of IBL pedagogies to teach IL including reflection, collaboration and peer support	Understanding of how reflective writing can support IL development in an IBL context. Extension of the conceptual understanding of IL	Understanding of how students use technology to support collaborative inquiry (digital literacy); application of theory of convivial tools in an HE context	Understanding of the multiple conceptions of group work held by students
	Being supervised	Increasing autonomy and agency		supervising research	
	Identity: Librarian & IL practitioner	Educational developer & IL researcher		Academic with multiple and diverse research & teaching perspectives	

Figure 5: Researcher journey

8. Contribution to knowledge

8.1. Theoretical contribution

My research establishes empirical evidence of the relationship between IL and IBL, and provide numerous examples of successful pedagogical approaches that can be used in an IBL context to support the development of IL. Importantly, evidence of the success of these approaches is provided through the ToC evaluation process. Much research into the teaching of IL and pedagogy for IL is conducted by librarians for librarians (Pilerot, 2016). Papers 1 and 2 present the perspectives of academic staff and students on their experiences of teaching and learning IL, and demonstrate the value of such perspectives in IL research. My papers provide an important crossover between the IL and wider education literature, not least in the extensive use of education literature in to provide context for my research.

Paper 3 demonstrates how the Seven Pillars model can be used as a framework to support analysis of reflective writing. In addition, through using the model in a research context, I was able to identify aspects of IL that were not present in the model (Goldstein, 2015), contributing to the development of conceptions of IL. New definitions and conceptions of IL e.g. CILIP (2018) incorporate the collaborative and reflective pedagogical approaches for IL that I explore in my research, and my research provides an important evidence-base for this development of IL.

Paper 4 offers a novel perspective on the choices of technology that students make in order to work collaboratively, and demonstrates how this aspect of group functioning is an important aspect of collaborative inquiry. I propose that students choose tools that are convivial, that are useful for the specific purpose needed, drawing on Illich's (2007) theory of convivial tools. This evidence of students' selective and negotiated use of tools contributes to a growing body of research on student directed use of technology in learning, and raises implications for the support and management of digital platforms for collaboration in HE.

Paper 5 presents student conceptions of group work that are qualitatively different from previous models of group formation and functioning. The detailed process models of group functioning depicted by students do not fit into linear models of group development e.g. Tuckman (1965), nor models of group roles e.g. Belbin (2010). These models attempt to *simplify* the representation of working in groups, however my research reveals *complexity*. Both papers 4 and 5 illuminate the complex and iterative nature of student group working, and the negotiated physical and virtual workspace that students inhabit. I could not find evidence of other research that attempted to understand students' broad *conceptions* of working in groups, and no other research has used drawings as a medium to understand these conceptions.

8.2. Methodological contribution

My research provides an example of the use of Theory of Change for impact evaluation of educational development projects in HE, moving beyond the traditional application of this method in community development projects. The use of the ToC methodology is modelled at both project and programme level, and I demonstrate it can be used to develop new pedagogical understandings. I also demonstrate how a meta-analysis and synthesis of data from different discrete projects can be facilitated by the ToC framework. The highly reflective nature of the ToC evaluation process in CILASS supports SoTL.

In Paper 3 I use the Seven Pillars model of IL combined with a theoretical model of reflection (Moon, 2007) to assess both the subject and depth of reflection. The combination of these two models is unique to my research, but could easily be adopted by future researchers.

In paper 4 I have demonstrated the use of Situational Analysis, a relatively new extension of Grounded Theory, in the education field, and contributed to an emerging interest in this methodology as a way to understand the student experience (den Outer et al., 2013). My research has used student reflective writing

as data, and generated robust insight into information literacy development and experiences of group work, despite the acknowledged difficulties with doing this. Finally, I have demonstrated the application of the draw and write technique with adults in an HE setting, which is still comparatively rare. I have provided a further example of the use of the Hartel (2014a) protocol for data collection in a novel setting.

8.3. Practical contribution

Papers 1 and 2 offer a range inquiry-based pedagogical approaches to teaching IL which could be adapted and re-used for many subject contexts in HE, including very specific activities, but also more general approaches such as the use of reflection or collaboration. Paper 3 is an example of the growing interest in SoTL of IL teaching, and the development of reflective pedagogies for IL. I demonstrate the value in using reflective writing to assess IL, which is indicative of a wider interest in reflection to support and develop IL, and IL practitioners.

Although partnership and collaboration between different professional groups for extending and developing the teaching of IL was not an explicit focus of paper 1, it clearly demonstrates that this is a desirable and productive, and shows how this can be achieved in practice. The value of librarians working in partnership with academics and learning developers for IL pedagogy development is explored more explicitly in paper 2, and this contrasts with the dominant discourse in the librarian literature of problematic relationships between faculty and librarians (McGuinness, 2006; Smith & Dailey, 2013).

My research has been of practical use in my own teaching and the teaching more widely in the Information School. Papers 1 and 2 are used to raise awareness of and stimulate discussion of IBL with future IL educators. The drawings of group work presented in paper 5 are used to stimulate frank exchange of ideas about group work as part of the support structure and facilitation we provide to students working

in groups. These activities could be extended to other institutions and student cohorts.

8.4. Summary of contribution

My research has presented a thorough exploration of the interrelatedness of IBL, IL, collaborative inquiry and reflection, and my conceptualization of this is presented in figure 6 below.

In this diagram I view my research in the broad reflective environment, which features students and educator reflective practice, and reflexivity in the research process. Within this landscape, the reflective process of SoTL takes place, represented with a porous boundary to indicate the essential overlap between scholarship and reflection. I have identified the key contribution to knowledge of each of the three central themes which are colour-coded in the diagram: IBL (green), IL (yellow) and group working (orange). The contributions to knowledge that have cross-theme significance are highlighted with cross-hatching containing both theme colours. The contributions to knowledge about the value of reflection and reflective pedagogy and practice are coloured blue

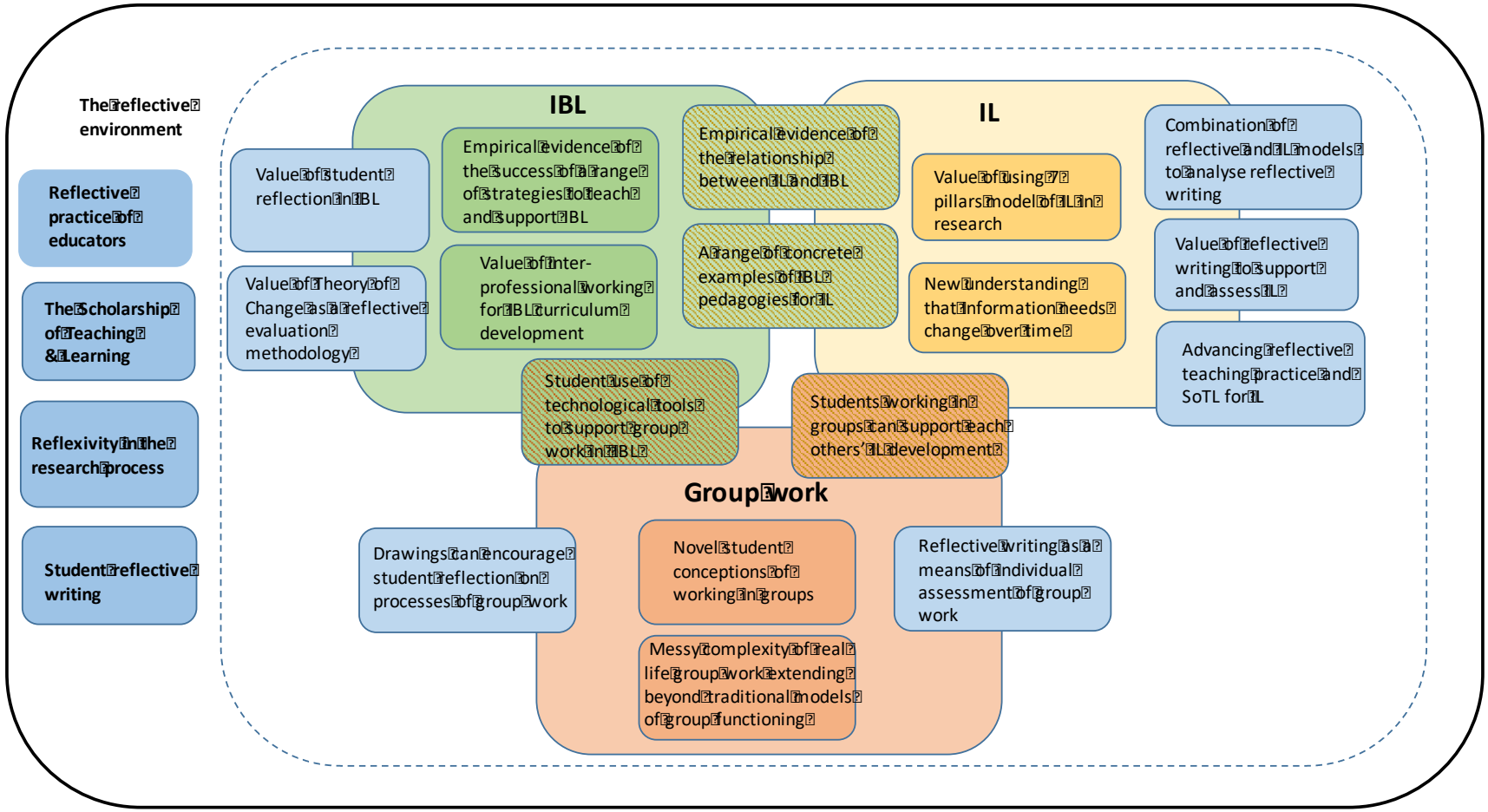


Figure 6: The landscape of my research

8.5. Limitations

My research has all taken place within the University of Sheffield, and while it does span a long time period, and covers a number of discipline areas, it is bounded within the particular institutional context. The nature of the ToC evaluation process means that the overall design of the research, and the collection of some of the data, was not in my control. This therefore raises questions about the extent of influence of others in the research process. Papers 3 and 4 are based on the narrow experiences of two cohorts of students studying the module which I was teaching. It is entirely possible that my views and opinions as their teacher had an influence on the data that was collected. There are acknowledged difficulties in using reflective writing as data, which I summarise in papers 3 and 4, meaning that the views of students may not be accurately represented. I have attempted to extrapolate conclusions that would be of use to a wider audience, but again a limitation is that the conclusions are of most use to me personally, and my particular practice as an educator. Paper 5 analyses drawn data, and there are questions raised about the accuracy of interpretation of this kind of data.

The CILASS project had a unique focus, and while that has led to a number of insights about the relationship between IBL and IL, it is unlikely that this context can ever be replicated in another university due to the scale of funding involved. The level of activity required by a hybrid professional such as myself to support the curriculum development is challenging to replicate. Without this supporting context it is more difficult for IL educators to impact on pedagogy for IL in the same way that I was able to, however the insights generated can certainly inform practice.

9. Conclusion

Brew (2003) proposes a new model of universities as academic communities of practice following the principles of Lave & Wenger (1991) who see learning as a social practice. In this model students, academics and professional services staff are all members of the community of practice, and jointly carry the community forward. Both research and scholarship can take place in this academic community of practice, teaching is student-focused and knowledge is seen to be a process of construction rather that something objective and separate from the knowers. In this model, Brew states "research and teaching are both viewed as activities where individuals and groups negotiate meanings, building knowledge within a social context" (p.12). My research embodies these principles, and demonstrates the value of reflective practice for students, academics and practitioners to improve learning and teaching for Il and more widely in collaborative inquiry.

Next steps for me as a researcher are to involve students more in the academic community of practice, and sharing more explicitly with them the pedagogical approaches being used. I am interested in the difference between students' professed competencies in IL and those they actually hold, as paper 3 revealed that students were competent across a number of the seven pillars, even if they did not reflect on that competence. LIS students who study in the information school who intend to become IL educators would be the ideal participants to involve in further participatory research design and implementation. I am keen to build on the use of the draw and write technique, either to extend the study understand group work in other disciplines, or to develop the approach to use in research in new contexts.

10. Bibliography

ACRL. (2000). *Information Literacy Competency Standards for Higher Education*. Retrieved from https://alair.ala.org/bitstream/handle/11213/7668/ACRL Information Literacy Competency Standards for Higher Education.pdf?sequence=1&isAllowed=y

ACRL. (2016). *ACRL Framework for Information Literacy for Higher Education*. Chicago. Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/infolit/Framework_ILHE.pdf

Asgari, S. (2017). *Conceptualising cultural issues and challenges within a UK Information School context.* University of Sheffield. Retrieved from http://etheses.whiterose.ac.uk/16100/

Ashley, J., Jarman, F., Varga-Atkins, T., & Hassan, N. (2012). Learning Literacies through collaborative enquiry; collaborative enquiry through learning literacies. *Journal of Information Literacy*, *6*(1), 50–71. https://doi.org/10.11645/6.1.1655

Bachman, C. (2014). Can practical wisdom be taught in Business schools? An inquiry-based learning approoach for management education. *Inquiry-Based Learning for the Arts , Humanities , and Social Sciences : A Conceptual and Practical Resource for Educators. Innovations in Higher Education Teaching and Learning*, *2*, 345–368. https://doi.org/10.1108/S2055-364120142

Backett-Milburn, K., & McKie, L. (1999). A critical appraisal of the draw and write technique. *Health Education Research*, *14*(3), 387–398. https://doi.org/10.1093/her/14.3.387

Barnett, R. (2000). University Knowledge in an Age of Supercomplexity. *Higher Education*, *40*(4), 409–422.

Barnhisel, G., & Rapchak, M. (2014). Wikipedia and the wisdom of crowds: a student project. *Communications in Information Literacy*, *8*(1), 145–159. https://doi.org/10.1016/j.explore.2006.10.013

Baxter Magolder, M., & King, M. (2004). *Learning partnerships: Theory and models of practice to educate for self-authorship*. Sterling, Virginia: Stylus.

Belbin, R. M. (2010). *Management teams: why they succeed or fail* (3rd ed.). Oxford: Butterworth-Heinelen.

Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Maidenhead: Open University Press.

Black, P. E., & Plowright, D. (2010). A multi-dimensional model of reflective learning for professional development. *Reflective Practice*, *11*(2), 245–258. https://doi.org/10.1080/14623941003665810

Blanchett, H., Powis, C., & Webb, J. (2012). *A Guide to teaching information literacy: 101 practical tips*. London: Facet Publishing.

Bourke, B. (2014). Positionality: Reflecting on the research process. *The Qualitative Report*, *19*(33), 1–9. Retrieved from https://nsuworks.nova.edu/tqr/vol19/iss33/3/

Boyer Commission on educating undergraduates in the research university. (1999). *Reinventing Undergraduate Education: A blueprint for America's research universities*. https://doi.org/10.1080/0305698042000337237

Braun, U. K., Gill, A. C., Teal, C. R., & Morrison, L. J. (2013). The utility of reflective writing after a palliative care experience: can we assess medical students' professionalism? *Journal of Palliative Medicine*, *16*(11), 1342–1349. https://doi.org/10.1089/jpm.2012.0462

Brew, A. (2003). Teaching and Research: New relationships and their implications for inquiry-based teaching and learning in higher education. *Higher Education Research & Development*, *22*(1), 3–18. https://doi.org/10.1080/0729436032000056571

Brew, A. (2010). Transforming academic practice through scholarship. *International Journal for Academic Development*, *15*(2), 105–116. https://doi.org/10.1080/13601441003737618

Brew, A., & Boud, D. (1995). Teaching and research: Establishing the vital link with learning. *Higher Education*, *29*(3), 261–273. https://doi.org/10.1007/BF01384493

Brooke, C., McKinney, P., & Donoghue, A. (2013). Provision of Distance Learner Support Services at U.K. Universities: Identification of Best Practice and Institutional Case Study. *Library Trends*, *61*(3), 613–635. https://doi.org/10.1353/lib.2013.0003

Bruce, C. S. (1997). *The seven faces of Information Literacy*. Adelaide: Auslib Press.

Bruce, C. S. (2008). *Informed Learning*. Chicago: Association of College and Research Libraries.

Cambridge, B. Fostering the scholarship of teaching and learning: communities of practice. (D. Lieberman & C. Wehlburg, Eds.), To improve the academy (2001). Bolton, MA: Anker.

Carson, L., & Fisher, K. (2006). Raising the bar on criticality: Students' critical reflection in an internship program. *Journal of Management Education*, *30*(5), 700–723. https://doi.org/10.1177/1052562905284962

Chiapatta Swanson, C., Ahmad, A., & Radisevic, I. (2014). A First-Year Social Sciences Inquiry Course: The Interplay of Inquiry and Metacognition to Enhance Student Learning. In *Inquiry-Based Learning for the Arts , Humanities , and Social Sciences : A Conceptual and Practical Resource for Educators. Innovations in Higher Education teaching and learning*.

CILASS. (2010a). *Centre For Inquiry-based Learning in the Arts and Social Sciences: Final Evaluation to HEFCE*.

CILASS. (2010b). CILASS Publications.

CILASS. (2010c). IBL Case studies. Retrieved November 29, 2018, from https://www.sheffield.ac.uk/ibl/resources/casestudies

CILIP. (2018). *CILIP definition of Information Literacy 2018*. Retrieved from https://infolit.org.uk/ILdefinitionCILIP2018.pdf

Clarke, A. E. (2003). Situational Analysis: Grounded Theory After the Postmodern Turn. *Symbolic Interaction*, *4*(4), 83–144. https://doi.org/10.1177/146879410600600409

Clarke, A. E. (2005). *Situational Analysis:* London: Sage.

Clarke, A. E., & Friese, C. (2007). Grounded Theorising using situational analysis. In A. Bryant & K. Charmaz (Eds.), *The SAGE handbook of grounded theory*. London: SAGE.

Connell, J. P., & Kubisch, A. C. (1998). Applying a Theory of Change Approach. In K.

Fulbright Anderson, A. C. Kubisch, & J. P. Connell (Eds.), *New Approaches to Evaluating Community Initiatives, vol. 2, Theory, Measurement, and Analysis*. Washington: Aspen Institute.
Coonan, E., Secker, J., Wrathall, K., & Webster, H. (2012). ANCIL in action: progress updates on a new curriculum for information literacy. *SCONUL Focus*, *55*.
Corbin, J., & A. Strauss. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). Thousand Oaks: SAGE.
Corrall, S. (2017). Crossing the threshold: reflective practice in information literacy development. *Journal of Information Literacy*, *11*(1), 23. https://doi.org/10.11645/11.1.2241
Cox, A. M., Mckinney, P. A., & Goodale, P. (2017). Food logging: an Information Literacy perspective. *Aslib Journal of Information Management*, *69*(2). https://doi.org/10.1108/09574090910954864
Cox, A. M., McKinney, P., & Goodale, P. (2017). Food logging: an information literacy perspective. *Aslib Journal of Information Management*, *69*(2). https://doi.org/10.1108/AJIM-12-2016-0208
Creme, P. (2005). Should student learning journals be assessed? *Assessment & Evaluation in Higher Education*, *30*(3), 287–296. https://doi.org/10.1080/02602930500063850
Creswell, J. W. (2009). *Research design: Qualitative, quantitative and mixed methods approaches* (3rd ed.). Thousand Oaks, California: Sage.
Critten, J. (2015). Ideology and critical self-reflection in Information Literacy. *Communications in Information Literacy*, *9*(1), 145–156.
Dean, J. (2015). Drawing what homelessness looks like: Using creative visual methods as a tool of critical pedagogy. *Sociological Research Online*, *20*(1). https://doi.org/10.5153/sro.3540
den Outer, B., Handley, K., & Price, M. (2013). Situational analysis and mapping for use in education research: a reflexive methodology? *Studies in Higher Education*, *38*(10), 1504–1521. https://doi.org/10.1080/03075079.2011.641527
Denzin, N., & Lincoln, Y. S. (2011). Introduction:the Discipline and Practice of Qualitative Research. In N. Denzin & Y. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (4th ed.). Thousand Oaks: Sage.
Dewey, J. (1916). *Democracy in action*. New York: Macmillan.
Dewey, J. (1938). *Experience and education*. New York: Macmillan.
Diehm, R.-A., & Lupton, M. (2012). Approaches to learning information literacy: a phenomenographic study. *The Journal of Academic Librarianship*, *38*(4), 217–225. https://doi.org/10.1016/j.acalib.2012.05.003
Diekema, A. R., Holliday, W., & Leary, H. (2011). Re-framing information literacy: problem-based learning as informed learning. *Library & Information Science Research*, *33*(4), 261–268. https://doi.org/10.1016/j.lisr.2011.02.002
Doolan, M. A., & Gilbert, T. (2016). Student choice: Blends of technology beyond the university to support social interaction and social participation in learning. *E-Learning, E-Education, and Online Training*, 95–102.
Feilzer, Y. M. (2010). Doing Mixed Methods Research Pragmatically: Implications for the Rediscovery of Pragmatism as a Research Paradigm. *Journal of Mixed Methods Research*, *4*(1), 6–16. https://doi.org/10.1177/1558689809349691
Fister, B. (2017). The Warp and Weft of Information Literacy: Changing Contexts,

Enduring Challenges. *Journal of Information Literacy*, *11*(1), 68. https://doi.org/10.11645/11.1.2183
Freire, P. (1970). *Pedagogy of the oppressed*. New York: Herder & Herder.
Gallacher, C. (2009). *Use of Sconul's 7 Pillars model for information literacy: findings of a study of Sconul institutions 2008-9*. Retrieved from https://www.sconul.ac.uk/sites/default/files/documents/Use_seven_pillars_study_2009.pdf
Godwin, P. (2003). Information literacy, but at what level? In A. Martin & H. Rader (Eds.), *Information and IT literacy: Enabling learning in the 21st Century* (pp. 88–97). London: Facet Publishing.
Goldstein, S. (2015). *Perceptions of the SCONUL Seven Pillars of Information Literacy: a brief review*. https://doi.org/10.1017/CBO9781107415324.004
Grabinger, R. S., & Dunlap, J. C. (1989). Rich environments for active learning : a definition. *Alt-J*, *3*(2), 5–34.
Greenhow, C., & Lewin, C. (2016). Social media and education: reconceptualizing the boundaries of formal and informal learning. *Learning, Media and Technology*, *41*(1), 6–30. https://doi.org/10.1080/17439884.2015.1064954
Guillemin, M. (2004). Understanding Illness: Using Drawings as a Research Method. *Qualitative Health Research*, *14*(2), 272–289. https://doi.org/10.1177/1049732303260445
Gumulak, S., & Webber, S. (2011). Playing video games: learning and information literacy. *Aslib Proceedings*, *63*(2/3), 241–255. https://doi.org/10.1108/00012531111135682
Hack, C. (2018). Does pedagogic research require ethical review? Retrieved January 26, 2018, from https://www.heacademy.ac.uk/does-pedagogic-research-require-ethical-review
Han, J. (2012). Information literacy challenges for Chinese PhD students in Australia : A biographical study. *Journal of Information Literacy*, *6*(1), 3–17. https://doi.org/http://dx.doi.org/10.11645/6.1.1603
Hart, D., Diercks-O'Brien, G., & Powell, a. (2009). Exploring Stakeholder Engagement in Impact Evaluation Planning in Educational Development Work. *Evaluation*, *15*(3), 285–306. https://doi.org/10.1177/1356389009105882
Hartel, J. (2014a). An Arts-Informed study of information using the draw-and-write technique. *Journal of the Association for Information Science and Technology.*, *65*(7), 1349–1367. https://doi.org/10.1002/asi.23121
Hartel, J. (2014b). Information behaviour illustrated. *Information Research*, *19*(4). Retrieved from http://www.informationr.net/ir/19-4/isic/isic11.html#.Wmh7YCOcYb0
Healey, M. (2005). Linking research and teaching: exploring disciplinary spaces and the role of inquiry-based learning. In R. Barnett (Ed.), *Reshaping the University: New Relationships between Research, Scholarship and Teaching.* (pp. 67–78). McGraw Hill / Open University Press.
Heflin, H., Shewmaker, J., & Nguyen, J. (2017). Impact of mobile technology on student attitudes, engagement, and learning. *Computers and Education*, *107*, 91–99. https://doi.org/10.1016/j.compedu.2017.01.006
Helsby, G., & Saunders, M. (1993). Taylorism, Tylorism and Performance Indicators: Defending the Indefensible? *Educational Studies*, *19*(1), 55–77.

Henderson, M., Selwyn, N., & Aston, R. (2017). What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. *Studies in Higher Education*, *42*(8), 1567–1579. https://doi.org/10.1080/03075079.2015.1007946

Hepworth, M., & Walton, G. (2009). *Teaching information literacy for inquiry-based learning*. Oxford: Chandos Publishing.

Herr, K., & Anderson, G. (2015). *The action research dissertation: a guide for students and faculty* (2nd.). Thousand Oaks, California: SAGE.

Higher Education Funding Council For England. (2011). Summative Evaluation of the CETL Programme: Final Report, (December). Retrieved from https://www.hefce.ac.uk/pubs/rereports/year/2011/cetlsummevaln/

Hodge, D., Haynes, C., LePore, P., Pasquesi, K., & Hirsh, M. (2008). From Inquiry to Discovery: Developing the Student as Scholar in a Networked World. In P. Levy & P. McKinney (Eds.), *Learning Through Enquiry Alliance (LTEA) Conference 2008 "Inquiry in a Networked World" Wednesday 25th – Friday 27th June 2008 University of Sheffield* (pp. 2–30). Retrieved from http://npio.ucm.muohio.edu/_files/documents/about-miami/president/reports-speeches/From_Inquiry_to_Discovery.pdf

Hutchings, B. (2007). *Enquiry-Based Learning: Definitions and Rationale*. *The University of Manchester*. Retrieved from http://www.ceebl.manchester.ac.uk/resources/papers/hutchings2007_definingebl.pdf

Hutchings, P., & Shulman, L. S. (1999). The Scholarship of Teaching : New elaborations, new developments. *Change*, *31*(5), 10–15. Retrieved from http://www.jstor.org/stable/40165542

Illich, I. (2007). *Tools for Conviviality*. Retrieved from http://www.preservenet.com/theory/Illich/IllichTools.html

JISC. (2015). Developing students' digital literacy. Retrieved May 18, 2018, from https://www.jisc.ac.uk/guides/developing-students-digital-literacy

Johnson, D. W., & Johnson, R. T. (1999). Making cooperative learning work. *Theory into Practice*, *38*(2), 67–73. https://doi.org/10.1080/00405849909543834

Johnson, D. W., Johnson, R. T., & Smith, K. (2007). The state of cooperative learning in postsecondary and professional settings. *Educational Psychology Review*, *19*, 15–29. https://doi.org/10.1007/s10648-006-9038-8

Johnston, B., & Webber, S. (2005). As we may think: Information literacy as a discipline for the information age. *Research Strategies*, *20*(3), 108–121. https://doi.org/10.1016/j.resstr.2006.06.005

Justice, C., Rice, J., Warry, W., Inglis, S., Miller, S., & Sammon, S. (2007). Inquiry in Higher Education : Reflections and Directions on Course Design and Teaching Methods, 201–214. https://doi.org/10.1007/s10755-006-9021-9

Kivunja, C., & Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, *6*(5), 26. https://doi.org/10.5430/ijhe.v6n5p26

Lahlafi, A. E., Rushton, D., & Stretton, E. (2012). Active and reflective learning initiatives to improve web searching skills of business students. *Journal of Information Literacy*, *6*(1). https://doi.org/10.11645/6.1.1680

Lambert, L., Walker, D., Zimmerman, D. P., Cooper, J. E., Lambert, M. D., Gardner, M.

E., & Szabo, M. (2002). *The constructivist leader*. New York: Teachers College Press.
Lave, J., & Wenger, E. (1991). *Situated learning: legitimate perpheral participation*. Cambridge: Cambridge University Press.
Lee, A., Williams, R. D., Shaw, M. A., & Jie, Y. (2014). First-year students' perspectives on intercultural learning. *Teaching in Higher Education*, *19*(5), 543–554. https://doi.org/10.1080/13562517.2014.880687
Levy, P., & McKinney, P. (2008). Inquiry in a Networked World: The third Learning Through Enquiry Alliance (LTEA) Conference, 25th - 27th June 2008. Sheffield.
Levy, P., & Petrulis, R. (2012). How do first-year university students experience inquiry and research, and what are the implications for the practice of inquiry-based learning? *Studies in Higher Education*, *37*(1), 85–101. https://doi.org/10.1080/03075079.2010.499166
Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions and emerging confluences revisited. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (4th editio). Thousand Oaks, California: Sage.
Lipponen, L. (2010). Information literacy as situated and distributed activity. In A. Lloyd & S. Talja (Eds.), *Practising Information Literacy: Bringing theories of learning, practice and information literacy together.* (pp. 51–65). Wagga Wagga: Centre for Information Studies.
Lloyd, A. (2006). Information literacy landscapes: an emerging picture. *Journal of Documentation*, *62*, 570–583. https://doi.org/10.1108/00220410610688723
Lloyd, A. (2009). Informing practice: information experiences of ambulance officers in training and on-road practice. *Journal of Documentation*, *65*(3), 396–419. https://doi.org/10.1108/09574090910954864
Lloyd, A. (2010). Lessons from the workplace: understanding information literacy as practice. In *Practising information literacy: bringing theories of learning, practice and information literacy together*. Wagga Wagga: Centre for Information Studies.
Lloyd, A. (2017). Information literacy and literacies of information: a mid-range theory and model. *Journal of Information Literacy*, *11*(1), 91. https://doi.org/10.11645/11.1.2185
Lloyd, A., Bonner, A., & Dawson-Rose, C. (2014). The health information practices of people living with chronic health conditions: Implications for health literacy. *Journal of Librarianship and Information Science*, *46*(3), 207–216. https://doi.org/10.1177/0961000613486825
LTEA. (2010). About LTEA. Retrieved November 29, 2018, from http://www.ltea.ac.uk
Lundgren, H., & Poell, R. F. (2016). On Critical Reflection. *Human Resource Development Review*, *15*(1), 3–28. https://doi.org/10.1177/1534484315622735
Ma, L. (2012). Some Philosophical Considerations in Using Mixed Methods in Library and Information Science Research. *Journal of the American Society for Information Science and Technology*, *63*(9), 1859–1867. https://doi.org/10.1002/asi
Mackey, T. P., & Jacobson, T. E. (2011). Reframing Information Literacy as a Metaliteracy. *College & Research Libraries*, *72*(1), 62–78.

https://doi.org/10.5860/crl-76r1
Markless, S., & Streatfield, D. (2007). Three decades of information literacy: redefining parameter. In S. Andretta (Ed.), *Change and challenge: Information literacy for the 21st century*. Adelaide: Auslib Press.
Marshall, A., Henwood, F., Carlin, L., Guy, E. S., Sinozic, T., & Smith, H. (2009). Information to fight the flab: findings from the Net.Weight Study. *Journal of Information Literacy*, *3*(2), 39–52. https://doi.org/10.11645/3.2.218
Marshall, A., Henwood, F., & Guy, E. S. (2012). Information and Health Literacy in the Balance: Findings from a Study Exploring the Use of ICTs in Weight Management. *Library Trends*, *60*(3), 479–496. https://doi.org/10.1353/lib.2012.0006
Martin, A. (2006). *Literacies for the digital age*. London: Facet Publishing.
Martzoukou, K., & Abdi, E. S. (2017). Towards an everyday life information literacy mind-set: a review of literature. *Journal of Documentation*, *73*(4), 634–665. https://doi.org/http://dx.doi.org/10.1108/02683940010305270
Mayne, L. (2012). Reflective writing as a tool for assessing teamwork in bioscience: Insights into student performance and understanding of teamwork. *Biochemistry and Molecular Biology Education*, *40*(4), 234–240. https://doi.org/10.1002/bmb.20621
McCulley, C., & Jones, M. (2014). Fostering RN-to-BSN Students' Confidence in Searching Online for Scholarly Information on Evidence-Based Practice. *The Journal of Continuing Education in Nursing*, *45*(1), 22–27. https://doi.org/10.3928/00220124-20131223-01
McDougall, J., Berger, R., Fraser, P., & Zezulkova, M. (2015). Media literacy, education and (civic) capability: A transferable methodology. *Journal of Media Literacy Education*, *7*(1), 4–17. Retrieved from www.jmle.org
McGuinness, C. (2006). What faculty think: Exploring the barriers to information literacy development in undergraduate education. *The Journal of Academic Librarianship*, *32*(6), 573–582. https://doi.org//10.1016/j.acalib.2006.06.002
McKinney, P. A. (2010). *Inquiry-based learning and Information literacy: A meta-analytical study*. Sheffield. Retrieved from https://www.sheffield.ac.uk/polopoly_fs/1.122797!/file/IL_meta-analysis_PM-FINAL.pdf
McKinney, P. A. (2017). enquiry-based assessment in a business intelligence module at the university of sheffield: Developing a business report. In *A Connected Curriculum for Higher Education*. London: UCL press.
McKinney, P. A., & Levy, P. (2006). Inquiry-based learning and information literacy development: a CETL approach. *Innovation in Teaching and Learning in Information and Computer Sciences*, *5*(2), 1–13. https://doi.org/10.11120/ital.2006.05020007
McKinney, P. A., & Webber, S. (2017). Teaching the next generation of IL educators: pedagogy and learning. ECIL conference St Malo 18-21 September 2017.
McKinney, P. A., Wood, J., & Little, S. (2009). A learning development team: three developers, one pedagogy. *Journal of Learning Development in Higher Education*, *1*(1), 1–16.
McNicol, S., & Shields, E. (2014). Developing a new approach to information literacy learning design. *Journal of Information Literacy*, *8*(2), 22–35.

https://doi.org/10.11645/8.2.1911
Mertens, D. (2015). *Research and evaluation in education and psychology: integrating diversity with qualitative and quantitative methods* (4th ed.). Thousand Oaks, California: Sage.
Mertens, D. M. (2003). Mixed models and the politics of human research: The transformative-emancipatory perspective. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioural research*. Thousand Oaks, California: Sage.
Meyer, J. H. F., & Land, R. (2003). Threshold Concepts and Troublesome Knowledge: linkages to ways of thinking and practising within the disciplines. In C. Rust (Ed.), *Improving Student Learning – Ten Years On*. Oxford: OCSLD.
Moate, J., & Sullivan, P. (2015). The moral journey of learning a pedagogy: a qualitative exploration of student–teachers' formal and informal writing of dialogic pedagogy. *Pedagogy, Culture & Society*, *23*(3), 411–433. https://doi.org/10.1080/14681366.2014.994666
Moon, J. A. (2007). Getting the measure of reflection: considering matters of definition and depth. *Journal of Radiotherapy in Practicein Practice*, *6*(4), 191–200. https://doi.org/10.1017/S1460396907006188
Neophytou, L. (2012). ICT in society and education: Help or hindrance? In C. Vrasidas & P. Panaou (Eds.), *Design thinking in education, media and society* (pp. 53–63). Nicosia: International Council for Educational Media (ICEM).
Nevalainen, M. K., Mantyranta, T., & Pitkala, K. H. (2010). Facing uncertainty as a medical student-A qualitative study of their reflective learning diaries and writings on specific themes during the first clinical year. *Patient Education and Counseling*, *78*(2), 218–223. https://doi.org/10.1016/j.pec.2009.07.011
Pickard, A. J. (2013). *Research methods in Information* (2nd ed.). london: Facet.
Pilerot, O. (2016). Connections between research and practice in the information literacy narrative: A mapping of the literature and some propositions. *Journal of Librarianship and Information Science*, *48*(4), 313–321. https://doi.org/10.1177/0961000614559140
Pinto, M., García-Marco, J., Granell, X., & Sales, D. (2014). Assessing information competences of translation and interpreting trainees. *Aslib Journal of Information Management*, *66*(1), 77–95. https://doi.org/10.1108/AJIM-05-2013-0047
Prendergast, A. (2014). The feasibiity of Inquiry-based learning - An Irish perspective. Exploring the role and motivation of Inquiry-based learning - An Irish higher education experience. *Inquiry-Based Learning for the Arts , Humanities , and Social Sciences : A Conceptual and Practical Resource for Educators. Innovations in Higher Education Teaching and Learning*, *2*, 345–368. https://doi.org/10.1108/S2055-364120142
Prosser, J. (1998). The status of image-based research. In J. Prosser (Ed.), *Image-based research: A sourcebook for qualitative researchers*. London: Falmer Press.
Prosser, J., & Loxley, A. (2008). Introducing visual methods. *ESRC National Centre for Research Methods Review Paper*, (October). Retrieved from http://eprints.ncrm.ac.uk/420/1/MethodsReviewPaperNCRM-010.pdf
Rai, L. (2006). Social Work Education : The Owning (up to) Reflective Writing in Social Work Education. *Social Work Education: The International Journal*, *25*(8),

785–797. https://doi.org/10.1080/02615470600915845
Ramsden, P. (2008). *The Future of Higher Education - Teaching and the Student Experience*. Retrieved from https://www.heacademy.ac.uk/knowledge-hub/future-higher-education-teaching-and-student-experience
Rowley, J., Johnson, F., Sbaffi, L., & Weist, A. (2015). Peer-based information literacy training: Insights from the NICE Evidence Search Student Champion Scheme. *Library and Information Science Research*, *37*(4), 338–345. https://doi.org/10.1016/j.lisr.2015.11.007
Saunders, L. (2012). Faculty perspectives on information literacy as a student learning outcome. *The Journal of Academic Librarianship*, *38*(4), 226–236. https://doi.org/10.1016/j.acalib.2012.06.001
SCONUL. (1999). *Information skills in Higher Education*. Retrieved from https://www.sconul.ac.uk/sites/default/files/documents/Seven_pillars2.pdf
SCONUL. (2011). *The SCONUL Seven Pillars of Information Literacy: Core Model for Higher Education*. London, UK.
SCONUL Society of College, N. and U. L. (2011). *The SCONUL Seven Pillars of Information Literacy*. *Literacy*. https://doi.org/10.1108/00907320610716486
Secker, J., & Coonan, E. (2011). *A New Curriculum for Information Literacy: transitional, transferable, transformational*. Cambridge, UK. Retrieved from http://ccfil.pbworks.com/f/ANCIL_final.pdf
Selwyn, N. (2016). Digital downsides: exploring university students' negative engagements with digital technology. *Teaching in Higher Education*, *21*(8), 1006–1021. https://doi.org/10.1080/13562517.2016.1213229
Sen, B. A. (2010). Reflective writing: a management skill. *Library Management*, *31*(1/2), 79–93. https://doi.org/10.1108/01435121011013421
Sen, B. A., & McKinney, P. (2014). The SEA - change model in Information Literacy : Assessing information literacy development with reflective writing. *Nordic Journal of Information Literacy in Higher Education*, *6*(1), 6–22.
Sen, B. A., & Spring, H. (2013). *Mapping the information-coping trajectory of young people with long term illness: An evidence based approach*. *Journal of Documentation* (Vol. 69). https://doi.org/10.1108/JD-10-2012-0133
Smith, M. D., & Dailey, A. B. (2013). Improving and Assessing Information Literacy Skills through Faculty-Librarian Collaboration. *College and Undergraduate Libraries*, *20*(3–4), 314–326. https://doi.org/10.1080/10691316.2013.829370
Spiranec, S., & Zorica, M. B. (2010). Information Literacy 2.0: hype or discourse refinement? *Journal of Documentation*, *66*(4), 140–153. https://doi.org/10.1108/00220411011016407
Spronken-smith, R., Walker, R., Batchelor, J., O'Steen, B., & Angelo, T. (2011). Enablers and constraints to the use of inquiry-based learning in undergraduate education. *Teaching in Higher Education*, *16*(1), 15–28. https://doi.org/10.1080/13562517.2010.507300
Stanczak, G. C. (2007). *Visual research methods: image, society and representation*. Thousand Oaks, California: Sage.
Stordy, P. (2015). Taxonomy of literacies. *Journal of Documentation*, *71*(3), 456–476. https://doi.org/10.1108/MBE-09-2016-0047
Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and*

behavioural sciences. Thousand Oaks, California: Sage.
The Boyer Commission. (1998). *UNDERGRADUATE EDUCATION : A Blueprint for America' s Research Universities*. *Boyer Commission on Educating Undergraduates in the Research University Stony Brook NY*. Retrieved from http://reinventioncollaborative.colostate.edu/the-boyer-report/
The University of Sheffield. (2005). *Centre for Inquiry-Based Learning in the arts and social sciences (CILASS): Modelling the process of research within the student learning experience*.
The University of Sheffield. (2016). *Learning and Teaching at the University of Sheffield 2016-2021*. Retrieved from https://www.sheffield.ac.uk/polopoly_fs/1.661828!/file/FinalStrategy.pdf
The University of Sheffield. (2018). The Sheffield Graduate Attributes. Retrieved November 29, 2018, from https://www.sheffield.ac.uk/sheffieldgraduate/studentattributes
Thomas, D., & Seely Brown, J. (2011). *A new culture of learning: cultivating the imagination for a world of constant change*. CreateSpace Independent Publishing Platform.
Trigwell, K., Martin, E., Benjamin, J., & Prosser, M. (2000). Scholarship of Teaching: A model. *Higher Education Research & Development*, *19*(2), 155–168. https://doi.org/10.1080/072943600445628
Trigwell, K., & Prosser, M. (2004). Development and use of the approaches to teaching inventory. *Educational Psychology Review*, *16*(4), 409–424. https://doi.org/10.1007/s10648-004-0007-9
Tuckman, B. (1965). Developmental sequences in small groups. *Psychological Bulletin*, *63*, 384–399.
Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin*, *63*(6), 384–399. https://doi.org/10.1037/h0022100
Tuominen, K., Savolainen, R., & Talja, S. (2005). Information Literacy as a Sociotechnical Practice. *The Library Quarterly: Information, Community, Policy*, *75*(3), 329–345.
Turkington, S. (2008). *Testing an information literacy assessment tool*. University of Aberystwyth.
Twomey Fosnot, C. (2005). *Constructivism: Theory, perspectives and practice* (2nd ed.). New York: Teachers College Press.
UNESCO. (2003). *The Prague Declaration: Towards and information literate society*. Retrieved from http://www.unesco.org/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/PragueDeclaration.pdf
UNESCO. (2005). *Beacons of the Information Society: The Alexandria Proclamation on Information Literacy and Lifelong Learning*. Retrieved from https://www.ifla.org/publications/beacons-of-the-information-society-the-alexandria-proclamation-on-information-literacy
UNESCO. (2018). Five laws of Media and Information Literacy. Retrieved December 6, 2018, from http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/Events/mil_five_laws_english.png
Vasconcelos, A. C. (2007). The use of grounded theory and of arenas/social worlds

theory in discourse studies: A case study on the discursive adaptation of information systems. *Electronic Journal of Business Research Methods*, *5*(2), 125–136.

Vasconcelos, A. C., Sen, B., Rosa, A., & Ellis, D. (2012). Elaborations of grounded theory in information research: arenas/social worlds theory, discourse and situational analysis. *Library and Information Research*, *36*(112), 120–146. Retrieved from http://www.lirgjournal.org.uk/lir/ojs/index.php/lir/article/view/497

Vukovic, K. (2015). Free Information: Networked Learning Utopia. In P. Jandric & D. Boras (Eds.), *Critical learning in digital networks* (pp. 37–55). Springer.

Walsh, A. (2012). Mobile information literacy: a preliminary outline of information behaviour in a mobile environment. *Journal of Information Literacy*, *6*(2), 56–69. https://doi.org/10.11645/6.2.1696

Webber, S. (2010). Investigating Modes of Student Inquiry in Second Life as Part of a Blended Approach. *International Journal of Virtual and Personal Learning Environmnets*, *1*(3). https://doi.org/0.4018/jvple.2010070104

Webber, S., Boon, S., & Johnston, B. (2005). A comparison of UK academics' conceptions of information literacy in two disciplines: English and Marketing. *Library and Information Research*, *29*(93), 4–15.

Webber, S., & Johnston, B. (2000). Conceptions of information literacy: new perspectives and implications. *Journal of Information Science*, *26*(6), 381–397. https://doi.org/10.1177/016555150002600602

Webber, S., & Johnston, B. (2017). Information literacy: conceptions, context and the formation of a discipline. *Journal of Information Literacy*, *11*(1), 156–183. https://doi.org/10.11645/11.1.2205

Webber, S., & McKinney, P. A. (2018). Using a model of the Teaching-Learning Environment as part of reflective practice. In *The Grounded Instruction Librarian: Participating in The Scholarship of Teaching and Learning.* Association of College and Research Libraries.

Weber, S. (2008). Visual Images in Research. In J. Knowles & A. Cole (Eds.), *Handbook of the Arts in Qualitative Research: Perspectives, Methodologies, Examples, and Issues* (pp. 42–54). https://doi.org/10.4135/9781452226545

Weber, S., & Mitchell, C. (1996). Ourselves Into Teaching : Studying the Images. *Teaching and Teacher Education*, *12*(3), 303–313.

Wharton, S. (2012). Presenting a united front : assessed reflective writing on a group experience. *Reflective Practice : International and Multidisciplinary Perspectives*, *13*(4), 489–501. https://doi.org/10.1080/14623943.2012.670622

Wheeler, E., & McKinney, P. A. (2015). Are librarians teachers? Investigating academic librarians' perceptions of their own teaching roles. *Journal of Information Literacy*, *9*(2), 111–128. https://doi.org/10.11645/9.2.1985

Yates, C., Stoodley, I., Partridge, H., Bruce, C. S., Cooper, H., Day, G., & Edwards, S. L. (2012). Exploring health information use by older Australians within everyday life. *Library Trends*, *60*(3), 460–478. https://doi.org/10.1353/lib.2012.0004

11. Appendices

11.1. Appendix 1: Paper 1 McKinney P.A., Jones M. & Turkington S. (2011) Information Literacy through inquiry: a Level One psychology module at the University of Sheffield. *Aslib Proceedings: new information perspectives* 63 (2/3) 221-240

Abstract

Purpose: This paper reports the evaluation of a curriculum development project that took place in the department of psychology at the University of Sheffield. The project, funded by a Centre for Excellence in Teaching and Learning (CILASS) sought to embed information literacy development in a Level One module using an inquiry-based learning pedagogical approach. Students worked collaboratively to find news stories that were purportedly based on real psychological research and then searched for the related research paper. They reflected on this task and the differences between the two sources as part of the assessed work for the module.

Design/Methodology/approach: The paper synthesizes the results a number of evaluation instruments (questionnaire, information literacy competency test, focus group, student reflective work) to examine staff and student perceptions of the inquiry task, and how effective the task was in building students' information literacy. A 'Theory of Change' evaluation methodology was used to define the scope of evaluation activities.

Findings: The SCONUL 7 Pillars of Information Literacy model is used to structure the findings from the various evaluation methods. Students developed their knowledge of, and ability to search, appropriate academic resources although they demonstrated a preference for searching via Google Scholar over Web of Knowledge. Students demonstrated through their reflective comments that they had developed significant abilities to compare and evaluate news stories and journal

articles, although they reported a lack of confidence in these abilities. Postgraduate Tutors thought the inquiry task was successful in developing students' information literacy and both students and staff responded positively to the ability to choose topics of interest to investigate.

Keywords: Inquiry-based Learning, information literacy, curriculum development, evaluation.

Introduction

The CILASS context

CILASS (Centre for Inquiry-based learning in the Arts and Social Sciences) was one of the 74 national Centres for Excellence in Teaching and Learning (CETLs), a 5 year programme funded by HEFCE (Higher Education Funding Council for England) to effect improvements in learning and teaching in Higher Education in the UK. CILASS was based at the University of Sheffield and worked most closely with the departments in the faculties of Arts and Social Sciences, building on existing excellence with inquiry-based pedagogies in those faculties; and also sought to engage the wider university in the development of inquiry-based learning pedagogies.

The University of Sheffield has a strategic commitment to both Inquiry-based Learning (IBL) and Information Literacy (IL) outlined in the current Learning Teaching and Assessment Strategy (The University of Sheffield, 2005) Sheffield graduates should be able to:

Carry out extended independent enquiry, formulating relevant questions and engaging critically with a wide range of evidence;

Demonstrate the core capabilities and skills of information literacy, interacting confidently with the nature and structure of information in their subject and handling information in a professional and ethical manner.

All schools and departments in the CILASS core faculties were invited to apply twice for funding to support departmental scale curriculum development projects to enhance approaches to inquiry-based learning. This article reports on one strand of the PEBBLE (Psychological Enquiry-Based Learning) project: "Critical Appraisal of the Public Presentation of Psychology" taken forward in the department of psychology in their first phase of engagement with CILASS. Project funds were used to buy staff time for curriculum development activities; and in addition capital funds were used to purchase 10 laptop computers to support project activities.

The project design, implementation and evaluation was supported by a CILASS 'Learning Development and Research Associate' (LDRA). The University Library also provided support for the project; and aspects of the project evaluation were conducted by a member of Library staff as research for a masters dissertation (Turkington, 2008).

Structure of the paper

This paper will define inquiry-based learning and outline the relationship between IBL and IL. The literature review will further explore the use of models of IL to support IL teaching and embedding IL in the subject curriculum. The context of the curriculum development project the 'Critical Appraisal of the Public Presentation of Psychology' is described as well as the nature of collaborative inquiry undertaken by students. The methodology of 'Theory of Change' impact evaluation is presented with details of the evaluation instruments and rationale for their choice. The results are presented using the framework of the SCONUL Seven Pillars of IL and an assessment is made of the competencies that students have developed in the Pillars in question. The discussion and conclusion section offers an evaluation of how successful the project has been in developing students' IL and recommendations are made for those wishing to undertake and evaluate a similar IBL initiative.

What is Inquiry-based learning?

IBL involves students in a process of self-directed inquiry or research, often with open-ended 'messy' scenarios possibly based on real life problems. It often involves case- and problem-based methods and research projects that can be small or large scale (Kahn & O'Rourke, 2004). IBL is essentially student led; and teachers act as facilitators rather than knowledge providers (McGregor, 1999). IBL pedagogies allow students to genuinely explore issues that are authentic in their discipline and engage with situations where there is no 'right answer'. This represents a move away from a transmission style of teaching to one where learning is seen as a process of knowledge construction. It is hoped that this practice will encourage students to engage actively with their subject (Biggs, 2003). CILASS was particularly interested in collaborative inquiry, and how the inquiry process can be supported and extended with peer interaction; inquiry supported by technology in the networked learning environment; information literacy to support inquiry and inquiry-based pedagogies for IL.

The relationship between IL and IBL

CILASS sees a clear relationship between information literacy and IBL in that students need to be competent and confident in the information environment for their discipline in order to be effective inquirers (McKinney & Levy, 2006). The CILASS approach to building IL through inquiry is rooted in a constructivist theory of learning where learning is seen as a process through which learners, instead of memorising facts, construct understanding themselves (McGregor, 1999). The use of inquiry-based pedagogies creates an environment in which students actively solve the problems of their discipline and this develops mental processes and ability to think (McGregor 1999). IBL attempts to mirror real life scenarios by requiring independent learning and information seeking which are essential skills for lifelong learning (Dodd, 2007).

When engaging in IBL, students have to gather information for themselves, they also have to read, reflect, raise new questions to explore and construct and present information effectively (Stripling, 1999). The competencies required to do these activities fall under the broad umbrella of Information Literacy. Stripling (1999: 9)

asserts that “Information age schools have to be restructured around an inquiry approach to teaching.” and that “Students must be actively involved in the process of constructing meaning in an information rich environment.” Information literacy is seen by academics as a skill that can only be developed through experience and practice, rather than as a subject that can be taught which is seen to be “central to the constructivist ideology of self directed and self paced learning” (McGuinness, 2006: 579). The freedom involved in IBL to choose topics to investigate increases student engagement and motivation with the learning process and makes it more enjoyable active and meaningful (Snowball, 1997). Furthermore this feature of IBL increases student engagement with the subject particularly if the subject is of personal interest, and also increases their engagement with IL in general (Hepworth & Walton, 2010).

There are many more examples of the use of problem-based learning (PBL) in the Library and Information Science literature than IBL, and there are examples both of information literacy interventions to support students who are undertaking a PBL curriculum (e.g. Dodd, 2007) and the use of PBL methods to teach IL (Fosmire & Macklin 2002, Pelikan, 2004). PBL can be seen as a subset of IBL in that students are engaging in inquiry, but this is much more structured than IBL which tends to allow for more open-ended exploration. Both pedagogies emphasise encouraging students to be “open minded, reflective and develop critical and active learning skills” (Dodd, 2007: 207). IBL can be seen as distinct from PBL in that it “Empowers students to take charge of their own learning and gives them more freedom to research into topics of their own interest”. It also increases the sense of ownership students have of their course material (Palmer, 2002: 82).

Fosmire and Macklin (2002) assert that a PBL curriculum not only requires that students demonstrate abilities that are concurrent with the Association of College and Research Libraries (ACRL) IL standards, but also that students engaged in PBL are more effective users and consumers of information than students engaged in traditional methods of learning. Furthermore, Palmer (2002: 82) states that “traditional forms of teaching, learning and assessment may not fully develop

transferable skills such as those indicated by the students or indeed many other skills such as group work, accessing e-journals and electronic journals."

Collaborative IBL for IL is seen to be a desirable pedagogy in that it addresses the isolation students feel when undertaking research, allows them to learn from each other and facilitates them in making connections between ideas (Stripling, 1999). Collaboration between information professionals and academics for information literacy is seen to be helped by that adoption of inquiry-based pedagogies that are student centred and involve active learning (McGuinness, 2006).

Models of Information Literacy

There are a number of definitions of and models of information literacy in existence worldwide (the Big6 model, 2001; Pathways to Knowledge Model, 2000) some of which e.g. the Association of College and Research Libraries (2003) and the Council of Australian University Libraries (2004) also provide competency standards that can be used by educators to chart student abilities and gauge improvement through IL interventions. The model that has been chosen by the University of Sheffield is the SCONUL "Seven Pillars" of Information Literacy (SCONUL, 1999). This model was developed for the UK Higher Education context and considers the skills that students need to be effective learners in HE as well as skills students will need to take into the workplace (SCONUL, 1999). It encompasses six common components of other IL models (defining an information need, information literacy skills, location of information, evaluation and organisation of information, use of information and evaluation of process and product (Byerly and Brodie, 1999) Furthermore the SCONUL model has a number of distinctive features such as the awareness of scholarly publishing, the ethical use of information and the construction of new knowledge through research that make it particularly relevant for the HE sector. Figure 1 shows a diagram of the Seven Pillars model.

Embedding IL in the curriculum

It is reported in the library and information literature that academics can be reluctant to engage with librarian instigated curriculum change to improve approaches to information literacy development (McGuinness, 2006). Although such evidence is anecdotal and the viewpoint of academics is seldom represented; there are studies (e.g. Markless and Streatfield, 1992) which do report that academics see the course work that students engage with as sufficient opportunity for them to develop IL competencies, with little need for specific IL teaching. McGuinness (2006) seems to corroborate this viewpoint with existing learning situations (e.g. Research methods classes, Library orientation, feedback and consultation with academic staff and through conducting their own research) seen as adequate for teaching students IL. However, this focus on development of IL through assignments generates situations where students are graded on the outcome of their literature searching, but receive little or no feedback on the processes involved in information search or evaluation. This approach is unlikely to build awareness in students of the improvement in their IL capabilities. Teaching IL in isolation is often thought of as an ineffective strategy that leads to lack of engagement (Stubbings and Franklin, 2006). Instead it is proposed that IL should be integrated into the subject curriculum so that it becomes linked with the process of problem solving and further reflection can stimulate deep learning and enable the learner to apply what they have learnt in other contexts (Hepworth and Walton, 2010).

PEBBLE

The Department of Psychology was granted funding for their first departmental programme of IBL curriculum development in Summer 2006. The Project leaders were explicit about the aims of the project to enhance conceptual, methodological and transferable skills in students from Level One upwards. There was a significant focus on the development of IL in students through inquiry in all three strands of the programme; including the development of 'higher order' (Bruce 1997) information literacy competencies such as the ability to critically evaluate information.

Critical Appraisal of the Public Presentation of Psychology

An inquiry-based learning activity was added to PSY101, a compulsory Level One module for all single honours students in the psychology department as well as a similar number of students from outside the department taking the module as a Level One option. 228 students were registered on the module in 2006-7. The module comprises a standard lecture series (not developed as part of the project) the content of which is assessed by multiple-choice exam; and a seminar series, the format of which was changed significantly through the project activities. A new group-based assessment was added based on the seminar series that formed 20% of the module mark.

The department considers that because of the intrinsic 'human interest' content of psychological material, it is often misrepresented or trivialised in the popular press. As a result incoming students to the department may have a conception of psychology that does not reflect the scientific nature of the discipline. The inquiry activity was led by postgraduate students providing tutorial support (referred to as postgraduate tutors in the department) in the seminar groups that accompanied the traditional lecture series for the module.

Students chose a subject to investigate that was of interest to them from the field of psychology, and then worked collaboratively to search the BBC news website and an online news database (Newsbank) to find stories that were purportedly based on real research. They then had to use the Web of Knowledge database to try to find the original research on which that news story was based. For the assessment the groups produced a PowerPoint presentation that detailed their search methods, reflected on the challenges they faced finding the research articles and included a critical reflection on the public presentation of Psychology.

The activities sought to develop IL competencies in students in a number of the 'Seven Pillars':
Pillar 2: Develop familiarity with the Web of Knowledge database as a source of academic quality information; and to a lesser extent with news sources

Pillar 3: develop basic search strategies on the Web of Knowledge database and in news sources
Pillar 4: develop competencies in accessing journal articles through the Library's online databases
Pillar 5: develop abilities to compare and evaluate popular news and academic journal articles; develop an awareness of the peer review process of scholarly publishing.

Process support for Inquiry

Colleagues from the Library amended the online information skills tutorial for the Web of Knowledge database with example search terms from Psychology. This tutorial and others in the suite (e.g. 'guide to the Library catalogue', 'effective searching of the Internet') were embedded within the module Virtual Learning Environment (VLE). The CILASS librarian was consulted regarding the access to newspaper databases provided by the Library.

A support document was created for students to help them with their inquiry projects that explained a number of pertinent issues to do with the task. This document contained a definition of information literacy and the SCONUL 'Seven Pillars' model and it was explicitly stated that the IBL activities would help students in building information literacy skills. The document contained some example topics and the keywords that might be used as search terms, as well as advice on terms to use like 'study' or 'trial' that would help students find the type of articles that might claim to be based on research. It was emphasised to students that the process of searching and their reflection on it was as important as the 'end product' of finding a news story and related journal article.

Postgraduate tutors received a similar document as a 'handbook' for the task and also took part in a training session where they had to perform the inquiry-task. This exercise had a dual function in that it served as a pilot for the undergraduate students so that any difficulties with the task could be addressed; and also

highlighted to the postgraduate tutors where their own information literacy skills were in need of further development.

Methodology

Project level evaluation

All CILASS projects undergo an evaluation process using a 'Theory of Change' methodology (Connell and Kubisch, 1998) combined with the use of EPO (Enabling, Process and Outcome) Performance Indicators (Helsby and Saunders, 1993). This approach to evaluation invites reflection and an analysis of learning achieved through project activities (See Hart et al., 2009 for a more extensive discussion of the use of this evaluation methodology at the University of Sheffield) A 'Theory of Change' document is produced by the project leaders and LDRA which describes the shape of the project, what is going to happen and how it will impact on students, staff, and the department. Project leaders define their project in terms of 5 key stages:

- The current situation in the department that has prompted the project
- The enabling factors and resources that are required to support the project
- The process and activities that will take place
- The outcomes that will happen as a result of the project
- The long term impact they envisage the project will have.

The aim is to develop a clear narrative across the 5 key areas so that it is clear which situation has prompted which activity and what outcomes hope to be achieved. Once the Theory of Change for the project has been agreed an evaluation plan for the project can be drawn up. The project leaders and the LDRA discuss how each Theory of Change 'indicator' from the Enablers, Process and Outcomes columns can best be evaluated, which stakeholder groups should be consulted and what data collection instruments should be used.

The relevant 'Processes' and 'Outcomes for this strand of the PEBBLE project are:

Process: New tutorials at Level One, Semester One feature an inquiry-based task that requires students to build information searching and evaluation skills, reflect on the skills they have gained; work in collaboration with their peers and develop presentation skills.

Outcome: Students have developed information literacy skills in terms of being confident in interacting with electronic information resources for psychology and be able to critically evaluate information that they find.

Evaluation methods

The chosen evaluation instruments comprised

- A focus group with Postgraduate Tutors (PGT FG),
- Questions added to the standard student module evaluation questionnaire (MQ)
- An information literacy competency questionnaire delivered at the beginning of Level One before any IL development activities took place and the beginning of Level Two after a full year's study. (ILQ1 and ILQ2)
- Reflective comments about IL development sourced from students' assessed work (RC)
- A reflective interview with the module (also project) leader. The information gathered from this process has been integrated into the paper as a whole.

Postgraduate Tutor focus group

All the postgraduate tutors were invited by e-mail by the module leader to participate in the focus group and four agreed to take part. The focus group was conducted by the LDRA using a semi-structured approach. The discourse of the focus group was recorded on an audio tape and subsequently transcribed.

Module questionnaire

The module questionnaire covered student opinions and responses to the entire module, not just their feedback related to the seminar-based inquiry task. Additional questions, drawn from the Theory of Change, were added to the standard module evaluation questionnaire used by the department for all modules. A number of critical issues such as student perception of collaborative inquiry were covered as well as issues related to information literacy development. Students were asked to rate their response to these questions on a 5 point Likert scale from 'Strongly agree' to 'Strongly disagree'. This paper will only report on the questions that are relevant to the IL aspect of the project which were:

- As a result of doing the activities in the tutorial task I feel more confident studying independently at University
- As a result of doing the activities in the tutorial task I feel more confident using library resources for psychology
- As a result of doing the activities in the tutorial task I can use the Web of Knowledge database
- As a result of doing the activities in the tutorial task I feel I have the skills to evaluate information I find.

There were 113 completed questionnaires out of a potential sample of 228 students registered on the module, giving a response rate of 49%

In addition some students gave additional feedback about the tutorial task in the space made available for free-text comments

Information Literacy Questionnaire

The use of an Information Literacy questionnaire as a project evaluation instrument was proposed by a colleague from the Library who wished to implement the questionnaire as research for a masters dissertation (Turkington, 2008). The questionnaire was devised by Diane Mittermeyer from The University of Quebec, Canada to measure the information skills of incoming students (Mittermeyer and Quirion, 2003). The questionnaire has been adapted and further developed by

academics at other institutions including the Monash University (Australia) (2005) and the University of Leeds, (UK) (Harrison and Newton, 2007). It is the University of Leeds version of the questionnaire that was implemented here, which had been amended to reflect the discipline context of UK psychology. As it had been previously validated and used to successfully assess the efficacy of IL teaching in a UK Psychology department, the questionnaire was deemed a suitable method of testing whether the inquiry task had any effect on students' information literacy.

The questionnaire was delivered to all students by the project leader during the first lecture in PSY101 (Level One Semester One) and again to the same cohort of students in a module the start of Semester One, Level Two. 153 completed questionnaires were recorded from the first distribution of the questionnaire giving a response rate of 67%. 97 completed questionnaires were recorded from the second distribution of the questionnaire to a cohort of 132 students giving a response rate of 73%. An initial attempt to get responses from students in the final lecture of Level One Semester One was largely unsuccessful and resulted in only 43 completed questionnaires, a response rate of 19%. The low response rate may be due two factors: lower than average student attendance in the last lecture of the term and the absence of the module leader to encourage engagement with the questionnaire

The questionnaire contains a total of 24 questions, 6 of which cover areas of IL that are directly related to competencies that this inquiry task sought to develop. This paper will report the data relating to those particular questions. The data from all items from the IL questionnaire were analysed as a research project for a masters dissertation (Turkington, 2008).

However, It is unfortunately not possible to draw a direct inference of causality between the IL activities on the strand of the IBL project reported in this paper and the development of IL capabilities evidenced by enhanced performance on the IL questionnaire delivered in Level Two. This is because students also undergo more IL development activities in Semester Two in the module that forms the second strand

of the PEBBLE project (Rowe et al., 2010). However, the timescale for implementing the project did not allow us to collect longitudinal data before its implementation or examine the effects of the 2 Level One projects independently. Notwithstanding these caveats, taken in conjunction with student's self reports, results of the IL questionnaire may be helpful in examining the usefulness of the Level One PEBBLE project. For instance, little or no improvement on the IL questionnaire would demonstrate that these projects were of little value in this regard.

Results

The results from the various evaluation methods used in the project will be presented using the framework of the SCONUL 'Seven Pillars' of information literacy.

Pillar 2

Pillar 2 of the SCONUL model is concerned with developing knowledge of suitable sources to meet an information 'gap'. This project aimed to develop familiarity with the Web of Knowledge online database, a key resource for the discipline of psychology. It is a widely held belief that students starting their University studies consider the Internet as a primary information source in all areas of their lives, both social and academic. PG tutor [2] noted that "Level One students display an over-reliance on the internet as a source of information and a corresponding lack of knowledge of scholarly sources of information such as journal articles."

The results from the information literacy questionnaire would seem to corroborate this claim, with the Internet being the source of choice in the pre-test results.

1. If you want to search for journal articles about "The prevalence of drug abuse in the United Kingdom", the quickest way of finding this would be to search in:	L1 06/07 Pre IL intervention n=153	L2 07/08 Post IL intervention n=97
a) The library catalogue	23.5%	**66%**
b) Journals on the library shelves	5.2%	0

c) Yahoo (or another internet search engine)	**53%**	5%
d) A bibliographic database *	4.6%	22%
e) Don't know	5.8%	1%
Didn't answer	7.9%	6%

* the shaded cells in this and subsequent tables represent the optimum response for each question

It is encouraging that the post-test results for ILQ1 (above) show a shift in the most common response to a more scholarly source of information (the Library) although the students have still either not become familiar with the term 'bibliographic database' or have misinterpreted the nature of the Library catalogue.

10. To read the most recently published research about depth, I would consult:	L1 06/07 Pre IL intervention n=153	L2 07/08 Post IL intervention n=97
a) A textbook	2.5%	4%
b) A journal	35.5%	**74.5%**
c) An encyclopaedia	0.5%	0
d) The internet	**47.5%**	17.5%
e) Don't know	7%	0
Didn't answer	7%	4%

The responses to ILQ question 10 (above) however show a much more positive shift towards the 'correct' answer and show that the vast majority of students understand the function of the academic journal following their activities in Level One.
The work that students produced reveals that although most students attempted to use the Web of Knowledge to find journal articles, Google Scholar was also used to find the journal articles. Comments reveal that Google Scholar was perceived to be

easier to use than Web of Knowledge, and also students reported greater levels of success with their search e.g.:

> "The task proved relatively easy, I found that "Google Scholar" was the simplest way of finding the original journal article". RC

> "Rather difficult to use WoK to search for related articles. For me, using Google Scholar was easier". RC

Pillar 3

Pillar 3 covers the abilities that are needed to devise successful search strategies for information sources. Students received significant support and scaffolding for their search strategy from the postgraduate tutors, and their strategy was to a large extent shaped by the task. There is little evaluative material that refers directly to student's construction of search strategies however PG tutor [1] commented that the students having "grown up with the Internet" were actually quite accomplished searchers already and just needed some prompting to be able to transfer what they already knew to a new medium, i.e. Web of Knowledge.

Students tended to choose to search for news articles on BBC News Online and in Newsbank based on their areas of interest. A common search strategy used to find related journal articles involved gleaning relevant search terms from the news article such as the researcher's name or institution; or the journal in which the research was published. Students were strategic in dividing the task among group members and also in selecting news articles that offered likely leads:

> "Initially we found many articles relating to mental illness and psychology. However, many of these did not contain researcher names, or the journal they were published in, so we eliminated these from our research, as we knew it would be very difficult to find the journals that matched such articles" (RC)

Search strategies can include various types of behaviour to elicit information in the most efficient way. Question 16 from the ILQ explores this:

16. You have found a reference to a journal article, how would you assess whether it would be useful to read before trying to find the full article?	L1 06/07 Pre IL intervention n=153	L2 07/08 Post IL intervention n=97
a) Read the abstract of the article	**77%**	**93.8%**
b) Read the bibliography of the article	5.2%	0
c) Read other articles by the same author	2%	0
d) Read the title only	2%	1%
e) Don't know	5.8%	0
Didn't answer	8%	5.2%

Here it can be seen that a large number of the incoming students to the department were already familiar with the function of the abstract and the number of respondents who knew the correct answer increased to near the whole cohort at the time of the second questionnaire.

Pillar 4

Pillar 4 is concerned with the ability to locate and access information, and includes search techniques. In response to the statement 'As a result of the tutorial task I feel I can use the Web of Knowledge database' 71.7% of students agreed or agreed strongly. The response to the statement 'As a result of the tutorial task I feel more confident using library resources for Psychology' is similarly positive with 61.1% of students agreeing or agreeing strongly.

Postgraduate tutor [3] raised concerns about student's lack of 'success' in their searching activities to locate the original journal articles:

> "Both the [news] articles they picked actually had no original article….one was a response to a seminar that was going on and one was a review of different papers, and they were quite upset and weren't sure if they were going to be marked down for that." PGT FG

A student comment from the module questionnaire confirms the difficulty experienced by some students in locating and accessing relevant material:

> "As this is the first year that this task has been incorporated into the tutorials, the difficulty of it for some students may not have been recognised. It is often extremely trying to find the original journal articles from news articles based on one 30 minute session a week." MQ

For their assessed work students were asked to describe their searches and the responses reveal that they followed the advice given to them in their supporting documentation. Their work demonstrates that some thought went into constructing an appropriate Boolean search string in the following examples taken from student PowerPoints:

- Ecstasy 'and' study
- Ecstasy 'and' research
- MDMA 'and' psychology
- Ecstasy 'and' effects.

Some responses demonstrate the required level of understanding of the purpose of Boolean operators e.g:

> "*I used similar search terms to those used while searching for the BBC articles as I had found them to be successful. Additionally I used the term 'AND' between all of the words to ensure that they were all included in the found articles*." RC

Students demonstrated understanding of how to refine a search if the number of results returned was too high, for example by adding more search terms or limiting the parameters of the search e.g.:

> *"Using the advance search feature on Google Scholar with these two pieces of information provided a long list of articles. Narrowing the list with the keyword 'gender' didn't help as most of the author's publications are in the same field. As before, filtering the results by date gave the correct journal article."* RC

In their reflections students were asked to respond to the question "was this task difficult or easy, and why?". Success in finding the original journal article from the news story, and thus finding the task 'easy', was often attributed to the process described above of taking suitable search terms from the news story. Students describe simple searches on Google Scholar and Web of Knowledge using the author's name combined with a simple keyword to find the relevant article. Where the news story didn't contain this level of detail and contained vague references to 'researchers' rather than specific names the task was perceived to be much more difficult. Lack of success in searching was attributed to factors such as the volume of research in a particular field leading to too many results to sift through, and an inability to refine the search appropriately.

Pillar 5

Pillar five covers the ability to compare and critically evaluate sources of information, and particularly for HE students this includes an awareness of the peer review process of scholarly publishing.

Postgraduate tutor [1] acknowledged the usefulness of the task in developing these competencies in students at an early stage in their studies:

> "It is really helpful, especially right at the beginning, because then they can go right the way through university knowing how to judge an article, judge sources of information." PGT FG

The module questionnaire posed the statement "As a result of the tutorial task I feel I have the skills to evaluate the information I find" and again here the responses are largely positive with 58.4% of the students agreeing or agreeing strongly. However 29.2% of students were 'undecided' indicating a lack of confidence in evaluation skills.

Nevertheless the student work reveal that many students were able to competently compare the news stories with the journal articles and evaluate the information they read. The following issues were identified by many groups:

- Journal articles were more authoritative than news stories due to basing their claims on the research that had been conducted. Where news stories used lots of direct quotes from the journal articles this increased perception of authority.
- Journals present facts and use statistics, graphs and charts to do so, newspapers try to argue a point of view.
- News stories are much shorter than journal articles therefore cannot contain the same level of detail.
- News stories misinterpreted research, implied causal relationships where none were reported by the original research, generalised findings that referred to specific groups, and were prone to only reporting selected elements of the research studies e.g.

  "The conclusion of the journal article states unequivocally that no statistically significant damage or deficit could be found in the experimental group, but the newspaper used the study to support the opposite position." RC

- The purpose of journal articles is to present research that gives sufficient detail for someone to replicate a study, the purpose of newspapers is to give general information and to entertain.
- Journals use subject specific jargon making them difficult to understand for the lay person, newspapers use language designed to be able to be

understood by the majority of the population and use language that is more emotive.

However a minority of groups showed only a superficial level of reflection on the differences between the two sources and did not appear to have developed competencies in comparing and evaluating sources e.g.:

> "Other than the amount of detail, there was little that was distinguishable between the article and the journal." RC

19. Journal articles are peer reviewed. This means that:	L1 06/07 Pre IL intervention n=153	L2 07/08 Post IL intervention n=97
a) People who buy and read the journal have commented on the articles	18.3%	8.2%
b) The journal articles are reviewed by experts in the field after they are published	19.6%	17.5%
c) The journal articles are reviewed by experts in the field before they are published	**32.8%**	**70.2%**
d) People who buy and read the journal can write letters to the journal about the articles	2.6%	1%
e) Don't know	18.9%	0
Didn't answer	7.8%	3.1%

14. Which of the following statements about information published on web	L1 06/07 Pre IL intervention n=153	L2 07/08 Post IL intervention n=97

sites and peer reviewed journals is true?		
a) all web sites and journal articles are authored by an official organisation or expert in the subject	4%	2%
b) information published on web sites is always more up to date than information in current issues of journals	8%	3%
c) all web sites and journal articles provide bibliographies of reliable sources of information	14.5%	18.5%
d) authors of journal articles must declare any conflict of interest they might have about the information they publish whereas web site authors do not	32.5%	**74.5%**
e) Don't know	**34.5%**	0
Didn't answer	6.5%	2%

These questions show a clear improvement in students' understanding of the peer review process of scholarly publishing. Comments from student work also reveal that some groups had considered the peer review as a way of establishing the authoritative credentials of journal articles over news stories:

> "Whereas, medical journals are scientifically based and are criticised by other scientists/ psychologists before being published therefore they are more reputable as a resource." RC

Inquiry and information literacy

All four postgraduate tutors agreed that the inquiry task was effective in developing information literacy in the students, although tutor [3] said that one of her tutees had difficulty understanding the purpose of the task. The tutor tried to explain the benefits in terms of information literacy, and the tutee responded that he thought

"it was a lot of work just to learn about that." It is clear from the feedback that the task wasn't universally popular and some students struggled to see the relevance of the activities to their studies as a whole:

> "I don't think the task really taught you anything and I don't really understand how you can be graded using a task like that." MQ

Students did not often comment directly on the information literacy capabilities they had developed through the task, although one student did write:

> "But on the whole, I learnt and gained a lot through this "assignment". I'm now not only equipped with the relevant knowledge to source for journal articles, but also keep up to date with the latest news all around the world." RC

The module questionnaire shows that a small majority (55.8%) of the students agreed or agreed strongly with the statement "as a result of the tutorial task I feel more confident studying independently at University" and could therefore see the value of the task in building capabilities for future inquiry.

The open-ended nature of the task was also popular with the students according to the tutors and invited more discussion:

> "Because they could look for anything… it was something that they were a bit more interested" PGT FG

Student work also reveals that the ability to choose their own topic of study was welcomed:

> "We decided to search for this as it is quite an important area of psychology and we found the study of Piaget's developmental psychology interesting in the course." RC

> "In a group discussion we decided to focus our project on genetics in autism, due to the current concentration on autism through the media, and our interest in the psychological research." RC

Discussion and conclusion

IBL for IL

The results from the various evaluation methods show that this inquiry task was successful in building information literacy capabilities in students. The response from tutors and the module leader indicates that the task was considered to be well designed in that it gave students the opportunity to choose an aspect of the discipline to investigate, which increased their engagement with the task. It is increasingly recognised that introducing students to self directed inquiry from the start of their university studies is a valuable pedagogical strategy (e.g. Brew, 2006; Hodge et al., 2008; Levy and Petrulis, 2007). Research conducted at the University of Sheffield suggests that students in the Arts and Social Science faculties often do not have the opportunity to experience inquiry at Level One (Levy and Petrulis, 2007) hence this activity offers a genuine opportunity for the University to increase the inquiry experience of a large cohort of Level One students.

Students developed an awareness of the existence and purpose of the Web of Knowledge database and some students were able to develop competency in the search features. Prior to this project students received a short introductory talk from the department's liaison librarian where they were introduced to this resource but there was no practical element. As such this IBL exercise represents a genuine improvement in the opportunity offered to students to develop familiarity and search expertise in this important resource. A large number of students found Google Scholar to be easier to use and the expectation that they will continue to use this resource for future search activities should be addressed in IL development activities. A further reflective exercise where students consider the differences between a dedicated journal database and Google Scholar at a later point in Level One should be considered.

More importantly, students appear to have developed an awareness of the purpose and content of academic journals and are aware of the function of the University Library in providing access to these, although some uncertainty remains in the role

of the Library catalogue in respect to journals. Students have also extended and developed their search skills and have demonstrated their understanding of Boolean operators and how to refine searches. The inquiry task has thus been successful in giving an introduction to the nature of academic resources for study at university level.

Although a large number of students reported a lack of confidence in their evaluative abilities the work they produced suggested that they could clearly identify many differences between the news articles and the journal articles and have demonstrated their ability to critically evaluate information. This lack of realisation indicates that students need more formative and/or summative feedback on their attempts to compare and evaluate the different sources.

The finding that some students could not perceive the benefit in the inquiry task is a further cause for concern. The inquiry-based learning task perhaps does not sit well with the more transmission based lecture series and factually based exam. Some students found the task enjoyable and useful but many were anxious about the perceived success of finding the original research article. When the task was designed, the fact that there might not be an easily accessible original research article was actually an important part of the task. The process of searching and the reflection on this was deemed to be essential to be essential to the task, but actually finding the related research article was not deemed to be essential. Future implementations of this task may wish to explicitly communicate this to students to attempt to reduce their anxieties.

Using Theory of Change evaluation methodology

The Theory of change evaluation methodology was effectively and enthusiastically implemented by both authors to generate a varied and rich data set. Although it is acknowledged that this level of evaluation is not sustainable year on year, the methodology, as its name suggests, was found to be an appropriate way of measuring the impact of a change in pedagogical approach.

The departmental procedure of distributing module feedback questionnaires online led to high response rates. However, the design and format of the questions was limited by the software used. Further exploration of student response to the inquiry task using more qualitative methods such as focus groups would give a richer picture of issues such as the lack of confidence in evaluative abilities and perceptions of the nature of the task and how it dovetails with the rest of the curriculum.

The IL questionnaire is a useful tool for measuring students actual IL competencies rather than their perception of these. It has been used at the University of Leeds to provide longitudinal data over a number of years and can be integrated with an analysis of student assessment data to give a rich picture of students IL capabilities and the effect on their academic performance (Harrison and Newton, 2007). The questionnaire, with permission, could be adapted to other discipline contexts. However care needs to be taken to assess the validity of the questions in any new context in which the questionnaire is used. It is recommended that the questionnaire is more immediately implemented following any pedagogical change in IL development activity so that improvements in performance can be more easily linked to the intervention. It is further recommended that students complete the questionnaire during a timetabled session to ensure a good response rate.

Collaboration

This project required collaboration between academic staff, educational developers and librarians to design an effective IBL activity, implement it and evaluate it. Links between the department of psychology and the Library have been strengthened and Library resources to support information literacy in the discipline context of psychology have been enhanced. These outcomes extend beyond the context of the project. The CILASS funding created an opportunity for the project leader to work closely with an educational developer with information literacy expertise. Funded time for educational development was an important feature of the project, and the mutual interest of the parties involved supported the detailed evaluation plan that was put in place.

This paper describes the implementation of a novel inquiry based learning task that was designed to improve students IL skills and engagement with research literature. Tasks involving comparing scholarly and popular media could be easily implemented for a variety of social and pure science subjects. Indeed the task has generated interest from other departments at the University of Sheffield (e.g. animal and plant sciences) and may also be implemented in their curriculum.

The benefits of this project have been enhanced knowledge of the value of IL development within the Department of Psychology and furthermore how IL can be embedded successfully within the subject curriculum.

Bibliography

Association of College and Research Libraries (2003) Information Literacy competency standards [Online] http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm[Accessed 06/08/2010]

Biggs, J. (2003) Teaching for quality learning at University 2nd ed. Society for Research into Higher Education and Open University Press, Maidenhead, Berks.

The big6 (2001) Information and Technology skills for student achievement [Online] http://www.big6.com/ [Accessed 06/08/2010]

Brew, A. (2006). Research and Teaching: beyond the divide. Basingstoke: Palgrave MacMillan.

Byerly, G. and Brodie, C.S. (1999), “Information literacy skills models: defining the choices.” In Stripling, B.K. (Ed.) Learning and libraries in an information age: principles and practice, Englewood: Littleton: Libraries Unlimited, pp. 54-82.

Bruce, C. (1997), “The relational approach: a new model for information literacy”. New Review of Library and Information Research, Vol. 3 pp. 1-22.

Council of Australian University Libraries (2004) Australian and New Zealand information literacy framework: principles, standards and practice. [Online] http://www.caul.edu.au/info-literacy/InfoLiteracyFramework.pdf [accessed 1/7/2010]

Connell, J.P. and Kubisch, A.C. (1998) “Applying a Theory of Change Approach” in Fulbright Anderson, K. Kubisch, A. C. and Connell, J. P. (eds) New Approaches to Evaluating Community Initiatives, vol. 2, Theory, Measurement, and Analysis. Washington, DC: Aspen Institute.

Dodd, L. (2007) “The impact of Problem-based learning on the information behaviour and literacy of veterinary medicine students at University College Dublin.” Journal of Academic Librarianship vol. 33 No. 2 pp. 206 - 216

Fosmire, M. and Macklin, A. (2002) “Riding the active learning wave: problem-based learning as a catalyst for creating faculty-librarian Instructional partnerships.” Issues in Science and Technology Librarianship Spring 2002

Harrison, A. and Newton, A. (2007) “Making the connections: assessment, training, progression and performance.” Paper presented at the Librarians Information Literacy Annual Conference (LILAC) 26th-28th March 2007, Manchester, UK, available at http://www.cilip.org.uk/get-involved/special-interest-groups/community-services/subgroups/information-literacy/events/lilac/lilac-2007/pages/parallels.aspx [Accessed 29.11.2010].

Hart, D., Diercks-O’Brien, G. and Powell, A. (2009), “Exploring Stakeholder Engagement in Impact Evaluation Planning in Educational Development Work.” Evaluation vol. 15 no. 3 pp. 285 - 306

Helsby, G. and Saunders, M. (1993), “Taylorism, Tylerism and performance indicators: defending the indefensible”. Educational Studies, Vol. 19 No. 1 pp. 55-77.

Hepwoth, M. and Walton, G. (2010) Teaching information literacy for inquiry-based Learning. Oxford: Chandos Publishing

Hodge, D., Haynes, C., LePore, P., Pasquesi, K. and Hirsh, M (2008). “From inquiry to discovery. Developing the student as scholar in a networked world.” Learning Through Enquiry Alliance (LTEA) Conference 2008 25th –27th June 2008, University of Sheffield, available at www.cilass-resources.group.shef.ac.uk/ltea2008/Hodge_CETL_2008_keynote.pdf; [Accessed 06.08.2010].

Jacobsen, T.E. and Xu, L. (2004) Motivating students in Information Literacy classes. Neal-Schuman, New York, NY

Khan, P. and O’Rourke, K. (2004) Guide to Curriculum Design: Enquiry-based Learning [Online]. LTSN Generic Centre, Higher Education Academy [Online] http://www.campus.manchester.ac.uk/ceebl/resources/general/kahn_2004.pdf [Accessed 12/05/08]

Levy, P. and Petrulis, R. (2007). “Towards transformation? First year students, inquiry-based learning and the research/teaching nexus.” In: Proceedings of the Annual Conference of the Society for Research into Higher Education (SRHE), December 2007, Brighton, UK.

McGregor, J. H. (1999). “How do we Learn?” in Stripling, B. K. (Ed.) Learning and Libraries in an Information Age. Principles and Practice. Littleton: Libraries Unlimited

McGuinness, C. (2006) “What faculty think – Exploring the barriers to information literacy development in undergraduate education.” Journal of Academic Librarianship Vol. 32 No. 6 pp. 573 - 582

McKinney, P. & Levy, P. (2006) “Inquiry-based learning and information literacy development: a CETL approach” ITALICS Vol. 5 No. 2 [Online] http://www.ics.heacademy.ac.uk/italics/vol5iss2/strategic%20IL%20(4).htm [Accessed 06.08.2010]

Markless, S. & Streatfield, D. (1992) Cultivating information skills in further education: Eleven case studies. Library and Information Research Report No. 86, British Library Research and Development Department, London.

Mittermeyer, D. and Quirion, D. (2003) Information literacy: study of incoming first year undergraduates in Quebec. [Online] http://crepuq.qc.ca/documents/bibl/formation/studies_Ang.pdf [Accessed 15/08/10]

Monash University (2005) Evaluation of information literacy 2005. [Online] http://www.lib.monash.edu.au/reports/infolit-evaluation-2005/ [Accessed 12/08/2010]

Palmer, S. (2002) “Enquiry-based learning can maximize a student’s potential” Psychology teaching and learning Vol. 2 No. 2 pp. 82-86

Pathways to knowledge (2000) [ONLINE] http://www.sparkfactor.com/clients/follett/home.html [Accessed 12.08.2010]

Pelikan, M. (2004) “Problem-based learning in the library: evolving a realistic approach.” Portal: Libraries and the Academy, Vol. 4 No. 4 pp. 509-520

Rowe, R., McKinney, P. & Wood, J. (2010). “Inquiry based assessment of statistical methods in psychology”. In Bidgood, P., Hunt, N. & Jolliffe, F. (Eds.) Assessment methods in statistical education: an international perspective. Wiley & Sons Ltd. pp189-201.

SCONUL (1999) Information Skills in Higher Education: A SCONUL Position Paper [Online] http://www.sconul.ac.uk/groups/information_literacy/papers/Seven_pillars.html [Accessed 10/06/10]

Snowball, R. (1997) "Using the clinical question to teach search strategy: fostering transferable conceptual skills in user education by active learning." Health Libraries Review Vol.14 pp.167-172

Stripling, B.K. (Ed.)(1999), Learning and libraries in an information age: principles and practice Littleton: Libraries Unlimited

Stubbings, R. and Franklin, G. (2006) "Does advocacy help to embed information literacy into the curriculum? A case study." ITALICS, Vol. 5 No.1 [Online] http://www.ics.heacademy.ac.uk/italics/vol5iss1.htm [Accessed 12.08.2010]

Turkington, S. (2008) Testing an information literacy assessment tool? Thesis, University of Aberystwyth.

The University of Sheffield (2005) Learning Teaching and Assessment Strategy 2005-10 [Online] http://www.shef.ac.uk/content/1/c6/04/83/65/lta-strategy2.pdf [Accessed 12.08.2010]

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11.2. Appendix 2: Paper 2 McKinney P.A. (2013) Information literacy and inquiry-based learning: evaluation of a 5 year programme of curriculum development. *Journal of Librarianship and Information Science*. 46 (2) 148-166

Abstract

Inquiry-based learning describes a range of learner-centred pedagogies increasingly employed in Higher Education where students learn through engaging in open-ended research and inquiry. It is acknowledged that this type of pedagogical approach requires advanced information literacy capabilities in students, and that there is a need to support the development of information literacy in inquiry-based learning curricula. This paper reports on the evaluation of a selection of curriculum development projects undertaken at a UK University that implemented inquiry-based learning and information literacy development. Data was collected using a "Theory of Change" evaluation methodology and analysed using a qualitative thematic approach. It was found that educators need to make explicit to students the need to develop information literacy to support their inquiries, and that dedicated approaches to facilitation from peers, librarians and academics are helpful when designing inquiry-based learning.

Keywords

Inquiry-based learning, information literacy, pedagogy

Introduction

Inquiry-based learning

The foregrounding of inquiry in undergraduate education can be traced to the Boyer Commission report (1998), which criticised didactic teaching for not preparing students sufficiently for further study nor for professional careers. The report proposed that learning, teaching and research should be more closely integrated and that undergraduate students should experience learning through inquiry from the start of their studies at university. Inquiry-based pedagogies create a "culture of inquiry" as "teachers become learners, learners are self and peer-taught and

everyone becomes a researcher" (Gordon, 2010: 79). The integration of inquiry into the undergraduate curriculum is seen to be a way of enhancing the linkages between teaching and research (Healey & Jenkins 2009). Rather than being seen as recipients of an education process, students become partners in the process of learning (Kahn & O'Rourke 2004). In addition IBL develops students' 'self authorship', seen to be an essential goal of undergraduate education (Hodge et al. 2008: 8).

Inquiry-based learning (IBL) is a powerful learner-centred pedagogy used widely in all levels of education. The term 'IBL' is used to describe a range of teaching and learning strategies that are driven by students pursuing their own research and inquiries (Kahn & O'Rourke 2004). IBL is characterized by inquiry that is open-ended where a variety of responses can be proposed (Kahn & O'Rourke 2004). IBL is based on constructivist educational theories and the belief that learners construct meaning from their learning activities, and that this understanding cannot be transmitted from teacher to learner (Biggs 2003). IBL is therefore characterized by teaching approaches in which the lecturer acts as a facilitator who encourages students in their learning activities (Cleland & Walton 2012). However research has shown that the adoption of IBL can raise issues of power and control for lecturers, and can be more demanding on their time. (Deignan 2009). In line with constructivist theories of learning and teaching, it is suggested that the active acquisition of knowledge leads to the increased likelihood that the learning will become intellectually embedded (Hutchings 2007).

Information literacy

Information Literacy can be defined as "the adoption of appropriate information behaviour to identify, through whatever channel or medium, information well fitted to information needs, leading to wise and ethical use of information in society" (Johnston & Webber 2003). The use of the term "Information Literacy" (IL) to refer to these competencies has been in use since the late 1970s and has been recognized internationally as an essential competency for modern society and lifelong learning by UNESCO in the 2003 Prague declaration and the 2006 Alexandria proclamation (Horton 2010). IL has been recognized as a key competency for learners in Higher Education (HE), and promoted in the US through the creation of the Association of

College & Research Libraries competency standards (ACRL 2000). These standards stress the importance of IL in a learner-centred, inquiry-based curriculum, and also the importance of building IL within the context of the subject being taught. In the UK the SCONUL "Seven Pillars" (SCONUL 1999) model of IL was created as a practical model to assist in strategy, design and delivery of IL in HE. The Seven Pillars model was updated in 2011 to reflect a widened conception of information literacy in education, while acknowledging the centrality of IL to effective learning in HE (SCONUL 2011). It is however worth noting that the use of IL standards and models can promote a skills-based conception of Il that is not consistent with conceptions of information use as a social process (Jacobs & Berg 2011). IL development is now a major sphere of activity for academic librarians, although it is noted that there are overlaps with a number of other terms being used to describe critical thinking and higher level cognitive skills in the HE environment such as digital literacy and academic literacy (Secker & Coonan 2011).

The librarian literature is replete with examples of scholarship into the teaching, development and assessment of Information Literacy, however it is clear that information literacy has moved beyond library instruction, and instead is taught and developed by diverse HE stakeholders for example learning developers, e-learning specialists and academic staff (Secker & Coonan 2011).

There is little research-based literature published on the relationship between inquiry and information literacy; inquiry-based pedagogies for information literacy or information literacy development to support inquiry-based learning. There is a small body of literature explored in more depth below relating to Problem-Based Learning (PBL) and information literacy (e.g. Dodd 2007; Fosmire & Macklin 2002) where information literacy development, facilitated by librarians is integrated into PBL curricula. There is again a very small body of literature reporting inquiry-based learning and the role of information literacy in supporting student inquiry (e.g. Gehring & Eastman 2008; Mazella & Grob 2011) and the use of IBL to develop IL (Hepworth 2009). With a few exceptions (Dodd 2007; Bowler & Street 2008; Hepworth; 2009; Gehring & Eastman) which feature empirical data collection, much

of the literature (e.g. Fosmire & Macklin, 2002, Pelikan 2004; Snowball 2007; Mazella & Grob 2011) is practitioner based and offers observation and reflection rather than independent research. In addition the interventions described are most often limited to a single, course or discipline (e.g. Walton & Hepworth 2011, Mazella & Grob 2011). The 2009 book by Hepworth & Walton contains an interesting discussion of inquiry and the relationship with information literacy, and offers some detailed examples of inquiry-based pedagogies for information literacy development; however there is no empirical data relating to the practical implementation of these strategies. This paper offers some examples of inquiry-based pedagogies for the development of IL in University students that have been applied in a variety of subject contexts.

Context

This research took place within the context of the "Centres for Excellence in Teaching and Learning" teaching enhancement programme, which saw the creation of 74 centres based in Universities across the UK. The purpose of this programme, the largest ever funded in the UK, was to reward excellent teaching practice and invest in that excellence for the benefit of students, teachers and institutions. More specifically the data is drawn from one such Centre: Centre for Inquiry-based Learning in the Arts and Social Sciences (CILASS) where the pedagogical focus on IBL, networked learning and IL provided a framework for over 100 curriculum development projects carried forward at departmental and individual level in a broad spread of discipline areas across the University.

The CILASS position on the relationship between IBL and IL is discussed in more detail in McKinney & Levy (2006). In summary, although information-seeking capabilities are essential for students undertaking IBL, it is the 'higher order' competencies (Bruce 1997; SCONUL 1999) of evaluation, critical thinking, synthesis and the creation of new knowledge that were the foci for development activity at the CETL. Papers were invited to the Librarians Information Literacy Annual Conference in 2009 on the CILASS sponsored theme of IL and IBL, and this indicates

the interest in this area from the IL community. Workshops and papers submitted under this theme from the US (Cohen et al. 2009); Finland (Helminen & Heino 2009) and the UK (Mogg 2009; Walton & Pope 2009) are testament to the international interest in this area.

This paper presents selected findings from the evaluation the CILASS educational development programme at the University of Sheffield. A 'Theory of Change' evaluation methodology was used to capture the learning from CILASS activities at both overall programme and individual project level. In this research, data gathered from a selection of curriculum development projects which featured a strong IL flavour will offer some insight into the relationship between IBL and IL, and how the development of IL capabilities in students can support them in their inquiries. The outcomes from some individual projects from the CILASS programme with an IL focus have been reported in the literature (e.g. Rowe et al. 2009; McKinney et al. 2011). However these are rooted in the particular discipline context and restricted to reporting one intervention; they do not provide an overview of the diversity of inquiry-based pedagogies for IL drawn from a range of discipline represented in this paper.

The present paper presents a meta-analysis of data from research questions that were drawn from the CILASS programme level Theory of Change:

- Have students developed their awareness and understanding of IL and its value?
- Have students developed their personal IL capabilities?
- What feedback have students given about the quality of their IL learning experience?
- What inquiry-based approaches to IL development have been developed?
- How have staff embedded IL development explicitly and in structured ways into their IBL pedagogy? What design and facilitation approaches have they adopted?

The following section will briefly review the literature on IBL and IL, then the methods used to collect and analyse the data will be explored. The main findings from the research will be presented, which will then be discussed in relation to pedagogical theory and IL research. This paper will make specific recommendations regarding how inquiry-based pedagogies can be used for IL development.

Literature review

IBL is often seen as an over-arching term that covers various approaches to learning that are driven by inquiry such as problem-based learning (PBL), case-based learning and field-work (Hutchings, 2007). In PBL students work collaboratively to solve a complex problem, and are facilitated through a number of clearly defined stages (Hmelo-Silver 2004). IBL is seen to be a more flexible pedagogy where the stimulus for learning can be much broader and the processes learners go through are not prescribed as they are in PBL (Hutchings, 2007).

Spronken-Smith & Walker (2010) define the core features of inquiry-based learning based on leading authors' educational research as: learning driven by questions and problems; learning based on constructing knowledge and understanding; active learning; student centred learning where the teacher is a facilitator; where the student directs the learning.

The label "IBL" can be used to describe a plethora of teaching approaches, and looking at the various conceptions and definitions of IBL extant in the literature a common feature is that the approaches to learning are question or problem driven. However there has not been much systematic research into what sort of tasks are conceived as being inquiry driven (Aditomo et al. 2011). The review by Aditomo et al. found that inquiry could involve literature-based research, scholarly research involving the collection of empirical data; simplified research where research questions and methods have been designed by tutors; discussion tasks; simulations of professional practice including roleplaying. The authors found that many inquiry tasks did not involve genuine knowledge creation.

To further explore the research-teaching nexus, In the matrix designed by Healey & Jenkins (2009), students can be involved in research in four ways, only one of which involves the student as researcher, but all involve the student in the culture of research and inquiry in their discipline. It is noted that while students should experience pedagogical approaches that encompass activity in all four aspects to allow for different learning styles, often the educational experience of students is weighted towards being an audience rather than a participant in research. Involving students in research at an undergraduate level is seen to be a way to "reinvigorate the undergraduate curriculum" Healey & Jenkins (2009: 9). Levy & Petrulis (2012) suggest that students can have varying conceptions of inquiry and that it is valuable to introduce students to controlled inquiry from level one and that this has benefits in terms of developing independence and self-belief.

One of the most common approaches taken is for students to engage in inquiry in a group. Socio-cultural theories of learning and teaching, initially proposed by the Russian theorist Vygotsky in the 1920s, privilege the role of social and cultural interaction in learning and development, leading to a belief that learning can be facilitated through collaboration with peers (John-Steiner and Mahn 1996). Group inquiry can enable students to generate ideas more easily, and with greater depth than an individual student, and in addition offers students the opportunity to develop so called 'transferable skills' particularly in communication and team-related skills (Hutchings 2007). Students recognise the value of collaborative learning as preparation for team working in their professional lives (Livingstone and Lynch 2000). Students who have experienced group-inquiry learning believe they have developed greater interpersonal skills and greater social awareness (Justice et al. 2009).

Peer tutoring is based on socio-cultural and social constructivist theories of cognitive development (Topping 1996) and takes a learner-centred approach that emphasizes the important roles played by social relations, community and culture in learning and cognition (Wang 2007). Vygotskian theories have also had an influence on the use of peer support mechanisms in Higher Education. The "Zone of proximal development" (ZPD) was conceived as the difference between what a learner can accomplish alone

and what they can accomplish with the support of a more experienced peer (Topping 1996, Wang 2007). Thus with peer support students can achieve greater learning. There is some debate about what constitutes peer tutoring or mentoring, and the term has been used to describe a variety of approaches, however the central aim seems to be to involve students in the teaching and learning process as a means to support professional and personal development and improve learning (Falchikov 2001). Peer mentoring programmes can increase student engagement and build cross-level student communities (Ody & Carey 2009).

There are two examples in the literature of University libraries in the US establishing peer tutoring programmes based in the library to support the librarians' IL development and teaching activities. Holliday and Nordgren (2005) describe a library peer mentor programme where students were employed to assist librarians at the reference desk and in IL teaching sessions; and Deese-Roberts and Keating (2000) describe a library strategies peer tutoring pilot project where student tutors support their peers through one-to-one sessions and assist librarians in IL teaching activities.

A different, module specific, model of peer mentoring for IL development reported in the literature by Bolton et al (2009) who describe an initiative in the UK HE context where students taking a level one module receive peer mentoring support from students taking a related level 3 module. Students are supported by their peer tutors in a PBL exercise involving information search and retrieval activities. Training for the student mentors takes place within the context of their module and features aspects such as the role of the mentor, active learning strategies, developing critical thinking and IL.

It is well known that students use each other as information sources, a survey of student's use of resources conducted at Liverpool Hope University (Verity et al. 2007) found that 90% of respondents would use the support of other students in order to find relevant resources for their studies, and 63% would consult their peers to find out about new forms of and availability of electronic material. A common feature of student-student mentoring is the benefit to mentors in terms of

developing their own IL capabilities (Holliday & Nordgren 2005 Deese-Roberts and Keating) in one case (Bolton et al. 2009) this was stated to be an unanticipated outcome of the project. Studies have shown that students acting as peer mentors are required to review and enhance the skills they are required to 'teach' and in addition develop their cognitive abilities to simplify and clarify their material. (Topping 1996).

The ability to develop inquiry-based approaches to learning has been facilitated by the increased access to information prevalent in our networked world, and there is a resultant need for students to develop IL capabilities for example in finding, filtering and analysing data and information (Hodge et al. 2008) Models of IBL foreground interaction with information as an essential feature of inquiry learning e.g. Justice et al. (2007) which defines stages of "identifying resources and gathering information"; "Assessing information" and "weighing evidence and synthesizing understanding" as part of the inquiry process. A model of IBL developed through research at the University of Sheffield into first year students' conceptions of inquiry (Levy & Petrulis 2012) also highlights information search, in IBL:

***Authoring*:** Inquiry tasks are designed to encourage students to explore their own open questions, problems, scenarios or lines of inquiry, in interaction with a knowledge base ('how can I answer my open question?').

***Producing*:** Inquiry tasks are designed to encourage students to explore open questions, problems, scenarios or lines of inquiry, framed by teachers, or others such as an external 'client', in interaction with a knowledge base ('how can I answer this open question?').

Pursuing: Inquiry tasks are designed to encourage students to explore a knowledge base actively by pursuing their own questions, problems, scenarios or lines of inquiry ('what is the existing answer/response to my question?').

Identifying: Inquiry tasks are designed to encourage students to explore a knowledge base actively in response to questions, problems, scenarios or lines of inquiry framed by teachers ('what is the existing answer/response to this question?').

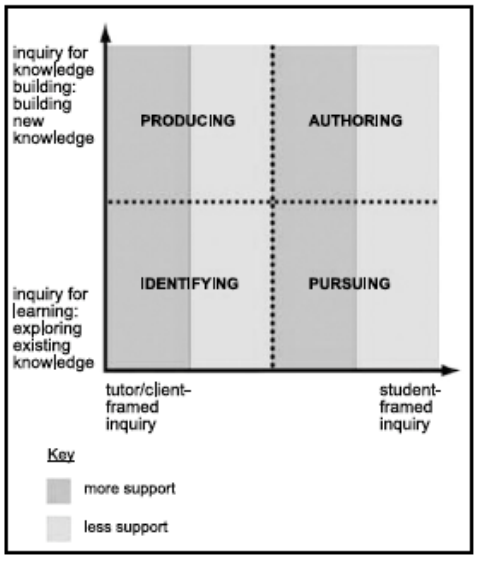

Figure 1. Modes of inquiry-based learning.

Students who participated in this research reported extensive engagement with information resources as part of their information gathering activities for inquiry-

learning and some viewed learning as a process of knowledge acquisition through (Levy & Petrulis 2011).

An early review of PBL and libraries in the health sciences revealed that students undertaking PBL, where the focus of student activities is on independent information gathering and learning, use the library more often than students learning on traditional transmission curricula; opt to use online information services and journals as information sources; present more sophisticated information queries at service points and demonstrate greater abilities to search for and find information (Rankin 1996). A further study of the information literacy capabilities of students learning through PBL found that students were more discerning in their use of information sources and could integrate information they found into the construction of their knowledge (Dodd 2007).

PBL has been used by librarians as a pedagogical 'hook' to create opportunities to embed information literacy development within the curriculum and this has led to extended librarian-faculty collaboration (Fosmire & Macklin 2002). PBL pedagogy has been used in librarian-led information literacy classes where students were set problems relating to the use and support of PBL in HE (Pelikan 2004) and clinical problems have been also been used in search skills training sessions (Snowball 1997). Walton & Hepworth (2011) in their study of level one learners found that learner-centred, collaborative and problem-based learning environments were effective in IL teaching.

The relationship between inquiry pedagogies and information literacy has been written about extensively in the context of schools and school librarians. For example Wray (2006) describes modeling information search activities with 6-year-old students engaged in an inquiry-based task. The students engage even at this young age with information intensive activities such as using indexes to support information searching in printed texts. The American Association of School Librarians recommends that young learners have the skills and abilities to engage with inquiry-based learning and highlights the importance of building skills in knowledge creation and critical thinking through the research process (AASL 2007). There is an important

role for the school librarian in fostering a culture of inquiry for learners (Stripling 2008) and in collaborating with teachers to adopt inquiry-based pedagogies (Diggs, 2009). WebQuests are open-ended learner-centred inquiry activities often employed by school librarians to teach information literacy (MacGregor & Lou 2006).

Further, in the HE context, Hepworth (2009) describes an IBL module where students chose a topic of investigation related to information science. Students' learning was scaffolded through the inquiry process with a number of information literacy related assignments, e.g. creating a mind map. A pre- and post-intervention information literacy diagnostic test was used to encourage reflection on IL and to assess IL development. The average mark achieved by students on this test improved from 50% to 80% over the course of the module. In addition qualitative student feedback revealed a positive response to inquiry-based learning indicating that they could see the benefit of the IL development for their future university career. A series of Information literacy related inquiry-based assignments were also used to support an IBL module in the context of biology (Gehring & Eastman 2008). Qualitative analysis of the work students produced for these assignments revealed that the tasks were successful in building information literacy (called fluency here), although it was found that the support from a specific tutorial on search techniques was also useful. IBL was used to model the research process in an English course where students conducted archival research, which featured a collaboration between a librarian and an academic (Mazella & Grob 2011). Students contributed various types of material (annotated bibliographies, answers to specific questions and other assignments) to a course blog. Students were supported with specific librarian delivered tutorials covering the resources they were expected to use and in addition the librarian had input into the pedagogical planning for the module. The authors report very positive personal outcomes form their collaboration although there is little comment on student perceptions of the inquiry, other than that gained in confidence in using special collections.

Methodological framework

The data for this research were gathered through the use of the 'Theory of Change' (ToC) impact evaluation methodology that was employed at both overall programme level and at individual project level within the CILASS programme. ToC is a theory-based participative evaluation methodology that was originally developed at the Aspen Institute to evaluate complex community change projects (Connell & Kubish 1998). The methodology involves the prediction by stakeholders of the anticipated changes that will take place to achieve participant-defined project goals (Anderson 2005). ToC methodologies have been used to evaluate educational development projects (e.g. Saunders et al. 2006) and a ToC approach was adopted to evaluate all curriculum development projects at the University of Sheffield from 2005.

Hart et al. (2009) lay out the rationale for using ToC combined with the use of EPO (Enablers, Process, Outcome) performance indicators (Helsby & Saunders 1993) at the University and they argued that evaluation of educational development projects is important for two reasons: to inform improvements in organizational approaches to learning and teaching and to provide accountability for public funding. In addition the adoption of ToC was a response to institutional concerns around "sustainability, scalability and transferability of good practice" from curriculum development projects (Hart et al. 2009:289). An evaluation methodology was needed to establish links between educational development projects and any outcomes resulting from them to provide accountability for public funding. However it has to be noted that this methodology cannot establish causal links between project activities and outcomes in the same way as scientific research is able to, partly due to the complex environment in which development takes place, that is subject to many internal and external influences.

The ToC methodology has a number of distinctive features. It is seen to be participatory in that stakeholders negotiate the scope and shape of the evaluation activities for each project, and define the criteria against which the success of the project is judged. It is a flexible methodology that allows for changes and adaptations to projects that can be incorporated into the overall evaluation at any stage, supported by the heavily reflective approach taken by project leaders. ToC

encourages a collaborative approach to evaluation by involving many project stakeholders in both the definition of indicators and their evaluation, thus building capacity for organizational learning. In this respect librarians, educational developers, students, IT experts and other professional services colleagues can be involved in the design, implementation and evaluation of curriculum development initiatives.

Hart et al. (2009) note that a challenge for Theory of Change evaluation is to develop meaningful criteria, called 'performance indicators' against which to measure the success of the project. Helsby & Saunders (1993) recommended the use of EPO indicators (Enablers, Process, Outcomes) as a way to define where stakeholders wish to go with a project project activities

Drivers	**Resources / enabling factors**	**Activities**	**Desirable outcomes**	**Anticipated impact**
What is the current situation that has led to the project	What support is needed to do the project activities (**E**nablers)	What activities need to take place to achieve the project outcomes? (**P**rocesses)	What are the desirable and feasible outcomes for the project (**O**utcomes)	What is the longer term impact of the project (**O**utcomes)

It was felt that ToC was appropriate for CILASS at overall programme level and at project level as it is inherently inquiry-based, fitting with the pedagogical focus of the programme as a whole. In addition ToC has the advantage of providing a standard framework in which to analyse the learning gained across a diversity of individual projects and can facilitate the kind of meta-analysis presented here. The

implementation of ToC for CILASS projects followed a standard pattern: Following an agreement to fund a project, the stakeholders would work with a CILASS research associate to define their ToC poster. Each indicator would then be accounted for in an evaluation plan that could incorporate the collection of diverse forms of data, including reflective interviews with stakeholders; quantitative and/or qualitative feedback from students and formal documentation. Data collection and analysis was performed by CILASS research associates, project leaders and student ambassadors. Scholarship relating to project activities was strongly encouraged and evaluation data were often used in the creation of conference papers, journal articles and project case studies. (e.g. Cox et al. 2008; Rossiter & Biggs 2008; Wood 2009).

Data sampling rationale and collection

A purposive sample of 12 CILASS funded projects was selected from the total pool of 122 projects to provide the data set for this analysis. These projects were chosen to represent a broad spread of discipline areas and include projects taken forward by the University Library. The projects were selected for the research on the basis of their strong IL flavour, and fall into two broad categories:

- Those that had a specific focus on developing IL competencies through the mode of IBL;
- Those that focused on developing IL competencies to support students in their discipline inquiry more widely.

The evaluation plan for each project was unique and was defined by the individual project leader through using the ToC poster as a framework to identify key project indicators. As a result there is a great deal of variety in the data set that accompanies each project. The data set for the analysis comprises all documents created through the implementation of the ToC evaluation methodology for each project. This includes: all official documentation relating to the projects such as funding application forms; interim and final monitoring and evaluation reports; ToC posters; qualitative and quantitative student impact data gathered through focus groups and questionnaires; staff impact data gathered through reflective interviews and focus groups, and the learning development case studies that have been generated by project leaders from this data (e.g. Freeman 2007). A list of the projects that are

included in this analysis and the data collected for each project can be found in appendix A.

Data analysis

A thematic qualitative analysis of the data was facilitated through the use of Atlas-ti software. IL related indicators were identified from ToC posters and other project documentation, and these indicators provided a framework for the analysis of IL Enablers, Processes and Outcomes in project evaluation data. In addition key themes relating to IBL pedagogies and IL were identified emerging from the total pool of data. The results section below is structured using the ToC framework, in each section we first present indicators drawn from ToC posters and subsequently the evaluation data that was collected that relates to the indicators.

Results

Current situation

The 'Current situation' that prompted each project is described in both initial project funding bid documents and from the relevant column in the ToC posters, and a number of IL related drivers for projects were identified from these two sources. Project leaders identified both student and departmental development needs relating to IL and IBL, and a number of these drivers were common across discipline and department boundaries, summarised in table 1 below:

Table 1: Summary of IL related drivers for curriculum development projects

Students	
Lack basic IL skills.	English 2
Are not familiar with Library conventions.	English 2
Prefer to use Google rather than electronic academic sources or the physical library.	English 1; Architecture 11

Are not able to critically evaluate information.	English 1; Psychology 5; Architecture 11; Journalism 12;
Receive varying levels of support for IL so development is patchy.	English 1; Architecture 11
Departments	
The importance of IL is not well communicated to students.	English 2; Journalism 12
The department is not explicit enough about the research activity students are expected to engage in and the IL capabilities this entails.	English 2;
There is no commonly agreed framework for the development of IL across modules and programmes.	English 1; Library 6; Information Studies 9; Architecture 11;
IL does not feature in learning outcomes.	Information Studies 9
The curriculum focuses too much on developing subject knowledge rather than in developing transferable skills.	Sociological studies 10
IL development is integral to the department's activities but there is no standard terminology for the concept.	Architecture 11; Journalism 12

Project leaders had varying perceptions of the level of searching ability of their students prior to coming to university. Some thought that students lacked even basic search skills while others considered students quite accomplished internet searchers

who simply needed support in weaning themselves off the internet as the sole source of information and support in transferring search skills to the academic resources. The prominence given to IL related drivers in these project bid documents and ToC posters is a clear indication of the high level of importance given to IL by these project leaders.

Enabling factors

Three key enabling factors were identified from the data as necessary support IL development in an inquiry context: the use of models of IL; support from learning developers; and support from the Library, and these are detailed below.

Models of Information Literacy

The SCONUL 'Seven Pillars' model of IL (SCONUL 1999) was used strategically throughout the CILASS programme to facilitate discussion with prospective and actual project leaders regarding the definition of and scope of IL. The model is also used in the University Library and is widely used in the UK HE sector as a framework for information literacy strategy and the development of library and independent resources to support information literacy development.

Only one project leader (Psychology 5) used the model explicitly with students and tutors to explain and define IL, and there is evidence from reflective interviews that project leaders found the model useful and relevant in terms of developing conceptions of IL. (English 1; Law 7; Psychology 5). Three projects used the Seven Pillars model as a framework for an IL strategy to support inquiry across programmes (Information studies 9; English 1 and Architecture 11).

Support from Learning Developers

As part of the programme support for IL a dedicated role of 'Learning Development and Research Associate (LDRA): Information Literacy', was created, whose purpose was to provide pedagogical support for curriculum development projects in IBL in general and in IL specifically. The remit of the role also included support for summative and formative project and programme evaluation; and taking forward

the CILASS research agenda in relation to IL. A further discussion of the LDRA role can be found in McKinney et al. (2009) and Little (2009).

Support from the Library.

Support from the Library in terms of the creation or adaptation of VLE-based IL tutorials, creation of other IL support materials; involvement in project planning, and specific student support activities were identified as enabling factors in several projects. The Library's online Information Skills tutorials, available on the University Virtual Learning Environment: MOLE, aim to provide a self-study route for students for IL development and skill testing. In addition librarians provided other face-to-face and online support for students engaging in IBL.

Processes

This focus here is specifically on activities that were described in the 'Processes' column of the Theory of Change' poster. First a description of inquiry-based pedagogies for information literacy gathered from Theories of Change project funding application and project case studies is presented (more detailed descriptions of project activities can be found in the appendix.) Following that evaluation data that reveals student and staff opinion of these approaches is discussed This is followed by a more in-depth exploration of peer support, reflective approaches and collaborative inquiry as examples of inquiry-based pedagogical approaches that were used more extensively in these projects.

Inquiry-based activities to build information literacy

The activities that students have engaged in through these projects are varied. For example, students have:

- Undertaken small experiments and compared their results with published material, requiring them to search for similar experiments in the literature [HCS 3] .
- Searched for information for a particular brief, constructed a bibliography and discussed the validity of the information they found in seminars [Journalism 12].

- Traced the sources of information from a particular news item [Journalism 12].
- Found and written a review of a journal article of interest to them [Sociological Studies 10].
- Searched for a news story in the discipline field that was purportedly based on real research data on a topic that was of interest to them, then found the original research article that the news story was based on. Reflected on search strategies used and compare and contrast the quality of information between the news story and the research article. [Psychology 5].
- Interviewed a 'client' (another student) about their information need, performed a literature search and presented the results in a bibliography. Reflected on the task. [Information Studies 8].
- Selected 3 words from a sonnet being studied and look these up in the OED online. Reflected on whether what they have found out about the meaning and origin of the word has changed their perception or opinion of the sonnet [English 1].
- Developed research questions from a passage of text and searched for resources that would help them answer their research question. Constructed a bibliography of relevant resources and discussed online and in class [English 1].

Students provided mixed feedback about their IBL learning experiences and how useful it was in developing their information literacy. Some responses indicated that the inquiry not only built IL capabilities but also significantly advanced discipline knowledge:

> However, I found the actual task of finding and evaluating corresponding journal articles interesting and helpful to my knowledge and understanding of psychology in a wider sense. *[*Psychology 5]

Other students felt they had extended their engagement with the literature for their discipline in a positive way, facilitated by the IL skills they had developed:

> I found the research tasks encouraged me to seek out further texts than those supplied on the reading list by providing me with new formats to searching for texts [English 1].

Students on the Psychology 5 project, in response to the statement 'I found this inquiry-based task enjoyable and motivating' provided a mixed response with 38.9% (n=43) 'undecided'. The same statement was included on a student questionnaire in the Human Communication Sciences 3 project, where 67% (n=18) of the UG and 58% (n=11) of the PG students agreed or agreed strongly.

Some students expressed dissatisfaction with the inquiry tasks they were assigned but recognised the value of the IL capabilities they had gained:

> They [the tasks] were tedious but they did provide me with the skills needed for the assessments.[English 1]

> I didn't see the point of it, as it did not appear to be benefiting us. as well as this, the assigned task was not stimulating. However, it did enable us to try using WoK [Web of Knowledge], which will be useful throughout the degree. [Psychology 5]

Other students (HCS 3 and Sociological Studies 10) felt that they already had the skills that the IBL activities were designed to build and as such felt the activities lacked value for them.

Some student evaluation data suggests that in some cases, students would have preferred a more transmission style of teaching to build information literacy:

> Tasks quite useful, but a sheet/ instructions on how to reference would have been more useful. [English 1]

While others expressed the view that IBL, while interesting, should only be employed alongside more transmission styles of teaching:

> Inquiry-based learning, it can help, but I'd like to say - don't go too far, don't move away from actually teaching - it can complement, like, it can help. [English 1]

Evaluation data gathered from project leaders and other staff stakeholders suggest that IBL has been successful in building IL competencies in students. However it was noted that staff need to be explicit about the links between IBL activities to build IL and the rest of the curriculum or students can fail to make the connections themselves. One way to do this is to stress the usefulness of IL in supporting students in approaching assessed work, even that of other modules. For example, one project leader noted that, through the project activities, students seemed to have developed a much better awareness of the function of bibliographies, and that this had led to that cohort of students producing better bibliographies for assessed work in other modules. It is important to be explicit with students about the IL aspects of the IBL they are being asked to engage with. This enables students to develop a conception of what IL is and that then helps them apply it across modules and develop their competencies further. One project leader commented that for her, IBL and IL are intrinsically linked in that good IL is fundamental to the success of IBL.

Peer support

In two projects students from more advanced levels of the same course provided peer mentoring for students engaged in the IBL project. The HCS 3 project used paid 'student guides' over the week-long induction week project. Each student guide worked with a small group of mentees to support them in an initial inquiry. The English 2 project used volunteer student mentors to provide guidance to level one students over the first few weeks of semester in a particular module. Both guides and mentors supported students in their inquiry by familiarising them with institutional information resources and the Library. The Law 7 project also featured peer support but in a less structured way. The Law students were encouraged to contribute to group learning through responding to posts on a module wide discussion forum, and student-led colloquia were used to support students in their learning. While module tutors and the Librarian also contributed to the discussion forum, students were encouraged to engage in a collaborative peer support process.

Student response to the inclusion of peer support in these projects has been largely positive, both from those giving and those receiving the support. Students taking part in a structured mentoring programme [English 2] felt personal fulfillment in that they had been able to 'give something back' and could see the benefit of their experience to a potential future career in teaching. They also felt they had enhanced their IL capabilities through the teaching process:

If you are teaching somebody else, you are improving your own skills for your own benefit.

Students acting as guides in the Human Communication Sciences 3 project also reported feeling that they had gained facilitation skills. They felt they had refreshed their own IL and IBL related capabilities through having to familiarise themselves with resources prior to the activities starting. The way in which the student guides in this project facilitated the inquiry of the new students was seen to be very positive:

> They didn't really tell us what to do, we sort of came up with our own ideas and they helped us put them together.

The guides were also praised for their approachable nature, and students reported feeling much more comfortable soliciting support from other students rather than from staff members.

Students who received peer support found it valuable to be able to draw on the personal experiences of students who were studying the same discipline but at a more advanced level. They benefitted from being able to discuss approaches to inquiry within the discipline, including although not limited to sourcing and processing discipline specific information.

> So rather than just giving us information, she was helping us with the way we would do it later on in the course. [Human Communication Sciences 3]

> It helped to have a different perspective from someone more experienced on many issues of which we as a group enquired about.[English 2]

The Law 7 MOLE discussion boards were broadly praised by students for the peer, librarian and tutor support available. Students liked the 'rapid response' nature of the boards and felt that they gained confidence from seeing that other students were having the same issues with the inquiry tasks as themselves. They found the anonymous nature of one of the boards allowed them to raise questions without fear of looking stupid in front of their peers.

A reflective approach to IL development

Several projects asked students to take a reflective approach to the development of Information literacy, and this was seen by project leaders to be an effective way of ensuring that students recognise that they have developed certain IL competencies through engaging in project activities. Students on the Psychology 5 project were asked to reflect on the search strategies they had used to find news and academic journals, and how effective they were at finding relevant information. They also had to reflect on the differences in the quality of information between provided by newspapers and by academic journals. Students on the Law 7 project had to complete a reflective learning diary as part of the project activities, and students on the Sociological Studies 10 project had an additional reflective seminar where they were invited to speak about their experience of bibliographic inquiry. Students on the Information Studies 8 project complete an assessed reflective portfolio about their learning on the module using the SCONUL 'Seven Pillars' model as a framework for information literacy development.

Unfortunately very little student evaluation data was collected relating to these reflective approaches, however reflective evaluation from the module leader on the Psychology 5 project indicates that those students who engaged more deeply with the reflective process produced work of a higher standard.

Collaborative inquiry

Four of the projects included in this analysis involved students in collaborative inquiry: Psychology 5, English 1, English 2 and the HCS 3. Generally group size has

been 3-5 students and in all projects students were placed in working groups by members of staff.

Students from the Human Communication Sciences 3 project found the opportunity to meet their course colleagues and engage with them valuable, particularly from a 'social' point of view. Collaborative working helped students spread the workload of the inquiry and made assessment seem less daunting. Responses to questionnaires used to gauge students' opinion of group work show a mixed response. 48.8% (n=55) of students on the Psychology 5 project agreed with the statement 'I enjoyed working collaboratively face-to-face' but 25.7% (n=29) were 'undecided'. However 77% (n=87) of students agreed, or agreed strongly that they would feel confident in doing group work in the future. Similar questions were asked of students on the Human Communication Sciences 3 project where responses were more positive with 85% (n = 23) of the UG and 48% (n= 9) of the PG students agreeing with the statement 'My experience of inquiry-based learning has made me enthusiastic about working collaboratively with others.'

The negative feedback about collaborative inquiry was tempered by acknowledgement that the tasks themselves were useful, but the logistics of organising group meetings and ensuring equal contributions from group members led to a poor opinion of collaborative inquiry. One student expressed a view that they felt held back by less able group members:

> It meant I was unable to 'get on' and finish because I had to keep e-mailing my group members to get their work and ideas too.[Psychology 5]

Other negative views of group work seem to stem from a perception that working collaboratively did not enhance understanding of the subject or facilitate skills development.

Outcomes & Impact

In this section the outcomes and impact identified as aims in Project Theories of Change are discussed before a closer examination of whether student and staff evaluation data reveals if these have been met.

Project Theories of Change defined various IL themed outcomes related to students, most commonly related to the development of personal information literacy capabilities. In some cases particular attributes of information literacy were highlighted as expected outcomes, for example the ability to critically evaluate information and synthesise information. Developing abilities to effectively use library resources was also a key outcome. Information literacy was explicitly linked to inquiry-based learning in project outcomes, both as a 'skill' for inquiry and also in terms of students developing into confident and autonomous learners.

Evaluation data revealed the development of personal IL capabilities and recognition by students of the value of IL.

Development of IL capabilities

Staff reported a better standard of referencing in assessed work and greater range of sources referenced was observed in students [English 1]. There was evidence that students seemed more comfortable in using a wider range of sources than previously [English 2]. The ability to go beyond material provided in reading lists gave an indication of enhanced information literacy abilities [Psychology 5]. The high quality of work that demonstrated significant reflection on search strategies and evaluation of information from different sources was also observed [Psychology 5]. However there was acknowledgement from staff that it is not always possible to attribute an improvement in IL competencies solely to the activities that students undertake in just one module.

Students on the Psychology 5 project felt they had learnt how to use a specific database, the Web of Knowledge (71.7% agreed or agreed strongly (n= 81)), but were less confident in their abilities to evaluate the information they found (58.4%

(n=66) agree or agree strongly, 29.2% (n=33) undecided). Students on the Human Communication Sciences 3 project were asked to say to what extent they thought the activities had developed their information literacy skills, and the most popular answer was 'some' from both UGs (52%, n=14) and PGs (42% n=8). An information literacy competency questionnaire used in the Psychology 5 project pre- and post the inquiry exercise revealed some demonstrable improvement in information literacy abilities, these are reported in more depth by AUTHOR et al. (2011). Students reported feeling that they had developed their search skills and strategies for both library and internet resources, and that these were useful skills to have for future academic work:

> Learning how to use e-journals and Google scholar as it will help with future essays. [Journalism 12]

However there is some evidence that some students did not feel they developed their information literacy through the projects. For example some of the Masters students on the Human Communication Sciences 3 project felt they didn't extend their IL capabilities beyond what they had learnt in their undergraduate degree. Other students felt they hadn't learnt to reference correctly and lacked confidence that they could select appropriate resources [English 1].

Students recognise the value of Information Literacy

It is apparent from evaluation data that students could see the value in developing a knowledge of resources for university study e.g.:

> Very helpful, enabled me to get used to researching and using online resources.
>
> [English 1]
>
> Finding out how to access database for more journals. [Journalism 12]

Students could see that IL skills were extendable and valuable beyond the academic environment:

> I learnt how to refine searches not only for my course, but for everyday life. [Journalism 12]

There was acknowledgement that academic work in general was improved by greater information literacy capabilities:

> I intentionally went beyond JSTOR to improve the quality of my essay.
> [English 1]

There is evidence from students that they can see the value of the IL capabilities they have gained and how they will be useful in their academic life:

> OED task was useful, esp. for future. [English 1]

> I felt that the electronic workbook and learning diary did take up a lot of my time however it was, with retrospect, very useful in the skills that it helped me to develop.
> [Law 7]

Data from students also suggests that they are able to see the value of the IL capabilities they have gained such as ability to use the library resources effectively on one module being directly transferrable to other future modules. Students taking part in the activities in the Psychology 5 project linked the skills they had gained with being able to do research in the future, suggesting that they have been made aware of the research component of their degrees and have positively linked the information search and evaluation skills they have developed with the research process.

However there is limited evidence from these projects that students could see the long-term benefits of being information literate beyond their university careers.

Discussion & recommendations

Here the main learning points from the analysis as a whole are summarized and recommendations are offered for the development of inquiry-based approaches to information literacy development and IL development to support inquiry more widely. The value of the Theory of Change impact evaluation framework is also discussed.

Models of IL, and in particular the Seven Pillars model are used widely to inform curricula for IL (Head & Jackson (2011); Secker and Coonan (2011); Cochrane (2006)); and the model has been used to inform IL and library strategies within HE and FE institutions (Gallacher 2009). The model also can serve as an effective means of introducing academic staff to the concept of IL, which is often not widely understood outside the library community (Gallacher 2009), although research has shown that academics value the competencies labeled as IL (Weetman 2005). The original Seven Pillars model that was employed in these projects has been criticised for being too linear, for creating a false dichotomy between IT and information skills and between lower- and higher-order information literacy (Andretta 2005), however these concerns have been addressed in the updated version of the model. If models of information literacy are shared also with students it can enhance the academic status of IL (Johnston & Webber 2003) and introduce students to the broad scope of information literacy. This research has demonstrated that through the use of IL models, educational developers and librarians can develop a shared vocabulary for IL with academic colleagues who can in turn use the model to develop a shared vocabulary of skills development with students. Students benefit from having a label to pin to their burgeoning capabilities and this can be facilitated through a reflective process structured around responding to an IL model.

Discipline sensitive approaches

Research has shown that conceptions of pedagogy for information literacy are discipline dependent, based in part on the disciplinary differences in information environment, resources and research practices (Webber et al. 2005; Boon et al. 2007). Research has also shown that inquiry-based pedagogies are discipline dependent and reflect differences in knowledge–structures and epistemologies (Wood & Levy 2008; Healey 2005). It is not surprising therefore that a variety of approaches to inquiry-learning and information literacy development have been demonstrated by the projects in this research. It is important therefore when designing inquiries for information literacy development or supporting the development of IL in inquiry-based curricula to be sensitive towards these disciplinary differences, particularly from the perspective of Professional Services

colleagues such as Librarians who might work across a number of disciplines. It has been suggested also that an interdisciplinary librarian can construct a "powerful pedagogical partnership" with discipline specialists with each contributing differing expertise to enhance student learning. (Holschuh Simmons 2005: 299) However we can also see from similarities in activities undertaken through projects that activities can be re-purposed relatively easily for new discipline contexts.

Peer Support

A distinctive approach that can be drawn from these projects is that of the perceived success of peer mentoring to support information literacy development in the inquiry context. All students, perhaps without realising it, significantly develop their IL competencies during their studies at University, and are well placed to share this knowledge through a mentoring process. Previous research has shown that students like to use other students as a resource to support their information search activities (Verity et al. 2007). New students can find other students more approachable than staff (Bolton et al. 2009), and find that their peers have targeted knowledge that can be of benefit to them. It is acknowledged that peer tutoring provides learning opportunities for both tutees and tutors and can develop tutors' IL capabilities (Topping 1996; Holliday & Nordgren 2005; Deese-Roberts & Keating 2000), and this is supported by the findings from this research which indicate that mentors further developed their IL and developed other transferable skills through the mentoring process.

Collaborative inquiry and IL

Collaborative inquiry is much favoured as a suitable pedagogy for IBL (Spronken-Smith 2009), drawing on socio-cultural theories of education. Vygotskian theories privilege the role of social interaction as a means of transforming experiences into learning (John-Steiner & Mahn 1996). However the evaluation data from these projects, and in other research into inquiry at the University of Sheffield (Levy & Petrulis 2012), reveal that collaborative inquiry can cause logistical and support issues for students and some students struggle to see the value of collaborative projects, particularly where groups are dysfunctional. Students can find it difficult to

adapt to collaborative inquiry if they lack experience of group work and their prior experiences of learning environments in schools and colleges were more individualized and competitive (MacDonald 2005; Asgari & Dall'Alba 2011). Students are more comfortable with familiar modes of learning, meaning that the role of the tutor in supporting and facilitating inquiry is much greater than in transmission curricula (Deignan 2009). This research has shown the value of support for (collaborative) inquiry from both academics and librarians in, for example, discussion boards and one-to-one advice sessions. Indeed, it is recommended in other studies on group work that students need support with developing skills and techniques for team working in order to be successful at it (Livingstone and Lynch 2000).

Reflection, inquiry and Information Literacy

When IBL is open-ended and students are expected to shape their own inquiry they benefit from structured feedback and support mechanisms. This does not necessarily have to take place in the context of assessment, and in fact evidence from these projects suggests that reflective discussion with peers, guided by tutors can be a good alternative to feedback via assessment. Opportunities to reflect can support further self directed learning (MacDonald 2005) and reflection is seen to be a key aspect of the research process than students engage in with IBL (Hutchings 2007). Knowledge sharing activities in relation to information literacy seem to be a suitable strategy to building IL competencies.

Student feedback suggests that inquiry-based tasks that build information literacy are sometimes perceived to be 'jumping through hoops', but with the acknowledgement that the competencies they have gained are useful. The design and timing of Inquiry-based interventions to build IL then seems to be a critical aspect of the student's perception of the task at the point at which they undertake it. However where student feedback was gathered more longitudinally or well after the IL intervention, then student's perception of the usefulness of the IL competencies they had developed increased. The challenge for educational development then is to ensure that inquiries that build IL are meaningful and embedded in the curriculum in such a way as to facilitate the process of recognition

of the value of IL. Reflective activities and discussion (as mentioned above) seemed to play a key role in facilitating student realization about the value of information literacy. Research has shown that reflective writing can help educators track information literacy development (Nutefall 2005) and it is thought that reflective writing can be beneficial in helping students develop metacognitive skills and develop personal strategies for enhancing and monitoring their thinking and feelings (Branch 2003).

Theory of Change as an impact evaluation framework

Using the ToC framework as a means for organising this paper has revealed that despite efforts to the contrary, not all projects achieved a clear narrative across the 5 columns of the ToC. This, combined with other more instrumental reasons based on time poverty and differing levels of engagement, has led to a situation where evaluation data is not sufficient to address all enabling factors, processes and outcomes.

The Theory of Change approach to impact evaluation has made explicit the positive outcomes from IL focused educational development and helped signpost areas for improvement. If librarians or educational developers with specific expertise in IL are present at the initial stages of the evaluation process, i.e. defining the Theory of Change, this can help embed IL more deeply in the project activities, foreground pedagogical approaches to developing IL and embed the support for IBL in terms of supporting students in building their IL.

Conclusion

In this paper the relationship between IBL and IL has been explored, with the caveat that this has been within the limits of this small selection of curriculum development projects. The findings have demonstrated that there is a need to consider IL development in the context of design for IBL, and that inquiry pedagogies can be used to teach IL. The role of Librarians and IL experts in the curriculum development process has also been considered.

Models of IL, despite some limitations, are an effective means of introducing staff and students to IL and help to legitimize IL as an academic and research-based concept. Librarians and IL educators should have an input into curriculum design for IBL so that IL development to support student inquiry can be embedded in learning design. The evaluation also demonstrates that Librarians can play a significant role in supporting students with their inquiries. As a general point it has been identified that students need support and expert facilitation from both academics and librarians in order to discover their own path through the inquiry.

When considering where IL development should take place, the findings show that Inquiry-based pedagogies to develop IL need to be embedded in the subject context in order to be meaningful to students, so that they can be situated alongside subject-based learning and skills and knowledge developed in tandem.

Tutors need to make explicit to students that information literacy development is a focus of a particular activity and discuss the concept of information literacy with them. It is furthermore important to explain the links between IBL activities to build IL and the rest of the curriculum or students can fail to make the connections themselves. The research has shown that Peer mentoring is a successful means of supporting the development of IL in the IBL context, and that this has benefits for both mentees and mentors. The experience of these projects has shown that peer support and mentoring can be developed in a variety of ways.

Further research to investigate the relationship between IBL and IL in different institutional and subject contexts would be very welcome to determine if the features identified in this research are generalizable to wider contexts.

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Appendix A

Table 2: A summary of the projects and data included in the meta analysis including project leaders.

Project	**Student level**	**Data**
English 1	UG levels 1& 2	• Bid • ToC • Project leader reflective interview • Student questionnaire • Student feedback collated by Student Ambassadors
This project embedded information literacy development in a number of core modules taught at levels one and two and as such required the involvement of multiple tutors. The SCONUL 'Seven Pillars' model of information literacy prompted the design of a series of unassessed collaborative IBL exercises that students took part in during the seminar programmes of the modules concerned. Project leader: Professor Cathy Shrank		
English 2	UG level 1	• Bid • ToC • Final report • Case study • Project Leader reflective interview

		• Mentee questionnaire • Mentor focus group • Self evaluation report
This project used second- and third-year students as group mentors on a first year core module, History of English. They facilitated the development of information literacy and key skills in historical approaches to language through an inquiry-based exercise and, in turn, themselves acquired coaching and mentoring skills. In order to accomplish this, students received support from the module convenors and a postgraduate student tasked with coordinating and supporting the mentors. Students were encouraged to reflect on and plan how to transfer the knowledge used in their mentoring activities to their own learning practices and research skills in their degree programme. Project leaders: Dr Susan Fitzmaurice & Dr. Philip Shaw		
Human Communication Sciences 3	UG level 1 & PGT	• Bid • ToC • Case study • PL reflective interview • MmedSci Student questionnaire • MmedSci student focus group • BmedSci student questionnaire • BmedSci student focus group • Student guide focus group
Intro Week inquiry activities in Human Communication Sciences were revamped in September 2006 as part of a CILASS project. Students worked in groups on a variety of activities, including treasure hunts and poster presentations to familiarise themselves with their course and IBL, their department and their university. At the end of Intro Week, students showcased posters they had created to a wide variety of staff and students from across the university, giving students an opportunity to discuss their research and their first taste of university life.		

Project Leader: Ms Margaret Freeman		
Library 4	Staff	• Bid • ToC • PL reflective interview • Librarian focus group x 2 • Presenter questionnaire x 6
The driver for the project was identifying that Academic Liaison Librarians needed to develop their approach to teaching to achieve their potential of acting as partners with academic staff in the delivery of information literacy. A greater understanding of the pedagogy of Inquiry-based learning, how it sits in the teaching and learning landscape of the university and how it can be used in the teaching of information literacy could help them achieve this aim. A series of workshops for Academic Liaison Librarians that drew upon the existing expertise IBL at the University to explore the relationship between IL and IBL took place over the course of an academic year. Discussion both online in MOLE and in the face-to-face sessions helped develop a community of IBL focused information literacy practitioners. Project Leader: Peter Stubley		
Psychology 5	Level 1 UG	• Bid • ToC • Case study • PL reflective interview x 2 • Self evaluation report • Student questionnaire • PG tutor focus group • Student feedback on tutor groups

		• Information Literacy questionnaire
This project introduced collaborative inquiry based learning at the very start of the level 1 curriculum in the Psychology Department. Students were asked to trace the origins of a Psychology-related story in the popular press back to its origins in published research. They were supported through this process by postgraduate tutors and by working together in groups to develop their information literacy skills. Project leader: Dr Myles Jones		
Library 6	All	• ToC • Case study • PL reflective interview • Formative evaluation report • Interim evaluation report • Feedback from other projects re: Library support
This project sought to increase student engagement in information literacy through a number of avenues: • Collaboration between the Library, the CILASS team and module leaders to develop information literacy pedagogies. • Further development of module resource lists in a more interactive way, including the digitisation of relevant materials where appropriate. • Widening the scope of the Library´s online `Information Skills´ resource, which is deployed via the virtual learning environment. Project leader: Peter Stubley		
Law 7	Level 1 UG	• Bid • ToC • Case stdy • Project Leader review • Self evaluation report

		• Interim evaluation report • Project Leader reflective interview • Interview with Librarian
This project used IBL in a core level 1 module with over 400 students. Project leaders decided to couple the traditional lecture and seminar programme with two innovations: an electronic workbook and a student tutor scheme. The electronic workbook guides students through the foundational materials using a series of weekly research exercises and problem based activities. Students have the opportunity to come together and discuss their research (both what they found and how they found it) in colloquia which are led by `Student Tutors´. The student-tutor scheme which gives a team of 20-30 second and third year students the opportunity to teach their first year peers in specially designed colloquia. Project Leaders: Dr Natasha Semmens & Dr Mark Taylor		
Information Studies 8	Level 1 UG	• PL reflective interview x 4
This project was a Scholarship of Teaching and Learning project taken forward by the module leader and the context was a Level 1 module in the Department of Information Studies. In this Information Literacy focused module teaching/activity in Second Life (SL) took place. Students were introduced to a problem, which requires them to do their own research in SL. The module also features development activity on face-to-face interviewing as well as practice and experience in interviewing in SL. The students also have to take part in reflective blogging activity. CILASS projects under the SOTL IBL grant scheme do not have to take part in the standard 'Theory of Change' evaluation approach, instead the researcher takes a reflective approach to their curriculum development activity. Project leader: Sheila Webber		
Information Studies 9	Staff	• Bid • ToC • Interim evaluation report

<table>
<tr><td colspan="3">This project aimed to develop an inquiry-based learning approach to integration and progression of IL in the Department of Information Studies(DIS), both at programme and module level. An initial audit of current information literacy teaching in DIS was carried out and the information was used to map current activity against the SCONUL "7 Pillars of IL" framework. The project aimed to identify curriculum areas in which there are currently gaps in terms of IL development, as well as those aspects of IL which require further development in DIS. The project also identified current best practice in terms of inquiry-based approaches to teaching, learning and assessment of IL, and areas where the pedagogic approach to IL education could be improved.
Project leader: Sheila Webber</td></tr>
<tr><td>Sociological Studies 10</td><td>UG levels 1,2 & 3</td><td>• Bid
• ToC
• Project leader reflective interview x 2</td></tr>
<tr><td colspan="3">This project formed one strand of the Department’s CILASS project and sought to build information literacy skills through more extensive use of the Library´s information skills resource and through dedicated IL focused seminars that were incorporated into modules at levels one, two and three. Students engaged with bibliographical reviewing and exercises in literature search strategies, citation searches through Web of Knowledge. The assessment of IL capabilities was included in the modules concerned, through techniques such as the assessment of annotated bibliographies.
Project Leader: Dr David Phillips</td></tr>
<tr><td>Architecture 11</td><td>UG levels 1, 2 & 3; PGT</td><td>• Bid
• ToC
• Project leader reflective interview x 2</td></tr>
<tr><td colspan="3">This project set out to develop a coherent package of learning resources to support students within the school of Architecture at every level, from new undergraduates, through the portfolio of Masters courses, to MPhil/PhD</td></tr>
</table>

candidates. An initial audit of IL skills was carried out in 2006/07 and this demonstrated that the existing support for learning was both outdated and fragmented in terms of content, delivery and availability. This project identified when and where this support is and should be provided for all the School's students, and to develop resources appropriately. The project developed a coherent strategy for supporting the School of Architecture's core learning and teaching activities and the design, development and implementation of a coherent suite of study skills resources that will be available to all students, relevant at every level and for every module of our courses.
Project leader: Dr Stephen Walker

Bibliography

AASL (2007) Standards for the 21st Century Learner. American Association of School Librarians. Available at: http://www.ala.org/aasl/sites/ala.org.aasl/files/content/guidelinesandstandards/learningstandards/AASL_LearningStandards.pdf (accessed 10 September 2012)

ACRL (2000) Information literacy competency standards for Higher Education. Association of College and Research Libraries. Available at: http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm (accessed 10 September 2012)

Aditomo A, Goodyear P, Bliuc A & Ellis R (2011) Inquiry-based learning in higher education: principal forms, educational objectives and disciplinary variations. Studies in Higher Education. DOI:10.1080/03075079.2011.616584

Anderson A (2005) "The community builder's approach to Theory of Change: a practical guide to theory development." The Aspen institute Roundtable on community change. Available at: http://www.aspeninstitute.org/sites/default/files/content/docs/roundtable%20on%

20community%20change/rcccommbuildersapproach.pdf (accessed 13 September 2012)

Asgari S and Dall'Alba G (2011) Improving group functioning in solving realistic problems. International journal for the scholarship of teaching and learning. 5 (1) Available at: http://academics.georgiasouthern.edu/ijsotl/v5n1.html (accessed 13 September 2012)

Biggs J. (2003) Aligning teaching for constructing learning. The Higher Education Academy. Available at: http://www.heacademy.ac.uk/assets/documents/resources/resourcedatabase/id477_aligning_teaching_for_constructing_learning.pdf (accessed 11 September 2012)

Bolton T, Pugliese T and Singleton-Jackson J. (2009) Advancing the promotion of information literacy through peer-led learning. Communications in Information literacy 3 (1) pp. 20-30

Boon S, Johnston B and Webber S. (2007) A phenomenographic study of English faculty's conceptions of information literacy. Journal of documentation, 63 (2) pp. 204-228

Bowler M and Street K (2008) Investigating the efficacy of embedment: experiments in information literacy integration. Reference Services Review. 36 (4) pp.438 – 449

Boyer (1998) Reinventing undergraduate education: A blueprint for America's research universities (1998) Boyer Commission on Educating Undergraduates in the Research University. Available at: http://www.niu.edu/engagedlearning/research/pdfs/Boyer_Report.pdf (accessed 11 September 2012]

Branch J (2003) Inquiry-based learning: the key to student success. School Libraries in Canada. 22 (4) pp. 6-12

Bruce C (1997) The relational approach: a new model for information literacy. The New Review of Library and Information Research 3 pp. 1-22.

CILASS (2009) CILASS Research and Evaluation. Available at: http://www.shef.ac.uk/cilass/resandeval (accessed 27/09/2011]

Cleland, J. and Walton, G. (2012) Online peer assessment: helping to facilitate learning through participation. Journal of learning development in higher education 4 pp. 1-22

Cochrane C (2006) Embedding information literacy in an undergraduate management degree: lecturers' and students' perspectives. Education for Information 24 (2-3) pp. 97-123

Cohen SF, Cottrell J and Bonino C (2009). Embedding Information Literacy: An Exercise in Inquiry. Workshop presented at the LILAC conference, Cardiff University 30th March – 1st April 2009. http://www.lilacconference.com/dw/archive/2009/Programme/tuesday_pm_abstracts.html#faye

Connell JP and Kubisch AC (1998) "Applying a theory of change approach" in: Fulbright Anderson K, Kubisch AC and Connell JP (eds), New Approaches to Evaluating Community Initiatives, Vol. 2, Theory, Measurement, and Analysis. Washington, DC: Aspen Institute.

Cox AM, Levy P, Stordy P and Webber S (2008). Inquiry-based learning in the first-year information management curriculum. ITALICS, Journal of the Information and Computer Sciences Higher Education Academy Subject Centre, 7 (1) June. Available at: http://www.ics.heacademy.ac.uk/italics/vol7iss1/pdf/Paper1.pdf (accessed 10 September 2012)

Deese-Roberts S and Keating K (2000) Integrating a library strategies peer tutoring program. Research strategies 17 (2-3) pp. 223-229

Deignan T (2009) Enquiry-Based Learning: perspectives on practice. Teaching in Higher Education, 14 (1) pp.13-28.

Diggs V (2009) Ask-think-create: the process of inquiry. Knowledge Quest 37 (5)

Dodd L (2007) The impact of Problem-based learning on the information behaviour and literacy of veterinary medicine students at University College Dublin. Journal of Academic Librarianship 33 (2) pp. 206 – 216

Falchikov N (2001) Learning together: Peer tutoring in Higher Education. London: Routlege-Falmer

Fosmire M and Macklin A (2002) Riding the active learning wave: problem-based learning as a catalyst for creating faculty-librarian Instructional partnerships. Issues in Science and Technology Librarianship Spring 2002

Freeman M(2007) Human Communication Sciences Intro week. Available at: http://www.shef.ac.uk/ibl/resources/casestudies/hcs/introweek Accessed 3 April 2012

Gallacher C (2009) Use of Sconul's Seven Pillars Model for Information Literacy: findings of a study of SCONUL institutions 2008-2009. Available at: https://www.sconul.ac.uk/groups/information_literacy/publications/7pillarsStudy.doc (accessed 26 June 2012)

Gehring, K. & Eastman, D. (2008) Information fluency for undergraduate biology majors: applications of inquiry-based learning in a developmental biology course. CBE – Life Sciences Education Vol. 7 pp54-63

Gordon C (2010) The culture of inquiry in school Libraries. School libraries worldwide 16(1) pp.73-88

Hart D, Diercks-O'Brien G and Powell A (2009) Exploring Stakeholder Engagement in Impact Evaluation Planning in Educational Development Work. Evaluation. 15 (3) pp.285 – 306

Head J and Jackson C (2011) The Welsh information literacy project: developing and information literate nation. Journal of information Literacy 5 (1) pp. 99-102

Healey M (2005) Linking research and teaching: exploring disciplinary spaces and the role of inquiry-based learning. In: Barnett, R (ed) (2005) Reshaping the University: New
Relationships between Research, Scholarship and Teaching. Maidenhead: McGraw Hill / Open University Press.

Healey, M. and Jenkins, A. (2009) Developing undergraduate inquiry and research. York: Higher Education Academy. Available at: http://www.heacademy.ac.uk/assets/documents/research/DevelopingUndergraduateResearchandInquiry.pdf Accessed 18 December 2012.

Helmiinen P and Heino T (2009) ICT driving license at the University of Helsinki: meeting the needs of diverse study fields. Paper presented at LILAC conference, Cardiff University 30th March – 1st April 2009. Available at: http://www.lilacconference.com/dw/archive/resources/2009/_more%20pdfs/Helminen%20short%20paper.pdf (accessed 12 September 2012)

Helsby G and Saunders M(1993) `Taylorism, Tylorism and Performance Indicators: Defending the Indefensible?', Educational Studies 19 (1) pp. 55-77

Hepworth M (2009) Developing academic information literacy for undergraduates through inquiry-based learning. ITALICS 8 (2)

Hepworth M and Walton G (2009) Teaching information literacy for inquiry-based learning. Oxford: Chandos.

Hmelo-Silver CE (2004) Problem-based Learning: what and how do students learn? Educational Psychology Review 16 (3) pp.235-266

Hodge D, Haynes C, LePore P, Pasquesi K and Hirsh M (2008), 'From Inquiry to Discovery: Developing the Student as Scholar in a Networked World Learning through enquiry Alliance Conference 2008. Available at: http://cilass-resources.group.shef.ac.uk/ltea2008/Hodge_CETL_2008_keynote.pdf (accessed 10 September 2012

Holliday W and Nordgren C (2005) Extending the reach of librarians: Library peer mentor program at Utah State University. College and Research Libraries News 66 (4) pp. 282-284

Holschuh Simmons M (2005) Librarians and disciplinary discourse mediators: using genre theory to move towards critical information literacy. Portal: Libraries and the Academy 5 (3) pp. 297-311

Horton FW (2010) Information literacy advocacy – Woody's ten commandments. Library Trends 60 (2) pp. 262-276

Hutchings, W. (2007) Enquiry-based Learning: Definitions & Rationale. Available at: http://www.campus.manchester.ac.uk/ceebl/resources/papers/ (Accessed 3 September 2012)

Jacobs, H. and Berg, S. (2011) Reconnecting Information Literacy Policy with the Core Values of Librarianship. Library Trends 60 (2) pp.383-394

John-Steiner V and Mahn H (1996) Sociocultural Approaches to Learning and Development : a Vygotskian framework. Educational Psychologist 31 (3-4) pp.191-206

Johnston B and Webber S (2003) Information literacy in higher education: a review and case study. Studies in Higher Education 28 (3) pp.335-352

Khan P and O'Rourke K (2004) Guide to Curriculum Design: Enquiry-based Learning Available at:http://liverpool.academia.edu/PeterKahn/Papers/447929/Guide_to_Curriculum_Design_Enquiry-Based_Learning (accessed 10 September 2012)

Little S (2009) Oily rag or winged messenger: The role of the developer in multi-professional teams. In: Donnelly R and McSweeney F (eds.) Applied e-learning and e-teaching in Higher Education. IGI Global DOI: 10.4018/978-1-59904-814-7

Justice C, Rice J, Warry W, Inglis S, Miller S and Sammon S (2007) Inquiry in higher education: reflections and directions on course design and teaching methods. Innovative Higher Education 31 (4) pp. 201-214

Justice C, Rice J and Warry, W (2009) Academic skill development – Inquiry seminars can make a difference: evidence from a quasi-experimental study. International Journal for the Scholarship of Teaching and Learning 3 (1) Available at: http://academics.georgiasouthern.edu/ijsotl/v3n1/articles/PDFs/Article_JusticeRiceWarry.pdf (accessed 13 September 2012)

Levy P & Petrulis R (2012) How do first-year university students experience inquiry and research, and what are the implications for the practice of inquiry-based learning? Studies in Higher Education 37 (1) pp.85-101

Livingstone D and Lynch K (2000). Group Project Work and Student-centred Active Learning: two different experiences. Studies in Higher Education 25 (3) pp. 325 – 345

MacDonald, R (2005) “Assessment strategies for enquiry and problem based learning” in: Barrett T, Mac Labhrainn I. and Fallon H (eds.) Handbook of Enquiry and Problem-based Learning. Irish Case Studies and International Perspectives. Centre for Excellence in Learning and Teaching, NUI Galway; All Ireland Society for Higher Education (AISHE): Galway; Dublin. [Available at: http://www.aishe.org/readings/2005-2/ (accessed 26 June 2012).

MacGregor, S.K. & Lou, Y. (2006) Web-based learning: how task scaffolding and web site design support knowledge acquisition. Journal of Research on Technology in Education 37 pp.161–175.

McKinney, P. & Levy, P. (2006) Inquiry-based learning and information literacy development: a CETL approach” ITALICS 5 (2) Available at: http://www.ics.heacademy.ac.uk/italics/vol5iss2/strategic%20IL%20(4).htm (accessed 6 September 2012)

McKinney, P., Jones M and Turkington S (2011) Information literacy through inquiry: a level one Psychology module at the University of Sheffield. ASLIB Proceedings 63 (2/3) pp.221-240

McKinney, P., Wood J. and Little S. (2009) The Learning Development team: Three developers, one pedagogy. Journal of Learning Development in Higher Education 1 (1) Available at: http://www.aldinhe.ac.uk/ojs/index.php?journal=jldhe&page=article&op=view&path%5B%5D=9 (accessed 10 September 2012)

Mazella D and Grob J (2011) Collaborations between Faculty and special collections librarians in inquiry-driven classes. Portal: Libraries and the Academy 11 (1) pp.467 - 487

Mogg R (2009) The pathway to success? using research trails for summative assessment. Paper presented at LILAC conference, Cardiff University 30th March – 1st April 2009. Available at:http://www.lilacconference.com/dw/archive/resources/2009/_more%20pdfs/Mogg%20short%20paper.pdf (accessed 9 September 2012)

Nutefall J (2005) Paper Trail: One method of information literacy assessment. Research Strategies 20 pp.89-98

Ody M and Carey W (2009) Demystifying Peer Assisted Study Sessions (PASS): What...? How...? Who...? Why...?. Paper presented at the 6th Learning Development in Higher Education Network Symposium, Bournemouth University 6th -7th April 2009 Available at: http://www.aldinhe.ac.uk/bmth09/papers/OdyCarey_paper.pdf (accessed 30 July 2010)

Pelikan M (2004) Problem-based Learning in the library: evolving a realistic approach. Portal: Libraries and the academy 4 (4) pp. 509-520

Rankin JA (1996) Problem-based learning and libraries: a survey of the literature. Health Libraries Review. 13 (1) p. 33-42

Rossiter D & Biggs CA (2008) Innovative Problem-based learning approach using on and offline resources in 1st year Chemical Engineering. Proceedings of the EE2008: International conference on Innovation, Good Practice and Research in Engineering Education. 14th-16th July, Loughborough.

Rowe R, McKinney & Wood J (2009) Inquiry-based assessment of statistical methods in Psychology in: Bidgood P, Hunt N and Jolliffe F (eds) Assessment Methods in Statistical Education: An International Perspective. Chichester: John Wiley & Sons, Ltd.

Secker, J. & Coonan, E. (2011) A new curriculum for information literacy: transitional, transferable, transformational. Cambridge: Cambridge University library Arcadia

project. Available at: http://arcadiaproject.lib.cam.ac.uk/docs/ANCIL_final.pdf (accessed 26 June 2012)

Saunders MP, Trowler P, Knight J, Machell S, Williams N, Lent and Spencer A (2006) Enhancing the Quality of Teaching and Learning in Scottish Universities: The Final Report of the First Evaluation of the Quality Enhancement Framework to the Scottish Funding Council's Quality Enhancement Framework Evaluation Steering Committee. Edinburgh: Scottish Further and Higher Education Funding Council

SCONUL (1999) Information Skills in Higher Education: A SCONUL Position Paper Available at: http://www.sconul.ac.uk/groups/information_literacy/papers/Seven_pillars.html (accessed 9 September 2012)

SCONUL (2011) The SCONUL Seven Pillars of Information Literacy, core model for Higher Education. Available at: https://www.sconul.ac.uk/groups/information_literacy/publications/coremodel.pdf (accessed 6 September 2012)

Snowball R (1997) Using the clinical question to teach search strategy: fostering transferable conceptual skills in user education by active learning. Health Libraries Review, 14 (3) pp. 67-172

Spronken-Smith R, Angelo T, Mathews H, O'Steen B and Robertson J (2007) How effective is Inquiry-based Learning in linking teaching with research? Paper prepared for An International Colloquium on International Policies and Practices for Academic Enquiry,

Marwell, Winchester, UK, April 19-21, 2007. Available at: http://www.intellcontrol.com/files/EBL/how%20effective%20is%20inquiry-based%20learning%20in%20linking%20teaching%20and%20research.pdf (Accessed 6 August 2012)

Spronken-Smith R (2009) Experiencing the Process of Knowledge Creation: The Nature and Use of Inquiry-Based Learning in Higher Education Avalable at: http://akoaotearoa.ac.nz/sites/default/files/u14/IBL%20-%20Report%20-%20Appendix%20A%20-%20Review.pdf. (accessed 26 June 2012)

Spronken-Smith, R. and Walker, R. (2010) Can inquiry-based learning strengthen the links between teaching and discipline research? Studies in Higher Education 35 (6) pp. 723-740

Stripling B (2008) Inquiry: Inquiring minds want to know School library media activities monthly 25 (1) Available at: http://www.teachingbooks.net/content/InquiringMindsWantToKnow-Stripling.pdf (accessed 13 September 2012)

Topping K (1996) Effective Peer Tutoring in Further and Higher Education, SEDA Paper 95 Available at: http://www.londonmet.ac.uk/deliberations/seda-publications/topping.cfm (accessed 6 September 2012)

UNESCO (2003) The Prague Declaration : towards and information literate society Available at: http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/PragueDeclaration.pdf (accessed 6 September 2012)

UNESCO (2006) The Alexandria proclamation on information literacy and lifelong learning" Available at: http://portal.unesco.org/ci/en/files/20891/11364818989Beacons_of_the_Information_Society___The_Alexandria_Proclamation_on_Information_Literacy_and_Lifelong_Learning.doc/Beacons%2Bof%2Bthe%2BInformation%2BSociety_%2B%2BThe%2BAlexandria%2BProclamation%2Bon%2BInformation%2BLiteracy%2Band%2BLifelong%2BLearning.doc (accessed 9 September 2012)

Verity M, Armstrong J and Caldwell T (2007) Who hides the books? The truth behind the tales (students' use of resources) Paper presented at the CETL Research Symposium, Liverpool Hope University June 26th 2007

Walton G and Pope A (2009) Research informed teaching, information literacy and the inquiry-based learning nexus. Paper presented at LILAC conference, Cardiff University 30th March – 1st April 2009. Available at: http://www.lilacconference.com/dw/archive/resources/2009/walton_pope_short.pdf (accessed 2 September 2012)

Walton G and Hepworth M (2011). A longitudinal study of changes in learners' cognitive states during and following an information literacy teaching intervention. Journal of Documentation 63 (3), pp.449-479.

Wang L. (2007) Sociocultural learning theories and information literacy teaching activities in higher education. Reference and user services quarterly 47 (2) pp. 149-159

Webber S, Boon S and Johnston B. (2005) British academics from different disciplines: comparing their conceptions of pedagogy for information literacy. Actes des 5emes Rencontres Formist: Lyon: 2005

Weetman J (2005) Osmosis – does it work for the development of information literacy? Journal of academic librarianship 31 (5) pp 456-460

Wood, J. (2009). Design for Inquiry-based Learning Case Studies. Journal of Learning Development in Higher Education, 1. Available at: http://www.aldinhe.ac.uk/ojs/index.php?journal=jldhe&page=issue&op=view&path[]=8 (accessed 10 September 2012)

Wood J and Levy P (2009). Inquiry-based pedagogies in the arts and social sciences: purposes, conceptions and models of practice. In: Proceedings of The 16th

Improving Student Learning Symposium, University of Durham, 1st-3rd December 2008.

Wray D (2006) An inquiry-based approach to Library instruction. School Libraries Worldwide. 12 (2) pp.16-28

11.3. Appendix 3: Paper 3 McKinney P.A. & Sen B.A. (2012) Reflection for learning: understanding the value of reflective writing for information literacy development. *Journal of Information Literacy,* 6(2), 110-12

Abstract

Reflective writing has long been acknowledged as an important aspect of personal and professional development. There is increasing evidence of the use of reflective writing assessments and activities in the context of information literacy education, particular in Higher Education. Writing reflectively can help students to understand their own information literacy development and engage in deeper learning. Students on an undergraduate Business Intelligence module at the University Sheffield completed a piece of reflective writing about their information literacy development as part of the assessed work for the module. This writing was mapped against a model of reflection and a model of information literacy to understand the depth and spread of reflection offered by these students. The results showed that students had chosen to reflect in some but not all areas of Information Literacy, and the depth of reflection was variable. However the aspects of information literacy where students were reflective illustrated that the learning outcomes **of** the module had been met. Mapping reflective statements against models of reflection was found to aid in the analysis and assessment of the reflective writing. The analysis undertaken by the researchers supported their own reflective practice as Scholars of Teaching and Learning.

Keywords

Reflection, pedagogy, teacher's reflective practice, Seven Pillars

1. Introduction

This paper presents findings from research analysing the reflective writing created by students studying an Undergraduate module in Business Intelligence at the University Sheffield. This module is offered as an elective module to final year single- and dual-honours students in the Information School, and is also available to students in other departments. The module aims to develop students' understanding of the value to business of exploiting internal and external information in terms of supporting organisational strategic decision-making. Throughout the module there is a significant focus on building Information Literacy competencies as students develop an awareness of, and ability to search, business information sources; and develop abilities to synthesise information from a variety of sources to create a valuable business report tool.

The module is assessed through a combination of group and individual assessment. The group assessed activity involves students working collaboratively to solve a business intelligence problem proposed by a Business Partner: a small business or individual. These Business Partners act as clients for the students who carry out an information interview to determine their client's information needs; carry out internet-based research; compile a written report and also present their findings verbally to the Business Partners. The individual assessment involves two pieces of reflective writing of 800 words each, one about the student's information literacy development, and one about their experiences of working as a group. It is the information literacy reflections written by students on the module that comprise the data for this research.

"Reflection provides an active and structured way of thinking and of facilitating professional development." Schon (1983) This classic definition of reflection introduces the ideas that reflection is not just an abstract concept, it is dynamic and practical and gives framework for professional change and development. This module is one of the last that students study before moving into professional roles and we consider the development of skills in reflective practice an important part of preparing our graduates for employment.

One of the problems often encountered in an educational context is that students are often asked to reflect yet given little or no guidance or support in what it means to be reflective. Moon (2001) presents a range of practical advice for tutors starting by giving students as clear definition of what "being reflective" means. Other suggestions include giving examples of good and bad reflective writing, generating discussion, using tools to aid students to reflect deeply, and to see things from different viewpoints. The need for support and guidance is further confirmed in the literature; Mann et al. (2009) carried out a systematic review of 29 studies and found that guidance and supervision are key to reflection. These suggestions have all been incorporated into our teaching and support of reflective practice, and are addressed in a reflective workshop to support students in preparing for their reflective assessment. The aims of this workshop are to help students understand what reflection is, why it can be helpful, and to understand the value to be gained from engaging with reflection at a deep level. As well as presenting the theory of reflection, students get an opportunity to practice reflective writing, and support each other in improving their reflective writing skills.

Reflection has long been associated with learning with classic theorists such as Kolb (1984) presenting his "Experiential Learning Theory" with its four phase cycle: (1) concrete experience, (2) reflective observation, (3) abstract conceptualization, and (4) active experimentation. Honey and Mumford's (2000) four key stages of learning also contained a reflective element and linking stages of learning to learning styles:

- Having an experience (stage 1) → Activists (style 1)
- Reviewing the experience (stage 1) → Reflectors (style 2)
- Concluding from the experience (stage 3) → Theorists (style 3)
- Planning the next steps (stage 4) → Pragmatists (style 4)

As teachers, having an understanding of the relationship between learning and reflection, and engaging in learning and reflection alongside our students informs our critical pedagogy.

An inquiry-based pedagogical approach is taken in the module, characterized by giving students the opportunity to engage with research and inquiry and investigate open-ended problems (Kahn & O'Rourke 2004) in particular the investigation on behalf of the business partner. Inquiry-based learning (IBL) is a based on constructivist educational theory which emphasizes the learner's role in actively constructing meaning for themselves leading to deeper learning (Biggs & Tang 2011; Perkins 2009). The process of learning through inquiry is particularly information intensive as students are required to explore the existing knowledge-base in order to answer their questions and may attempt to build knowledge through their inquiries (Levy & Petrulis 2012). It is acknowledged that students engaging in IBL will build Information Literacy capabilities (Hutchings 2007). The reflective assignment on Information Literacy development was introduced to the module in an attempt to constructively align (Biggs& Tang 2011) the Information Literacy related learning outcomes, the information-centric teaching and learning activities and the module assessment.

There are various models of and standards of information literacy that have been developed worldwide (e.g. the Seven Faces (Bruce 1997); Information Literacy Competency Standards for Higher Education (ACRL 2000); Australia and New Zealand Information Literacy Framework (ANZIIL 2004)), however it is the SCONUL (2011) "Seven Pillars of Information Literacy" model (see figure 1 below) developed in the UK for the UK Higher Education context that is used in The University of Sheffield generally and the Information School specifically to define and explain the concept of Information Literacy. The Seven Pillars model, originally launched in 1999, was significantly updated and expanded in 2011 to respond to dramatic changes in the information environment. The model defines the core abilities (competencies and skills) and understandings (attitudes and behaviours) deemed to be at the centre of information literacy development in Higher Education (SCONUL 2011). A key aspect of the model (Figure 1) is that information literacy development is explicitly defined as a non-linear process, with the expectation that development can occur across pillars both "simultaneously and independently" (SCONUL 2011: 4). Each of the

Seven Pillars (Identify, Scope, Plan, Gather, Evaluate, Manage and Present) describes IL attributes that form part of the information literacy landscape.

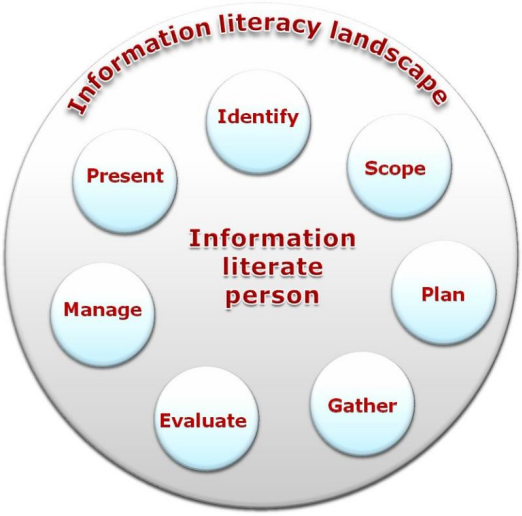

Figure 1: Sconul 7 Pillars model of Information Literacy

Reflection is not only important for our students, it is a vital part of professional practice for educators. As "Scholars of Teaching and Learning" (Boyer 1990) we wish to improve students' learning through our reflective practice. We propose that through analysing the reflective writing of these students we can engage with transformative reflective practice in our teaching, and through

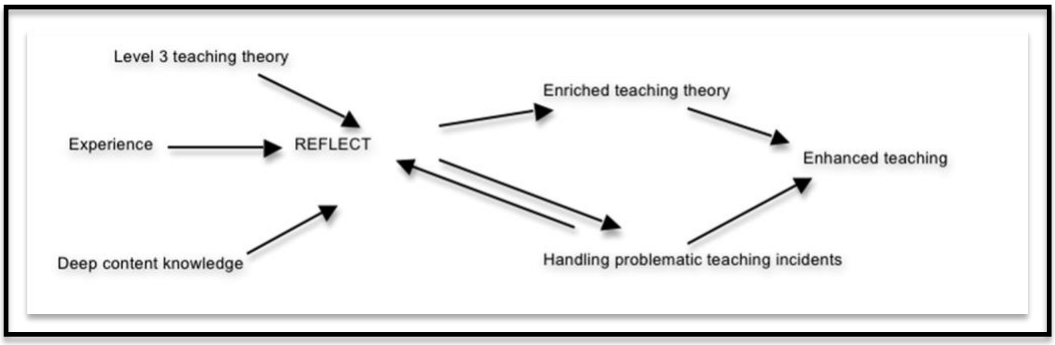

Figure 2: Theory and transformative reflective practice in education (Biggs & Tang 2011: 49)

this enhanced our teaching as "expert teachers continually reflect on how they might teach even better" (Biggs & Tang 2011: 45). Figure 2 shows the relationship

between theory, experience, reflection and enhanced teaching that we feel describes our view of the value of reflective practice for teachers.

2. Aims & Objectives

This research aims to explore the relationship between reflective writing and information literacy development through a qualitative analysis of students' reflective writing

The objectives for this research are:

- To map reflective comments made by students onto the information literacy landscape to understand where students feel IL development has occurred
- To investigate how deeply reflective students have been on the aspects of information literacy expressed in the Seven Pillars model
- To investigate the extent to which module learning outcomes related to IL development have been met
- To investigate the value of the Seven Pillars model as a tool for supporting teaching & learning in Information literacy

This paper will offer a model for assessment of Information Literacy learning outcomes through the mode of reflective writing. We will demonstrate how models of reflection and Information Literacy can be used to provide a framework for assessment, an analysis of reflective writing, and offer our own reflections on the value of students writing reflectively about their Information Literacy development.

3. Literature Review

In this review we will first examine the literature on reflective writing in the Higher Education context before looking more specifically at the literature on the use of reflective approaches in the teaching of information literacy. We will also briefly review the literature on the reflective practice of educators.

There are differing views and perspectives on reflection presented in the literature (Moon, 2001; Ghaye & Lillyman, 2000). Schön (1983) is considered a classic scholar

on reflective practice, and distinguishes between “reflection in action” and “reflection on action”. “In action” occurs during an experience or event; “on action” looks back at a past experience or event. There is a relationship between deeper learning and reflective practice (Bourner, 2003; Leung & Kember, 2003). This deeper learning is more likely to occur when participants engage in what is termed as deep or critical reflection (Mann, Gordon, and MacLeaod, 2009; Moon, 2007). Encouraging deep reflection in students in an educational environment requires the support of a tutor. There is a need to develop a relationship of trust as written reflections can contain sensitive and personal content. Reflective writing is a skill that is developed, so training and guidance is required as students develop their skills (Moon, 2001). The reflective process can be developed and maintained to support continuous learning (Khan, 2006; Taylor, 2006; Watson, 2008). Tutors can help by ensuring that adequate support (or scaffolding) is in place to allow deeply critical reflection to take place. Once the student has engaged with the process, and has developed their reflective skills then a de-scaffolding approach can be taken where the tutor support is reduced and the student moves to autonomous learning (Simons and Klein, 2007; Ford, 2008).

When students first embark on a new learning situation they are often dependent learners (Ford, 2008). Dependence refers to a learning situation where information is used directly by the student to inform the problem, the solution, and/or the reasoned evidence supporting the solution. The goal is to increase student confidence and autonomy so that they reach a learning situation in which the student finds information, and/or processes information to autonomously generate knowledge of what is the problem, the solution, and/or the reasoned evidence supporting the solution (Clifford, 1999). A goal of higher education is to enable and facilitate movement on the part of the student from dependence to autonomy (Clifford, 1999). The reflective process is critical to the learning process with students reflecting on their actions past and present and taking that learning forward.

In the process of reflecting on experiences as tutors, encouraging reflective practice in others, critically examining students' reflective writing, and observing the way students learn, a model was developed at The University of Sheffield Information School (Figure 3) to contextualise the dynamic nature of reflection, and to support the students in understanding the learning benefits achievable through deep reflective practice. The model illustrates the stages in the reflective process and how students can be supported by tutors critical analysis and deep reflection to achieve positive change. (Sen & Ford, 2009).

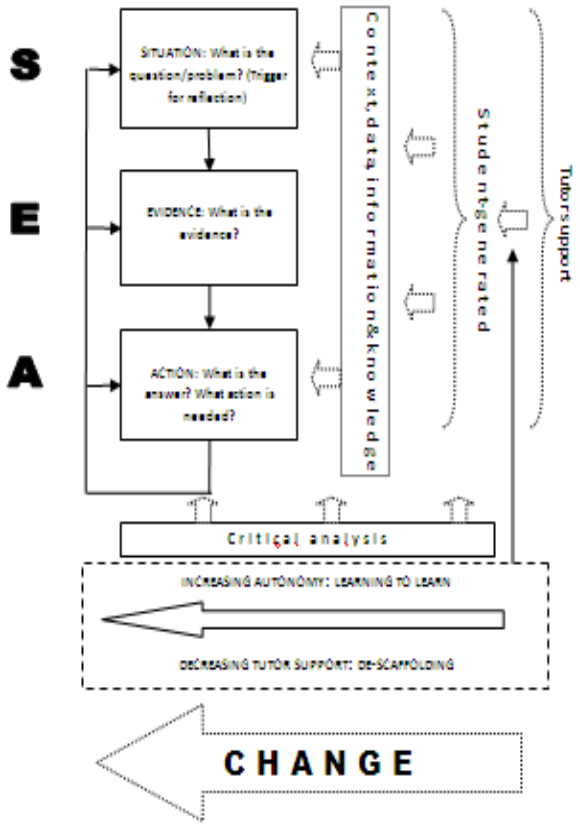

Figure 3. The SEA-Change Model of Reflection (Sen & Ford, 2009).

This model (Figure 3) and has been used for some years as a baseline for teaching reflection within the School (Sen 2010), and for helping students understand the benefits that reflective practice can bring. More recently this work has been developed within the School in relation to Information Literacy.

Information literacy and reflection

The relationship between reflection and Information Literacy development is discussed in detail in both the academic the literature and in Information Literacy models and standards. Reflection is seen to be a critical element of learning to be information literate (Bruce & Hughes 2010) and is noted as such in the Australia & New Zealand IL Framework (2004) and the ACRL IL competency standards (2001). More recently reflection is described as a "key element" of the New Curriculum for Information Literacy devised through the Cambridge University Arcadia project (Secker & Coonan 2011). There is a growing body of literature that reports on engaging university students with reflection in order to build Information Literacy capabilities (e.g. Bruce and Hughes 2010; McGuinness & Brien 2007; Gilstrap & Dupree 2008) and the review will focus on the use of reflective pedagogies and assessments in the Higher Education context. As noted in the introduction, the wider literature on teaching and learning recommends the use of reflection in constructivist pedagogies, and the Information Literacy literature supports this view. Johnston and Webber (2003) advocate the use of reflection with students to respond to the need for aligned teaching learning and assessment. Reflection on Information Literacy development is seen to be an important aspect of problem-solving and enquiry, linked to deep learning. (Hepworth & Walton 2009). In Bruce's "Relational model" of Information Literacy education, the ability of students to actively plan and reflect on their information searching is key to the development of the higher order IL capabilities (Bruce 2006), agreeing with Johnston & Webber (2003) who see reflection is a way to facilitate the development of more advanced IL competencies.

A number of IL educators have employed the use of reflective diaries to facilitate a continuous process of reflection throughout a module (Bruce and Hughes 2010; Bordonaro & Richardson 2004; McGuinness & Brien 2007; Diekema et al. 2011) or longitudinally over the course of the PhD research process (Han 2012) The creation of these reflective diaries can be facilitated through the use of weekly prompt questions (Bruce & Hughes 2010) or through the use of a standard framework for each entry together with a sample entry (McGuinness & Brien 2007). The time

intensive nature of assessing reflective diaries has been noted as a limitation of the approach (McGuinness & Brien 2007)

The Reflective Online Searching Skills (ROSS) environment developed at the Queensland University of Technology facilitates reflective practice for students in an online IL resource. ROSS is a standalone e-learning unit that can be used to support IL development in any module, and consists of a series of eight interrelated interactive 'modules' that support the search process. A reflective workspace is provided for students to relate what they have been learning through ROSS to the particular assignment they are working on. (Partridge et al. 2008; Bruce et al. 2006) While the reflective writing students enter into ROSS can be assessed, the reflective element can simply be included as a means to support IL development. (Partridge et al. 2008). Walton & Hepworth (2011) found that tutor responses to students' posts about information search activities on an online forum that summarise and provide a narrative of significant aspects of the posts facilitated students' reflective practice.

The use of critical incidents as triggers for reflection has been employed in the Information Literacy context. Students' assignments included reflective writing in response to critical incidents of information search and use (Bruce & Hughes 2010). Gilstrap & Dupree (2008) report on the use of a Critical Incident Questionnaire with students in each of a short series of Information Literacy classes. Students were asked to reflect on the critical incidents that had occurred for them during the class and complete the short questionnaire. Their responses were used to support the librarians' reflective practice as teachers and understand where the students had developed Information Literacy. The research found that through reflecting on critical incidents of confusion the students demonstrated a deep level of reflection and a resulting iterative learning cycle.

It is seen to be important to assess reflection in order to determine that learning has taken place; to provide effective feedback to students, and to prioritise and legitimize reflective practice for students (Bourner 2003). Nutefall (2005) describes the use of a "Paper Trail" assignment, one of six Information Literacy focused

assignments for a particular module. For this assessment students had to create a reflective annotated portfolio on the research process they used for a different assignment, and were invited to reflect specifically on how successful their search strategies were. Another example of a reflective assignment is reported by Lehlafi et al. (2012) where students were asked to reflect on what they had learnt about using the internet as a research tool in a particular module, following librarian facilitated IL interactive support lectures.

Students' reflective writing can show coping strategies for finding and using academic information (McGuinness & Brien 2007); the development and improvement of approaches to research, greater understanding of the value of IL, and an enhanced understanding of the value and purpose of the Library electronic services (Lehlafi et al 2012). It has also been shown that reflection in the context of the search process can help students understand more advanced search techniques (Bruce 2006).

Reflective assessments have been used to determine whether or not learning outcomes have been met (Nutefall 2005) and whether or not students have achieved defined competencies, in for example an institutional IL framework (Lahlafi et al. 2012). The Big 6 model (Diekema et al. 2011) and the ACRL standards (Gilstrap & Dupree 2008) have also been used as frameworks for analysis. However in many of the projects included in this review it is not clear whether specific learning outcomes related to Information Literacy have been included in modules, nor whether teachers have discovered if these have been met through the analysis of the reflective writing. Bruce's "Seven Faces" model (Bruce 1997) has been used as a framework to analyse reflective writing (Han 2012), however none of the research included in this review has used the SCONUL Seven Pillars themselves as a framework for assessing the extent to which information literacy has been developed and in which areas.

Information Literacy educators' reflective practice

There is a strong tradition of information literacy educators themselves engaging in reflective practice facilitated through the analysis of students' reflective writing (e.g. Bruce & Hughes 2010; Gilstrap & Dupree 2008; Belanger et al. 2012). Jacobs (2008) strongly identifies a need for "self reflexivity regarding pedagogical praxis" (p. 256) and goes on to link reflective practice to contributing to the ongoing conversation around the global vision of information literacy. Through writing and publishing our pedagogical reflections we can thus conform to this ideal. Engaging in pedagogical reflection and publishing can also facilitate successful librarian-faculty partnerships (Belanger et al. 2012). Tutor reflections can be stimulated through the analysis of students' reflections but can also be stimulated through collecting reflective data from students after each face-to-face teaching session. The issues raised can be subsequently incorporated into the following teaching session (Gilstrap & Dupree 2008). Lehlafi et al. (2012) describe a method for facilitating reflection on face-to-face IL teaching sessions through the collection of simple feedback written on post-it notes on the themes of "stop/start/continue".

This review has demonstrated that there is an established relationship between reflection and learning that has value for both students and teachers. This relationship can be exploited for mutual benefit in the teaching of Information Literacy skills. This study explores these issues further when working with a small group of undergraduate students in the context of a piece of assessed reflective writing.

4. Methodology

In the 2010-11 iteration of the Business Intelligence module a total of 14 students were enrolled on the module. Of these, nine students gave their informed consent to take part in the research, following provision of a detailed participant information sheet as per the University of Sheffield ethical guidelines for research. Eight students were male, one female; two were overseas and seven home students; six students were studying on the BSc Information Management programme, two studied BSc Computer Science and the remaining student studied dual honours BA

Accounting and Financial Management and Information Management. Students understood that the reflective writing that they submitted as part of the assessed work for the module would form the data for the research project, and they were assured that they would remain anonymous in any subsequent reporting.

The overall aim of the research was to explore the relationship between students' reflective writing and their information literacy development. In order to do this we identified 3 distinct methods of qualitative analysis.

1. We mapped the extent to which students had chosen to reflect across the breadth of the information literacy landscape; looking for reflective statements that evidenced development in each of the SCONUL Seven Pillars; Identify, Scope, Plan, Gather, Evaluate, Manage and Present, (SCONUL 2011), using the detailed descriptions provided in the updated 2011 model.
2. We then "scored" each of these comments for depth of reflection using the Jenny Moon model of reflection (2001) which defines four levels of reflection: 1. Descriptive writing with little reflection; 2. Descriptive writing with some reflection; 3. Reflective writing (1) showing some analysis and self questioning; 4. Reflective writing (2) showing clear evidence of standing back and learning,
3. We analysed the content of the reflective assessment looking for evidence of whether or not the module learning outcomes had been met.

Furthermore we wanted to engage with the reflective process ourselves as Scholars of Teaching and Learning to determine whether this was a valuable assessment in terms of student learning. Data revealed through the three methods outlined above has fed into our tutor reflections on the facilitation and design of the assignment and our reflections on the depth of the student learning in terms of Information Literacy.

5. Results

> "I believe I have been aware of information literacy throughout my course, nonetheless, carrying out this reflective report has enabled me to further deepen my understanding. It has helped me understand the competencies and reflect on how I can become more information literate in future."(*S7)*

The quote above exemplifies the depth of reflective practice that the students on the module engaged with, and also how their understanding of themselves and their Information Literacy was enhanced through the module activities. The following results section will be structured using the research objectives and will present more detailed aspects of students' reflections about their Information Literacy.

5.1 Research objective 1: Mapping reflective comments onto the IL Landscape

The 2011 version of the Seven Pillars (SCONUL 2011) model defines a set of attitudes/understandings and competencies/abilities of the information literate person under each of the Seven headline Pillars. We analysed the students' reflective writing to identify statements which demonstrated that the student had either gained a competency/skill or achieved an understanding of these aspects of IL. The following table (Table 1) shows which aspects of Information Literacy *were* represented in the students' writing, these are highlighted in bold

Table 1. Aspects of information Literacy represented in the students' writing using the SCONUL Seven Pillars (2011)

- **Aspect evidenced in reflective writing**
- Aspect not evidenced in reflective writing

Pillar	Understanding of	Ability to
Identify	• **That new information and data is constantly being produced and that there is always more to learn** • That being information literate involves developing a learning habit so new information is being actively sought all the time • That ideas and opportunities are created by	• **Identify a lack of knowledge in a subject area** • Identify a search topic / question and define it using simple terminology • Articulate current knowledge on a topic • **Recognise a need for information and data to achieve a specific end and define limits to the information need**

	investigating/seeking information The scale of the world of published and unpublished information and data	• **Use background information to underpin the search** • **Take personal responsibility for an information search** • Manage time effectively to complete a search
Scope	• **What types of information are available** • The characteristics of the different types of information source available to them and how they may be affected by the format (digital, print) • The publication process in terms of why individuals publish and the currency of information • Issues of accessibility What services are available to help and how to access them	• **"Know what you don't know" to identify any information gaps Identify which types of information will best meet the need** • **Identify the available search tools, such as general and subject specific resources at different levels** • Identify different formats in which information may be provided • **Demonstrate the ability to use new tools as they become available**
Plan	• The range of searching techniques available for finding information. • **The differences between search tools, recognising advantages and limitations** • **Why complex search strategies can make a difference to the breadth and depth of**	• **Scope their search question clearly and in appropriate language** • **Define a search strategy by using appropriate keywords and concepts, defining and setting limits** • Select the most appropriate search tools

	information found • **The need to develop approaches to searching such that new tools are sought for each new question (not relying always on most familiar resources)** • **The need to revise keywords and adapt search strategies according to the resources available and / or results found** • The value of controlled vocabularies and taxonomies in searching	• Identify controlled vocabularies and taxonomies to aid in searching if appropriate • **Identify appropriate search techniques to use as necessary** • **Identify specialist search tools appropriate to each individual information need**
Gather	• How information and data is organised, digitally and in print sources • How libraries provide access to resources • **How digital technologies are providing collaborative tools to create and share information** • The issues involved in collecting new data • The different elements of a citation and how this describes an information resource • The use of abstracts • **The need to keep up to date with new information**	• Use a range of retrieval tools and resources effectively • **Construct complex searches appropriate to different digital and print resources** • Access full text information, both print and digital, read and download online material and data • Use appropriate techniques to collect new data • Keep up to date with new information • Engage with their community to share information • Identify when the information need has not been met

	• **The difference between free and paid for resources** • The risks involved in operating in a virtual world • The importance of appraising and evaluating search results	• Use online and printed help and can find personal, expert help
Evaluate	• The information and data landscape of their learning/research context • **Issues of quality, accuracy, relevance, bias, reputation and credibility relating to information and data sources** • How information is evaluated and published, to help inform personal evaluation process • **The importance of consistency in data collection** • **The importance of citation in their learning/research context**	• **Distinguish between different information resources and the information they provide** • **Choose suitable material on their search topic, using appropriate criteria** • **Assess the quality, accuracy, relevance, bias, reputation and credibility of the information resources found** • **Assess the credibility of the data gathered** • Read critically, identifying key points and arguments • **Relate the information found to the original search strategy** • **Critically appraise and evaluate their own findings and those of others** • **Know when to stop**
Manage	• Their responsibility to be honest in all aspects of information handling and dissemination (e.g. copyright, plagiarism and	• Use bibliographical software if appropriate to manage information • Cite printed and electronic

	intellectual property issues) • The need to adopt appropriate data handling methods • The role they play in helping others in information seeking and management • **The need to keep systematic records** • The importance of storing and sharing information and data ethically • The role of professionals, such as data managers and librarians, who can advise, assist and support with all aspects of information management	sources using suitable referencing styles • Create appropriately formatted bibliographies • **Demonstrate awareness of issues relating to the rights of others including ethics, data protection, copyright, plagiarism and any other intellectual property issues** • Meet standards of conduct for academic integrity Use appropriate data management software and techniques to manage data
Present	• The difference between summar**i**sing and synthesising • **That different forms of writing/ presentation style can be used to present information to different communities** • That data can be presented in different ways • **Their personal responsibility to store and share information and data** • Their personal responsibility to disseminate information &	• Use the information and data found to address the original question • **Summarise documents and reports verbally and in writing** • Incorporate new information into the context of existing knowledge • **Analyse and present data appropriately** • **Synthesise and appraise new and complex information from different sources** • **Communicate effectively using appropriate writing styles in a**

	knowledge • How their work will be evaluated • The processes of publication • The concept of attribution • **That individuals can take an active part in the creation of information through traditional publishing and digital technologies (e.g. blogs, wikis)**	**variety of formats** • Communicate effectively verbally • Select appropriate publications and dissemination outlets in which to publish if appropriate • Develop a personal profile in the community using appropriate personal networks and digital technologies (e.g. discussion lists, social networking sites, blogs, etc.)

It can be seen from this table that there are aspects of IL that are not represented in student's reflective practice, and we can also see where students have demonstrated that they have gained particular skills or developed their understanding. For example there were very few reflective statements that illustrated development in the "Manage" pillar, nevertheless students did demonstrate they had these skills through citing sources and submitting appropriate bibliographies in their group reports. In the "Scope" pillar students demonstrated the development of many skills and competencies, but demonstrated little development of "understanding" attributes, for example their understanding of attributes of different types of information resources and their understanding of the publication process.

In the "Gather" pillar the reverse was true; students reflected more on their understandings than their abilities. They did not reflect for example on the use of abstracts, again despite being required to submit an executive summary with their group coursework. They also did not reflect on their ability to keep up to date with new information or use online help functions, despite this reasonably being part of the activities, not did they reflect on engaging with the community to share information which would probably not be a focus of their activities. In the "Present"

pillar students reflect on their understanding of the publication process, and this was not an aspect of the module activities.

This mapping process shows that it is not necessary then to develop understanding before abilities. Indeed the creators of the Seven Pillars model state that it is not a linear model, and there does not seem to be an actual or implied hierarchy of understanding before abilities. The high level of detail supplied for the attributes under each Pillar made it possible to map reflective writing against the Pillars very effectively, and this is a clear advantage of the 2011 version of the model. We can also see that students may not choose to reflect on aspects of IL that we know they have used.

5.2 Research objective 2: How deeply reflective have students been?

Each of the reflective statements attributed to each pillar was scored for depth of reflection using the criteria developed by Jenny Moon (2007). So for example a statement was scored with a 1 if it was descriptive and only considered one point of view, a 2 if it was descriptive with a limited amount of reflection; 3 if it showed some analysis and self-questioning. The deepest reflections scored a 4, and demonstrated critical self-questioning, and ability to see others point of view, and where it was clear that learning had taken place. We will present the depth of reflection in each of the Seven Pillars pictorially. In each of the diagrams each of the small circles surrounding the central circle represents a individual reflective comment, and the number in the circle indicates the level of depth of reflection as judged on the Moon scale. Thus the diagrams represent both the depth of and volume of reflection in each pillar (Figures 4-10).

Identify

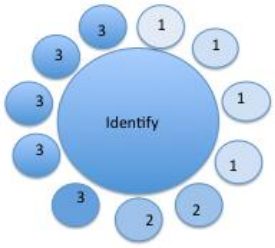

Figure 4: depth and volume of reflection in the Identify pillar

There is a good spread of reflection across the attributes defined in the "Identify" Pillar (Figure 4) and a good level of depth of reflection with five statements scored at level 3. The nature of the project task required students to interview their business partners to identify their information needs, and many of the students reflected on this process as being different from identifying their own information needs, and this was no doubt a point of development for the students.

> Although this was achieved in a moderate manner, I think personally we should
>
> have strengthened the explanation of the information need for the business, as on several occasions we struggled to fully understand the task that was set for us, resulting in later stages to go back to recognizing the information needs of the company. *(S6)*

The idea that information needs change over time also came through very strongly in the students' writing:

> The list of needs we have product has been change over time compare those in the final report due to some needs were less important and more focus on certain needs. (S2)

This is a concept that is not currently expressed in the Seven Pillars model.

Scope

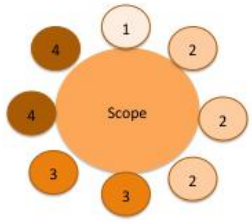

Figure 5: depth and volume of reflection in the Scope pillar

Although there are not many statements relating to this pillar (Figure 5), there was a lot of depth of reflection with two statements scoring a 4 and two a 3. Students were deeply reflective about choosing sources and defining a strategy for choosing sources.

> On reflection, I think I did well as I felt confident in selecting the best sources and with only one experience of difficulty, I found all the information I required using those sources. I have learnt about information sources I didn't know existed, which proved useful in researching businesses and markets. I wouldn't have without the business intelligence module. I will definitely be using these sources more in the future. (S1)

It seems that these students had to change the type of sources they habitually used for this assignment and to broaden their experience of subject specific sources (e.g. MINTEL)

> In order to address this information gap I went straight to Google without devising an appropriate search strategy and as a result I found it hard to find a good amount of relevant information. At this time it did not occur to me to use MINTEL or any other business sources. On reflection this was perhaps the biggest flaw in my strategy as I didn't consider what sources would be best for my specific need. (S3)

Plan

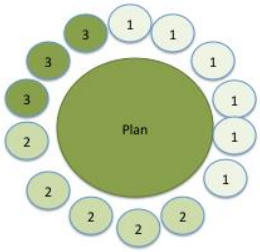

Figure 6: depth and volume of reflection in the Plan pillar

There was a lot of low level reflection in the "Plan" pillar (Figure 6) , featuring a description of the search terms used on particular sources, and of how searches had been narrowed and broadened e.g.

> I used a basic plan to search for the different types of information although much was from the same source. I feel this isn't a negative thing as it worked. (S1)

> When using the search engines we would use both advanced and normal searches to give us the best possibilities of variance in the results…. (S6)

These reflections demonstrate a certain level of competency without being very deeply reflective. The more deeply reflective statements revealed that students had identified ways in which their search strategy could be improved.

> I also should have perhaps constructed more complex searches that used phrases andother specialised commands. It is evident that my search strategy formulisation needs improving. I also learned that I need to be more open minded when constructing search strategies and carrying out searches. (S3)

Gather

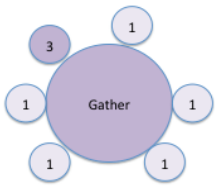

Figure 7: depth and volume of reflection in the Gather pillar

The “Gather” pillar (Figure 7) did not attract much volume or depth of reflection. In the module workshops students were introduced to and experienced searching a number of paid for information resources (Mintel, Lexis Library, Newsbank) and the quality of information provided by these services vs what they were able to find for free on the internet was a point of reflection. It was also noted that information they needed was available on the internet but only for a fee.

Evaluate

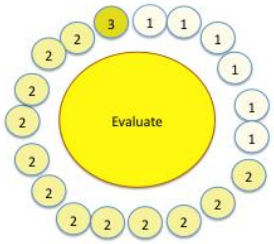

Figure 8: depth and volume of reflection in the Evaluate pillar

There were many reflective statements related to the process of evaluating information, indicating a lot of interest/development in this area (Figure 8). However there was not a lot of depth to the reflections, often reflections comprised a description of what criteria were used to evaluate information e.g.

> I evaluated the quality and relevance of information by researching into the source it came from to identify whether it is a reputable source. For example, .edu, or .ac source is more likely to contain higher quality and reputable information, (S1)

In many cases these reflections revealed that the students were successfully applying information literacy competencies to the task at hand, even though they were not reflecting very deeply on these competencies. When students reflected on how they had evaluated information, and how they had chosen suitable material to include in the final version of the project it often took place in the context of a group

discussion, so the collaborative nature of the task included elements of information literacy development.

Manage

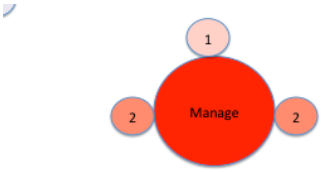

Figure 9: depth and volume of reflection in the Manage pillar

The "Manage" pillar attracted the least amount of reflection (Figure 9). Students discussed issues to do with storing information effectively, although they simply described what they did rather than reflecting deeply on the process. Nevertheless the students' projects well referenced with accurate bibliographies indicating that they had applied competencies in this Pillar, even if they did not reflect upon them.

Present

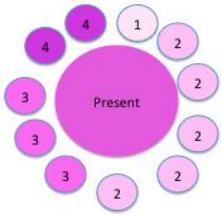

Figure 10: depth and volume of reflection in the present pillar

The "Present" pillar attracted a deep level of reflection; close to half of the reflective statements were assessed as level 3 or 4 on the Moon scale of reflective writing (Figure 10). Students reflected on how they had stored and shared information with others in their group, and how they had attempted to present the information effectively for their client. The creation of a business report (rather than an academic essay) also attracted reflection eg.:

> In contrast, I believed that the report required a different approach. It required more formal and objective writing. In the report the information was organised in a structured way with the appropriate evidence and citations. When looking back I believe that from the report we produced, new and relevant findings emerged and perhaps they presented the nutrition start-up with a fresh perspective of potential gaps in the market (S3)

The deeper reflections clearly identified ways the students' thought they could have improved their practice.

5.3 Research objective 3: extent to which module learning outcomes related to IL development have been met

There are eight module learning outcomes for the module as a whole, and three of these relate directly to information literacy development. We analysed the extent to which students demonstrated that they had met the module learning outcomes through the Information literacy reflective writing. The following table shows the extent to which individual students demonstrated meeting the learning outcomes for the module.

Table 2. Module learning outcomes achieved. Identified from an analysis of student reflections.

LO1 - the types of, and channels for, information preferred by businesspeople
LO2 - purposes for which external information can be used within the organisation
LO3 - to understand models of information use within business
LO4 - to identify environmental factors affecting business information
LO5 - to identify key types of business information
LO6 - to search selected business information sources effectively
LO7 - to locate, collect, analyse, and synthesise information retrieved from a variety of sources into a client report
LO8 - [for information management students] to relate this learning to what students have learnt about information management and knowledge management in modules earlier in their studies

	Learning outcomes							
Students	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**LO6**	**LO7**	**LO8**
S1		√	√	√	√	√	√	√
S2	√	√			√		√	
S3	√	√			√	√	√	√
S4	√	√			√	√	√	√
S5	√				√	√	√	√
S6		√	√			√	√	
S7		√	√		√	√	√	√
S8		√			√	√	√	√
S9		√				√	√	

It can be seen that all the students demonstrated that they could locate, collect analyse and synthesise information

6. Discussion

The reflective writing assignment and our analysis of it has given both students and tutors on the module a valuable opportunity to reflect "on action" (Schön 1983)

The use of the revised Seven Pillars model (SCONUL 2011) was helpful in analysing the data in this research project as it gives detailed descriptions aspects of Information Literacy enabling the statements made by students to be mapped against them. It is apparent from the literature that other researchers (Lehlafi et al. 2010; Diekema et al. 2011; Gilstrap & Dupree 2008; Han 2012) have also found it illuminating to map reflections against IL models and standards. In looking at conceptions of Information literacy revealed by the breadth of competencies described in the Seven Pillars model, we can develop our own conceptions of Information Literacy. In mapping our students' reflections against the model we can further validate the model by giving example of the understandings and abilities described in the model, and also offer potential additions and improvements. One "understanding" of Information Literacy revealed by the data was that Information

Literacy needs can change over time as a research project progresses and in the light of information found. This is not currently expressed in the Seven Pillars model but could be inserted if the model is revised.

In looking at the depth of students' reflections the analysis revealed that students had the ability to be deeply reflective, and identified in a number of cases clear examples of what they thought they had learnt and a self questioning, critical approach to learning Moon's (2001, 2007) work identifies the benefits of deep reflection as opposed to surface level reflection, This is supported by later work by Sen & Ford (2009). The literature is clear on the value of, and the need to provide support and scaffolding for reflection (Moon 2001; Mann 2009), and although there is no absolute certainty, we are hopeful that the reflective workshop gave our students a pathway to being deeply reflective. One question that emerged through the analysis was whether the depth of reflection illustrated through students' writing indicated that the student had achieved a deeper level of development, a higher level of competency in a particular aspect of Information Literacy. In a numbers of cases students demonstrated that they had a certain level of competency, e.g. that they could apply suitable evaluation criteria to a piece of information; without reflecting very deeply on it. So if it isn't the level of competency that stimulates reflection, what does stimulate deep reflection? We can speculate that it is development that students' found particularly interesting, or surprising, but without further research we will not know for sure.

Another conclusion that was drawn as a result of mapping reflections against the Seven Pillars is that it would be difficult for one learning task or assignment to support the development of Information Literacy competencies across the full spread of the Seven Pillars. Inevitably the activities required by particular assignments will require students to use and develop a selection of competencies, so for example this task did not particularly require students to engage with the ethical use of information or use data management software and these are aspects of IL that do not form part of the student's reflections. Nevertheless we would consider it important that the spread of understandings and abilities described by the Seven

Pillars was addressed across a programme of study, and suggest that that these be assessed through the medium of reflection.

None of the Information Literacy literature included in the review mentioned the use of reflective models as a means to analyse the depth of reflection of their students' writing. We found that the Moon model with its clearly described four levels of reflection (Moon 2001) not only gave us a framework for our assessment of the students, but also provided an excellent framework for analysing the depth of reflection for this research.

Diekema et al. (2001) caution that providing easy to measure learning outcomes can lead to a "generic skills-based pedagogy of information literacy" (p.262) However this is not the case in the Business Intelligence module, where it has been shown that it is "easy" (or at least straightforward) to measure Information Literacy learning outcomes through the use of reflective writing, in the context of a constructive, inquiry-based pedagogy. The literature is clear about the link between deeper learning and reflection, (Bourner, 2003; Leung & Kember, 2003), deeper learning and Inquiry (Biggs &Tang 2011) and deeper learning and Information Literacy development (Hepworth and Walton 2009). The relationship between all four concepts could thus be summarised :

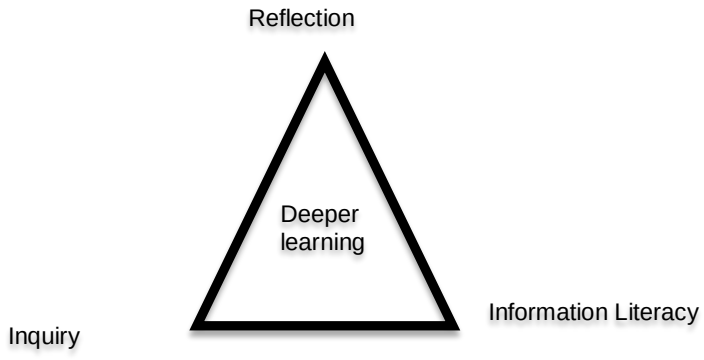

Figure 11: Reflection, Inquiry, IL and deeper learning

In reflecting on our need to learn as teachers we have identified a need to make it more explicit to students that their reflective writing helps us to be reflective

practitioners. Thus we can establish a more equal dialogue with students following the teachings of Freire and become "teacher-students with students-teachers"(Jacobs 2008: 261)

7. Conclusion

The research has demonstrated that reflective writing is a suitable method of assessing information literacy development in the Higher Education context. Reflective writing by students can offer an insight into which aspects of information literacy have been developed, and indicate where learning activities have provided opportunities for Information Literacy development. Reflective writing assessments are appropriate for inquiry-based learning and constructivist pedagogies more generally and can stimulate deeper learning in students.

It is appropriate to use models of information literacy to give a framework for both assessing and analysing reflective writing. In particular we recommend the Seven Pillars (SCONUL 2011) model in the HE context due to the detailed descriptions of the understandings and abilities and the range of competencies covered. The Jenny Moon model of reflection (Moon 2011) gives a standard framework for assessment and analysis that can standardize approaches.

Students' reflective writing can provide a valuable set of data for educators who themselves wish to be reflective practitioners. Reflective statements can be mapped against module learning outcomes to demonstrate the level of success of the teaching and learning environment of a module, and indicate where changes need to be made to learning activities.

Further research into student's IL focused reflective writing in this module context would give further insight into which aspects of IL are developed and which could be better supported through the learning activities. To this end data has been collected from 11 students who studied the module in 2011/12. In addition it would be interesting to see how this type of assessment could be applied in other learning contexts. Deeper meaning could be found through more qualitative conversations

with students exploring their reflective writing after assessment had concluded. Unfortunately this is difficult due to the timing of this particular module but may be applicable in other learning contexts.

The small cohort and hence sample size is a limiting factor in this study, as is the specific learning context. Therefore it is not possible to generalize these findings to a wider population or contexts. However the assessment design could easily be applied in other contexts and the results feed into a growing body of research conducted in the Information School into the value of reflective writing.

References

ACRL (2000) *Information Literacy Competency Standards for Higher Education*. Chicago: Association of College and Research Libraries. [Online] http://www.ala.org/acrl/standards/informationliteracycompetency [Accessed: 28th August 2012]

ANZIIL (2004) *Australian and New Zealand Information Literacy Framework: principles, standards and practice*. 2nd edition. Adelaide: Australian and new Zealand Institute for Information Literacy [Online] http://www.library.unisa.edu.au/learn/infolit/Infolit-2nd-edition.pdf [Accessed: 28th August 2012]

Belanger, J., Blisquez, R. & Mondal, S. (2012) Developing a collaborative faculty-librarian information literacy assessment project. *Library Review* 61(2) pp.68-91

Biggs, J. & Tang C. (2011) *Teaching for quality learning at University* 4th ed. Maidenhead: Society for Research into Higher Education.

Bordonaro, K. & Richardson, G. (2004) Scaffolding and reflection in course-integrated library instruction. The journal of academic librarianship 30(5) pp.391-401

Bourner, T.(2003) Assessing reflective learning. *Education + Training*. 45(3), pp.267-272.

Bruce, C**.** (1997). *The seven faces of information literacy*. Adelaide: Auslib Press.

Bruce, C., Edwards, S. Lupton, M. (2006) Six Frames for Information literacy Education: a conceptual framework for interpreting the relationships between theory & practice ITALICS 5(1) [Online] http://www.ics.heacademy.ac.uk/italics/vol5-1/pdf/sixframes_final%20_1_.pdf [Accessed: 5th July 2012]

Bruce, C. & Hughes, H. (2010) Informed learning: a pedagogical construct attending simultaneously to information use and learning. *Library and Information Science Research* 32(4) pp. A2-A8

Clifford, V.A. (1999) The development of autonomous learners in a university setting. *Higher Education Research and Development.* 18,(10), pp.115-128.

Diekema, A., Holliday, W. & Leary, H. (2011) Re-framing information literacy: problem-based learning as informed learning. *Library and Information Science Research* 33(4) pp. 261-268

Ford, N. (2008) Educational informatics. *Annual Review of Information Science and Technology*, 42(1) pp.497-544.

Ghaye, T. and Lillyman, S. (2000) *Reflection: Principles and practice for healthcare professionals*. Dinton: Quay Books.

Gilstrap, D. & Dupree, J. (2008) Assessing learning, critical reflection and the quality educational outcomes: the critical incident questionnaire. *College & Research Libraries* 69(5) pp. 407-426

Han, J. (2012) Information literacy challenges for Chinese PhD students in Australia: a biographical study. *Journal of Information Literacy* 6(1) [Online] http://ojs.lboro.ac.uk/ojs/index.php/JIL/article/view/PRA-V6-I1-2012-1/1629 [Accessed: 28th August 2012]

Jacobs, H. L. M. (2008) Information Literacy and Reflective Pedagogical Praxis. *Journal of Academic Librarianship*. 34(3) pp. 256-262

Johnston, B. & Webber S. (2003) Information literacy in higher education: a review and case study. *Studies in Higher Education* 28(3) pp.335-35

Hepworth, M. and Walton, G. (2009). *Teaching information literacy for inquiry-based learning*. Oxford: Chandos.

Honey, P. & Mumford, A. (2000). *The learning styles helper's guide.* Maidenhead: Peter Honey Publications Ltd.

Hutchings, W. (2007)*Enquiry-based Learning: Definitions & Rationale* [Online] http://www.campus.manchester.ac.uk/ceebl/resources/papers/ [Accessed: 4th August 2011]

Khan, P., et al. (2006) *The role and effectiveness of reflective practices in programmes for new academic staff: A grounded practitioner review of the research literature.* Manchester: University of Manchester/Higher Education Academy. Manchester,

Khan, P. and O'Rourke, K. (2004) *Guide to Curriculum Design: Enquiry-based Learning* [Online]. LTSN Generic Centre, Higher Education Academy [Online] http://www.campus.manchester.ac.uk/ceebl/resources/general/kahn_2004.pdf [Accessed: 12th May 2008]

Kolb D.A. (1984) *Experiential Learning experience as a source of learning and development,* New Jersey: Prentice Hall

Lehlafi, A., Rushton, D. & Stretton, E. (2012) Active and reflective learning initiatives to improve web searching skills of business students. *Journal of information literacy* 6 (1) [Online] http://ojs.lboro.ac.uk/ojs/index.php/JIL/article/view/PRA-V6-I1-2012-3/1635 [Accessed: 28th August 2012]

Levy, P. & Petrulis, R. (2012) How do firstyear university students experience inquiry and research, and what are the implications for the practice of inquiry-based learning? *Studies in Higher Education* 37(1) pp.85-101

Leung, D. and Kember, D. (2003) The relationship between approaches to learning and reflection upon practice. *Educational Psychology*. **23,** 1 pp. 61-71.

Mann, K. Gordon, J. and MacLeaod, A. (2009) A. Reflection and reflective practice in health professions education: a systematic review. *Advances in Health Science Education Theory and Practice*, 14(4),pp. 595-621.

McGuinness, C. & Brien, M. (2007) Using reflective journals to assess the research process. *Reference Services Review* 35(1) pp. 21-40

Moon, J. (2001) *PDP working paper 4. Reflection in Higher Education learning.* Learning and Teaching Support Network. [Online] http://www.york.ac.uk/admin/hr/training/gtu/students/resources/pgwt/reflectivepractice.pdf, [Accessed: 28th August 2012]

Moon, J. (2007) Getting the measure of reflection: Considering matters of definition and depth. *Journal of Radiotherapy in Practice.* 6(4), pp.191-200.

Nutefall, J. (2005) Paper trail: one method of Information literacy assessment. *Research Strategies* 20(1-2) pp 89-98

Partridge, H., Edwards, S. Baker, A., McAllister, L. (2008) The Reflective Online Searching Skills Environnment: embedding information literacy into student learning through an online environment. *IFLA Journal* 34(1) pp.55-71

Secker, J. & Coonan, E. (2011) *A new curriculum for information literacy: transitional, transferable, transformational* [Online] http://ccfil.pbworks.com/f/ANCIL_final.pdf [Accessed: 5th July 2012]

Schön, D. (1983) *The reflective practitioner*. New York: Basic Books.

SCONUL (2011) *The SCONUL Seven Pillars of Information Literacy, Core model for higher education*.[Online] https://www.sconul.ac.uk/groups/information_literacy/publications/coremodel.pdf [Accessed:23rd August 2012]

Sen, B. and Ford, N. (2009) Developing reflective practice in LIS education: the *SEA-change* model of reflection. *Education for Information.* 27(4) pp.181-195.

Sen, B. (2010) Reflective writing: a management skill. *Library Management*, 31**, (**1/2), pp79 – 93

Taylor, B. (2006) *Reflective practice: A guide for nurses and midwives*. 2nd Ed. Maidenhead: Open University Press.

Simons, K.D. and Klein, D.J. (2007) The impact of scaffolding and student achievement levels in a problem-based learning environment. *Instructional Science*, 35 (1) pp. 41-72

Walton, G. & Hepworth, M. (2011) A longitudinal study of changes in learners' cognitive states during and following an information literacy teaching intervention. Journal of Documentation 67 (3) pp.449-479

Watson, M. (2008) *Building your portfolio: The CILIP guide*. London: Facet.

11.4. Appendix 4: Paper 4 McKinney, PA and Sen, B (2016) "The use of technology in group-work: a Situational Analysis of students' reflective writing. *Education for Information*. 32 (4)

Abstract

Group work is a powerful constructivist pedagogy for facilitating students' personal and professional development, but it can be difficult for students to work together in an academic context. The assessed reflective writings of undergraduate students studying Information Management are used as data in this exploration of the group work situation and what matters to students in terms of ensuring success. Situational Analysis provides the methodological framework and a number of mapping techniques are used to interrogate the data. Students reflect on the importance of communication for group work and identify the convivial tools they use when arranging meetings, working collaboratively and producing outputs. Students valued the instant communication facilitated by smart phones, but despite the immediacy of electronic communication, face-to-face meetings are still highly valued. Silences in the data reveal the lack of engagement with the Virtual Learning Environment as a tool for group collaboration. Implications for educators in supporting group work are identified.

Keywords: Group-work, collaboration, Situational Analysis, technology, Inquiry-based learning

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1. Introduction

The authors have worked for some years with groups of students in the information subject area of Higher Education, and this paper is a result of an on-going reflective process concerning how students work together in groups. It is widely accepted that the ability to work in teams is an important graduate attribute [1]–[3], and teamwork is a skill often sought by graduate employers and is included on popular lists of graduate skills. Employers expect Universities to offer learning environments in which students can learn this important skill [4]. Sociocultural theories of learning assert that knowledge is (co)created through cooperation and collaboration [5]. Group working can fulfill a natural human desire to work cooperatively with others, and can lead to a feeling of empowerment and belonging where support and solutions can be provided by other group members [6]. In contrast with competitive or individual learning, cooperative learning tends to promote greater retention, increased critical thinking, creativity and problem solving, higher achievement, and transferability of learning to other situations [7]. Although group work can provide both positive and negative experiences for students in the Higher Education context, the negative experiences can have stressful and far-reaching consequences for students both in terms of the experience and also the grades achieved. Students can feel alienated within a group [6] and there are well documented issues to do with freeloading and inequality of contribution (e.g. [8]).

New social and communication technologies (e.g. Google Docs, Facebook), that students can use to support their learning provide a “rich and complex” communication environment that facilitates collaborative and inquiry learning [9 p.17]. There are conflicting discourses around students’ use of such technologies, with some promoting the view that all student group work is now characterized by heavy use of technology, whether in terms of the outputs or technology mediated communication [10]. However, in their review of research in the area Facer and Selwyn [11] uncovered a mixed picture of learner use of these technologies, with a lack of evidence of a radical transformation of student learning through uses of social networking.

This paper presents an analysis of students' assessed reflective writings about their experiences of group work. A recurring theme in their reflections was the students' use of technology and the impact this had on working with each other during the completion of their group assignments. As tutors, a primary concern is supporting students to achieve successful outcomes in their assessed work; a concern which influenced our research focus and questions:

- What do students think "matters" in this situation of assessed group work?
- What elements and activities are identified as contributing to group success or failure?

The methodology used in the analysis of the data is Situational Analysis, an innovative approach proffered by Clarke [12] who states "Situational analyses seek to analyze a particular situation of interest through the specification, re-representation, and subsequent examination of the most salient elements in that situation and their relations" (p. 29). Situational Analysis, which is little known in many disciplines but increasingly of interest in education research [13] and in social science more widely, extends traditional Grounded Theory "around the postmodern turn" [15 p.553]. As the method is unfamiliar in some domains it is worthy of further explanation (see methodology), though the approach is well documented in Clarke's excellent publications [12],[14],[15].

In the analysis of the data in this study, it became apparent that the technological tools (defined as actants in the study) and their relationships to other elements were of particular importance in the way that students negotiated their way through the group project and supported their group working practices. It is the examination of these aspects of the data that forms the focus for this paper.

1.2 Reflective writing

Reflection is seen to be an important aspect of professional practice [16] and as such it should be included in professional education. Boud [17] states "Reflection involves learners processing their experiences in a wide range of ways, exploring their understanding of what they are doing, why they are doing it and the impact it has on themselves and others ….reflection is intrinsic to learning" (p. 23). There is a strong

tradition of both reflective assignments and pedagogical research in reflection in the Information School [18]–[21]. This has led to a well-developed support structure featuring a reflective writing workshop for the students where they have the opportunity to learn reflective theory. As part of the workshop students have the opportunity to practice reflective writing and receive peer feedback. The four levels of reflection model [22] forms the theoretical framework for the assessment of students' reflective writing. This model outlines the concept of depth in reflection and specifies what needs to be present in the writing in order to deepen the reflection:

- Level 1: Descriptive writing - descriptive and contains little reflection. May tell a story but generally from one point of view.
- Level 2: Descriptive writing with some reflection - a descriptive account that signals points for reflection while not actually showing much reflection. What little reflection there is lacks depth.
- Level 3: Reflective writing (1) - description, but it is focused, with particular aspects accentuated for reflective comment. Shows some analysis, some self-questioning.
- Level 4: Reflective writing (2) Clear evidence of standing back from the event. Shows deep reflection. Self-questioning, and the views and motives of others are also taken into account. Observation that learning has been gained.

Students are introduced to strategies that they can use to move beyond simply describing what happened towards critical reflection. Writing with greater depth of reflection encourages a greater understanding of the learning process.

1.3 Significance of this study

There are many examples of qualitative analysis of students' reflective writing as a way to understand learning in the literature in a diverse range of disciplines (e.g. [23]–[26]). There are a limited number of studies that used reflective writing as data to understand group processes and behaviors [16],[27],[28]. This study adds to that body of work but provides originality in analytical process that has been adopted.

This paper reviews the literature on collaborative inquiry and student group working in Higher Education. How students use technology to support group working and the use of reflective approaches to support group working are also reviewed. Situational Analysis as a methodology is discussed and the findings of the research are presented using a selection of mapping and analytical techniques drawn from Situational Analysis. The discussion links the findings with previous research in the field and outlines where new insights have been achieved. Finally implications drawn from the findings for are outlined for educators who support students working in groups.

2. Working in Groups

There has been extensive research in many disciplines (e.g. Management, Education, Sociology, Linguistics, Psychology) on how people generally, and teams specifically work together and communicate. Models and theories have focused on team roles (e.g. Belbin [29]); and stages of group development such as Tuckman's "Forming, Norming, Storming and Performing" model [30]. These management theories have been applied to research in the Higher Education context. With these models, the way that individuals communicate is recognized as being central to the functionality of the group. Some features of team working found in these analytical frameworks are present in this data, but they do not provide the main focus for this review. Our focus is on recent research into student group working in Higher Education in line with the context for the study.

2.1 Group-work in Higher Education

Students recognize that group work allows them to share ideas and knowledge, develop communication skills and develop confidence in their approach to work [31]. When teams work well the workload is fairly shared and this results in a sense of belonging, and related
development of trust and confidence in team members [32]. Effective teams allocate roles and responsibilities [10], and it can be beneficial to engage students in open discussions around roles and responsibilities [33]. Students are well aware that group working is an integral part of their learning experience at university [4],[31].

Conversely group projects can be a “difficult and dreaded” activity [34 p.62]. Students have issues with fairness in group assessments with unequal contributions given the same grade. Leadership in groups can be problematic, and the conflicting personal and academic commitments of individual members can have adverse affects on the ability of groups to meet face-to-face [31]. Although students want to achieve high grades, they can be unsure of how to do this in the context of group work [4]. Groups can be unsuccessful if they attempt to break up projects into isolated tasks and do not work collaboratively with each other [27]. It is helpful for academics to design group work that mirrors ‘real world’ activities of students’ forthcoming professional roles. [33]. Students recognize that they will be working in teams when they move into employment, and challenging group situations can actually help students prepare well for conflict situations at work [3].

Students use a complex range of technology-based communication channels in their group work including face-to-face meetings [35] and can display a sophisticated understanding of the social presence and value of different forms of communication [36]. Access to mobile phones is seemingly ubiquitous with research showing that 96.4% of first year students in Melbourne had a mobile phone [37], and mobile phones are superseding other technologies such as dedicated ‘clickers’ in lectures [38]. Smart phones make it possible for pervasive access to learning “anytime, anywhere” [39]; facilitate multitasking behavior [40]; and provide opportunities for collaboration and discussion with classmates and tutors that is supportive of a constructivist pedagogy [41]. Research has shown that it can be difficult for students to engage in synchronous communication, whether that is face-to-face or online; mobile phones are preferred when an immediate response if needed [10]. The instant accessibility and convenience of mobile phones for communication or information seeking is an important feature for students, who value communicating more frequently but exchanging less volume of information [41]. Text messaging has been found to be more important than email for study communication as it is more likely to capture the attention of the recipient as phones are always on [42], and this

has led to an expectation that responses will be received quickly [43]. Social networking sites offer spaces for socially constructed, digitally connected learning and can blur the boundaries between formal and informal learning [44]. Students seem to be adept at re-purposing social software for educational use, for example students who are heavy users of Facebook for social interactions are also more likely to use it for educational purposes [45].

There is disagreement in the literature about whether students perceive there to be a barrier between using social softwares for educational work and their social lives. Ali et al. [35] found that students sought to keep social and work activities separate. However, Nortcliffe and Middleton [40] found that students do not make clear boundaries between study, life, and work due to the ubiquitous nature of smartphone technology, and this "persistent autonomous engagement" (p.201) has a profound impact on them as learners. Research in the school context has shown that Facebook can offer a "third space", i.e. a space that offers a blend of social and academic communication [35]. The choice of social software or technology may well be dependent on a "critical mass" of students adopting it [49 p.107]. The theory of convivial tools [47] asserts that people choose tools based on their ease of use, their adaptability, and independence from the establishment.

2.2 Reflection in Higher Education

Reflection and reflective practice are seen to be effective pedagogical strategies in Higher Education that enable students to not only facilitate their learning, but also to develop themselves through critical self reflection [48]. Reflection is seen to be an essential feature of inquiry-based learning, and it is suggested that reflection should be built into the assessment of inquiry [49]. Clarke [28] in a phenomenological research project using student reflective diaries as a dataset linked emotional awareness to effective reflections on team and group processes. Livingstone and Lynch [3] stress the importance of reflection in a group working environment as a means to enable students to develop and take away an understanding of the group working process.

However the relationship between reflective writing and assessment is not without debate. Creme [50] asserts that that assessing reflection is counter-intuitive to the potential benefits of self-expression and experimentation, and recommends that reflection is used only for formative feedback. Students, faced with the uncomfortable, messy and self critical situation of not being able to present their 'best' work, simply write what they think the assessor wishes to read [16],[22],[51]. It can be awkward for students to admit personal weakness, and so instead they ascribe problems to the group as a whole, or simply present a positive and non-critical account of their group work [16]. However despite these difficulties, reflective writing has been used successfully as data for research into student learning in the Higher Education context [52].

In this review the literature that explores the tension between the acknowledged long-term benefits of group working, and the potentially unfair and difficult experiences of students undertaking group has been presented. Students make extensive use of modern communication technology, and seem adept at flexibly adapting their communication practices to make the most of the affordances of the technology available to them. Although there are criticisms of the assessment of reflective writing, research has demonstrated that the opportunity to engage in structured reflection and reflective writing has benefits, and can help students understand their own practices with group work.

3. Methodology

One of the essential characteristics of Grounded Theory is that the researcher does not approach the data with a set of pre-determined concepts or themes [53], and this aspect of the methodology is reflected in the way emerging themes in the data were surfaced over the analysis period. The philosophical roots of the Straussian framework of Grounded Theory draw on pragmatic and interactionist theories of co-creation of knowledge and self reflective research, and there are undoubted synergies between this and the reflective data on collaborative inquiry that is used in this research. Corbin and Strauss [54] state "The final theory that is constructed though grounded in data is a representation of both the participants and the

researcher. Another researcher could take the same data and by placing a different emphasis on the data construct a different theory. However this does not negate the validity of the theory. The most important thing is that whatever theory is produced is grounded and that it gives another insight and understanding into human behaviour"(p. 29).

Situational Analysis (SA) draws on the post-positivist grounded theory developed by Strauss that is based on a constructivist perspective of the existence of multiple realities dependent on the symbolic representation that each individual constructs. SA draws heavily on the social worlds / arenas framework proposed by Strauss which places much more emphasis on the context or situation of the action and interaction than in the original conception of Grounded Theory proposed by Glaser and Strauss [55]. The method is characterized by a move away from looking for commonalities in the data and towards presenting variation and complexity, not in the individual as in other postmodern methods (e.g. autoethnography, ethnography, narrative analysis), but in the whole situation of inquiry. The approach uses a series of mapping techniques to chart relationships between human actors, non-human actants and discursive elements in the situation and attempt to capture the complex nature of their relationships [14],[15].

Non-human actants are defined as the non-human elements that matter, that effect some change or transformation, that have agency in the situation; their limitations and structural conditions affect the way humans act in particular situations [14]. Actants identified in Situational Analyses are diverse, and have included elements such as schools [56]; the media, medicines and technology [57] and methods of assessment [13]. The identification of these non-human actants is very much dependent on the situation, Clarke [14] gives the example of reliable access to electricity being of no consequence in a study situated in a first-world context, however in a third world context the unreliable nature of power supplies would have much more agency, i.e. it would matter more in this situation.

In SA the situation itself is seen to be the unit of analysis [14]. In applying SA, The researcher selects from a range of analysis and data mapping techniques those that

particularly aid with their interpretation of the data. The function of the various mapping activities is to provoke a deeper analysis of the situation and elicit the relationships between the elements that are present [15]. Clarke [12] states that there are three main types of situational maps and analyses:

1. Situational maps to articulate the elements in a situation and interrogate the relationships between them.
2. Social worlds/arenas maps that map sites of action, and relationships.
3. Positional maps that allow the plotting of positions both articulated and not articulated in the data.

The process of visually mapping the data from the ordered situational map (where the analysis is presented in a simple tabular form), allows the researcher to move flexibly and systematically around the data. This enables the researcher to answer the "big questions" around identifying what is important and special about the situation being analysed [12]. In this mapping process the important human and non-human actants in the situation are identified and their relationships explored. The identification of these non-human elements which have agency in the situation is arguably a way in which Situational Analysis extends and develops Grounded Theory in a postmodern perspective and challenges the notion that only humans matter in a situation [13]. The maps intentionally attempt to represent the "stunning messiness" of everyday life [15 p.370]. An important feature of the situational map is the identification of the "sites of silence" in the data. Clarke [12] states "What seems present but unarticulated? What thousand pound gorillas do we think are sitting in around our situations of concern that nobody has bothered to mention yet" (p. 85). It is argued that multidimensional mapping can represent real life situations and a variety of positionalities including human and nonhuman activities and discourses within them. This visual mapping process allows us to see the data with fresh eyes and to understand the relationships between elements in a situation [14].

3.1 Research context

The data for this research was gathered from two cohorts of undergraduate students studying the Business Intelligence module, which is offered to final year Information Management students at the University of Sheffield. The module includes an inquiry-

based assessed group project where students research a business information problem proposed by a local business, entrepreneur or charity. While some time for the group project is incorporated into the timetabled teaching session for the module, the majority of the group work takes place outside of teaching time and is self-directed and self-organized. The University's virtual learning spaces (e.g. the Virtual Learning Environment, email, enterprise Google platform) and physical learning spaces (e.g. the Library, departmental spaces and physical technological infrastructure) are available to students as potential sites of group activity, however the way in which these are to be used by groups is not prescribed. The assessment of the group project comprises of a presentation and written report, and forms 60% of the assessed work for the module. The remaining 40% of the assessment is covered by two pieces of individual reflective writing each 800 words. Students reflect on their information literacy development as an important skill for information professionals (see [21]), and about their experiences of group work on the module. It is data from their reflections on their group working experiences that provided the data for this paper. The introduction of the reflective assignment on group work allows students to be given individual credit for a group task, and gives the module teaching team a rare insight into
the working practices of students, normally an area of student work that is hidden from educators. The analysis of the students' reflective writing about their experiences of working as a group, over and above that required by the assessment process, offered the opportunity to understand in greater detail what students considered to be important about group work.

Cohort 1 (2010-11) contained 13 students, 9 of whom gave consent for their reflections to be used in this study. Cohort 2 (2011-12) contained 19 students, 16 of whom gave informed consent, giving a total of 25 participants. Across the two cohorts 16 participants were male and 9 female; 4 were overseas and 21 were home students. The data was retrieved from the VLE post submission for assessment. The assignment brief asked students to write reflectively on their experiences of working as a group on this particular module.

4. Data analysis

The data was analysed over a long period of time in a number of distinct phases, consistent with a Grounded Theory approach where the researcher seeks to continually refine, develop and compare the emerging descriptions derived from the data [58]. In the first stage of analysis initial reflections on the interesting insights revealed from the assessment of the reflective writing were discussed and recorded by the research team. In the second stage, data was organized into broad themes in tabular format Word document and memos and observations recorded in electronic and hard-copy version of the document.

The third stage of the analysis of the data followed a "constant comparison" approach [57 p.7] where items of data were compared for similarities and differences, and then grouped into themes using NVivo qualitative analysis software. These were discussed by the research team, and then the data was revisited and the codes were refined and developed. In a fourth stage both members of the research team engaged with messy mapping of the data, relationships between the elements were explored and the various maps produced were discussed and developed. Finally a focus for this paper was generated based on the student reflections of the non-human actants that were integral to the group work process.

5. Results

5.1 The ordered situational map

The ordered situational map that was derived from the analysis of the data is presented in table 1. Clarke [12] presents a number of section headings for use in the ordered mapping process, and the headings used for this particular map have been selected as the most meaningful or important for this particular set of data. Concurrent with the Clarke [12] approach, some core themes appear more than once under different headings; which signals the need to understand them in multiple ways.

Individual human elements/actors	**Non human actants**
The student working in a group The other individual group members The lecturer The client	**Ways of communicating: (**Voice call, facebook group, email, skype, whatsapp, google docs, facebook message, in person, Instant messenger, text message) **Technology:** (smart) Phones, Computers (silent), The internet (one mention) Meetings Project tasks The report Work (load) The business Time
Collectives	**Discursive constructions of individuals and or collective human actors**
The group The class The business	Arranging meetings Shared desire to 'do well' (Taking) leadership in the group Effective communication linked to team success Valuing each others' contribution Need for time management Developing skills in working with others for the future Developing self confidence through group working There are successful, positive outcomes from group work Individuals' work must be synthesised

	Information must be shared
Discursive constructions of nonhuman actants? Access to technology is ubiquitous Face-to-face meetings enhance information sharing	**Silent actors/actants** Access to mobile networks and wifi (2 mentions of internet) The Virtual learning Environment Distinction between 'social' and 'work' media Twitter Support from tutors Physical space suitable for group working Serious conflict within the team
Key events in the situation The client interview The presentation	**Spatial elements** **(silent)** Meeting rooms (locations for meetings) The Library (Information Commons)
Temporal elements Needing to respond quickly to communications Looking into the future – what employers want/will value regarding team working Working at the same pace Reflecting on past experiences of group work Time taken to arrange suitable meeting times Time keeping for meetings Being efficient	**Socio-cultural / symbolic elements** Group work is about supporting each other Group work is about negotiating a shared pathway Group work is about solving conflicts

Major issues / debates	Related discourses
Importance of keeping in touch with the group Importance of negotiating tasks and who is best suited to which task Challenges in selecting the 'best' method of communication Feeling that some group members have not contributed equally Feeling that the work of some group members is not of sufficient quality Importance of face-to-face communication & meetings	Discourses on team roles Discourses on conflicting priorities with other pieces of work Discourses on equal contribution Discourses on group formation and the mechanics of making the group 'work'

Table 1. The ordered map.

5.2 Relational maps

The relational map diagrams the relations between elements in the situation and allows the researcher to identify the relations that are present in the data and the ones that will be further pursued in the analysis [12]. These maps are deliberately "messy" as multiple relationships are explored and mapped. In figure 1 a relational map is presented. In this map the actants (i.e. any non-human element that has agency in the situation) and temporal elements that were identified as needing further exploration, are represented within shaded enclosures. The sites of silence are surrounded by dashed lines.

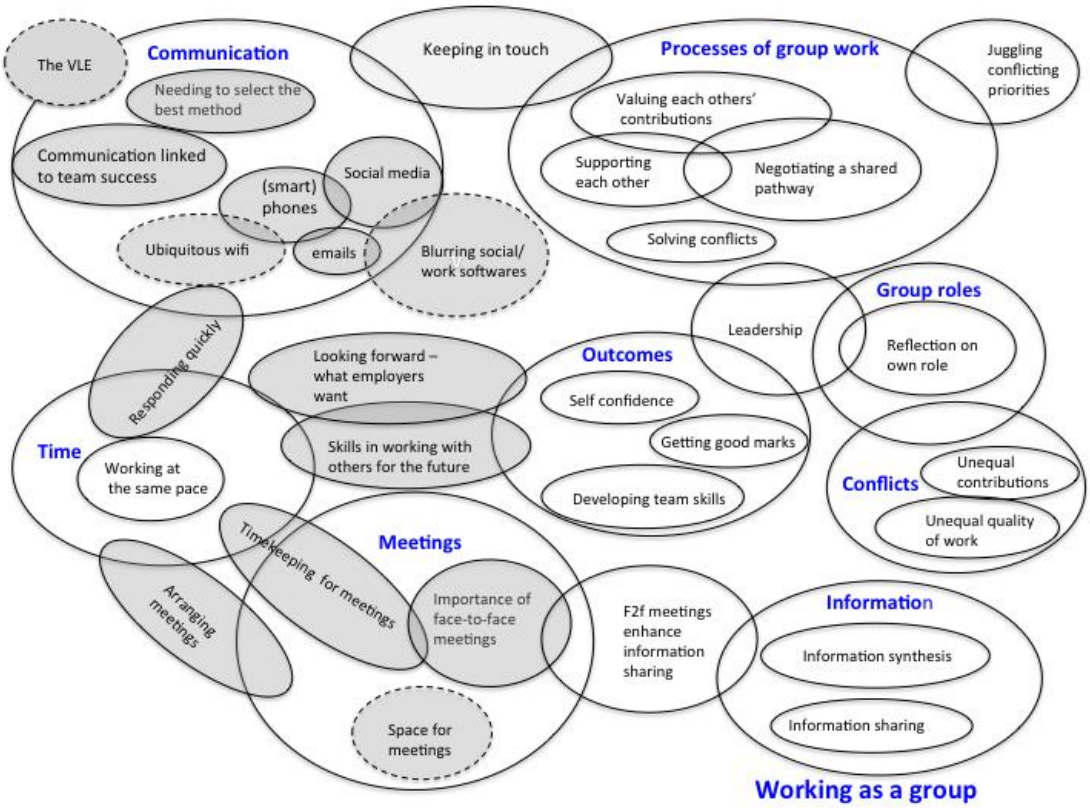

Figure 1: the relational map.

Figure 2 presents a further aspect of the relational mapping between the elements identified as significant for this particular paper.

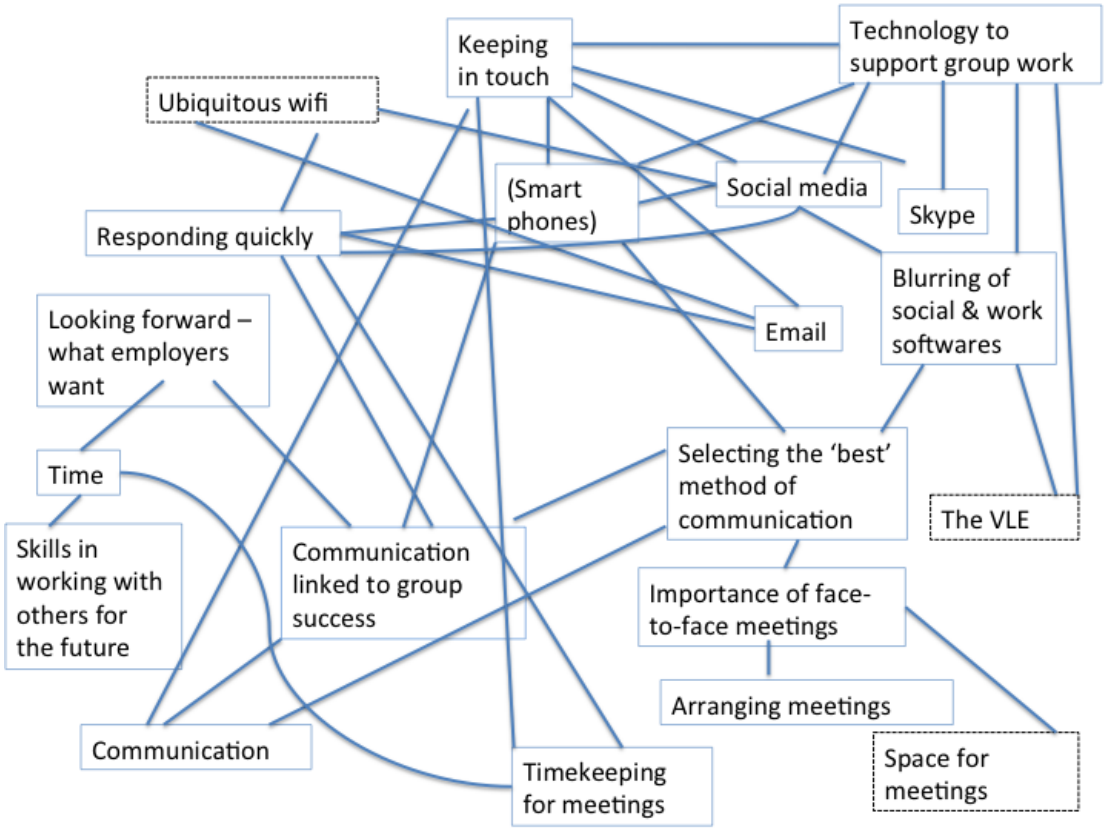

Figure 2: a revised version of the relational map.

In this map we begin to see the centrality of (smart) phones to the technological support of students working in a group and the importance of effective communication to the success of group work. Again in this diagram the sites of silence are surrounded with dashed lines, and their relationships explored as for the elements that are not silent.

The elements are more fully explored in the section below with evidence from the students' writing and this is followed by a discussion in relation to the literature.

5.3 Actants

The non-human actants comprising of communication methods facilitated through technology came through very strongly in the data and there were both casual descriptions of their use as well as significant deep reflection on their relative uses and merits. Students discussed using specific apps or software (e.g. Google Docs; WhatsApp; social networking sites):

> "We used E-Mail and skype to sort out logistical issues such as arranging meetings, and also updating of work progress and file sharing. This method of communication has been really effectively for our group, as SKYPE's instant messaging service facilitated the sharing of information despite not being physically together." (2)

Many of the software applications were used on mobile (smart) phones, as students referred specifically to their use e.g. with texting and calling and the use of mobile specific applications. Some communication and work presumably took place on desktop or laptop computers although the use of these is implied as use of these actants was identified as a site of silence in the data.

Mobile phones seem to be a key chosen communication channel in groups because of the continual contact that they can facilitate:

> "We primarily used messaging on the social network at this stage because it was agreed that we all have access to it 24/7 through mobile devices; therefore it was sensible and proved efficient at the time. Moreover, another reason was that it was difficult to match our timetables and hence we stuck with online messaging before and during Easter." (20)

The face-to-face meetings were identified as a non-human actant, the importance of these despite the use of electronic communication methods was stressed by a number of students. The report, the final outcome of the group work, and the work-load were ascribed sufficient importance in the students' reflections for them to achieve the status of actants.

The processes by which face-to-face meetings were arranged was a significant point of description of the group processes, and also reflection on difficulties experienced and lessons learned:

> "Communication was more effective face to face; however it was unrealistic to think we could arrange that many meetings around five individuals' timetables. Therefore meetings and decisions were discussed through more

than one medium: the telephone, SMS text messaging, email, face to face and 'WhatsApp'". (17)

The sheer amount of time and various communications need to arrange meetings was problematic, leading to the identification of this factor as a 'temporal element' in the ordered situational map.

> "This proved irritating as it would take a prolonged period of time to organise group meetings, especially when getting hold of one group member who was particularly difficult to correspond with. This would usually mean any suggested times for meetings would often change at the last minute causing confusion and having to move around plans to suit group members." (16)

However there was also reflection on what the "best" method of communication should be for that group e.g.

> "These were effective methods because by phoning and instant messaging your co-worker we got instant responses from each other therefore we always knew what was going on. E-mail was a less effective method because we didn't regularly check them meaning we were late to responses which delayed us ever so slightly." (21)

Students reflected on the properties of different tools and also the personal preferences of both themselves and other group members. Students seem accepting of each others' electronic communication preferences. "Keeping in touch" was identified as a way to make group work more efficient, and the students' reflective writing revealed a multifaceted and multi-channel approach to communication, and this was facilitated largely through technology.

Despite the excellent communication functionality of the tools, difficulties were still experienced with them due to the human natures of those using them. The processes by which groups communicated, and the need to have effective communication were identified as two of the key success factors to group work. Poor communication practices were linked to failure either of the individual in terms

of their functioning within the group, or the group as a whole. The plethora of communication tools used by these students and the negotiation practices that took place among them to choose the 'best' tool indicate a flexible and situation-driven approach to communication using technology.

5.4 Sites of silence

An essential feature of SA is to identify the sites of silence, and to reveal elements that are expected, but not present in the data. In the case of this data set, although there was much discussion about the methods of electronic communication, there was absolutely no mention of the availability, or indeed cost of mobile (data) networks, and there was an implicit assumption that all group members would use a (smart) phone. The phones themselves are mentioned, however other hardware e.g. PCs and tablets are not. The implicit assumption here is that 'everybody' has access to this stable and easy-to-use equipment, it is beneath mention. Interestingly, although all student groups were provided with a group collaboration area featuring a discussion board, group communication tool and file exchange capabilities on the Virtual Learning Environment, they do not reflect on using this, and the VLE is not mentioned. The students appear to make no distinction between (social) media used for personal interactions, and that used for their studies e.g. they reported no internal conflict using Facebook groups and messaging to interact with group members. Despite the growth in Twitter as a communication medium, it is not mentioned in this data set. The lack of use of some technologies or tools is a key feature of the sites of silence in the data. Some it may be assumed are being used but are not mentioned (e.g. wifi, computers) and some it may be assumed are simply not being chosen to be used (e.g. Twitter, The VLE).

The lecturer is mentioned in passing as a source of information, e.g. "This was immediately resolved as another member emailed our lecturer." (19). However there is no reflection on the significant amount of scaffolding and support given to students on the module e.g. the dedicated sessions on reflective writing and report writing; discussions on group roles and approaches to group working that take place in class.

Although students identify that face-to-face meetings are an essential feature of effective working, they do not reflect on where these meetings take place, or how suitable space is found; only on the timing of the meeting. This leads to the assumption that students are able to find suitable group working space, alluded to by the group who meet directly after the weekly class, presumably staying in the open access room in which the class is held. The library, or "Information Commons" either as a place to meet or a place to study is not mentioned, despite the centrality of this building to the undergraduate student experience. Serious conflicts seem absent from the student reflections. Disagreements and minor problems feature in the reflections, but full-scale group break-down seems to have been avoided by these two cohorts.

5.5 Temporal elements

Temporal aspects featured strongly in the reflective data; and this may reflect the time-limited aspect of all university assessed work. As mentioned above, the time it took to arrange meetings was a point of frustration. Furthermore group members being late for, or not attending meeting was problematic and identified as poor time management. It is interesting that the even though communication technology is seen to be positive, access to it does not preclude less positive behaviours, i.e. although it is possible to text a group member at a point of need, it does not mean that person will respond instantly.

As would be expected from deeply reflective writing, students both looked to the future and the past. They wrote about the skills they had gained that they would then take into employment, "This opened my eye to similar situations I am likely to have at work" (7). "I have become a more confident person because I have been able to express my opinion in the group without them judging it as well as improving my presentation skills which are necessary in the working environment." (21). In looking to the past students reflected on their past experiences of group work, and how this experience differed.

5.6 The Social Worlds/Arenas map

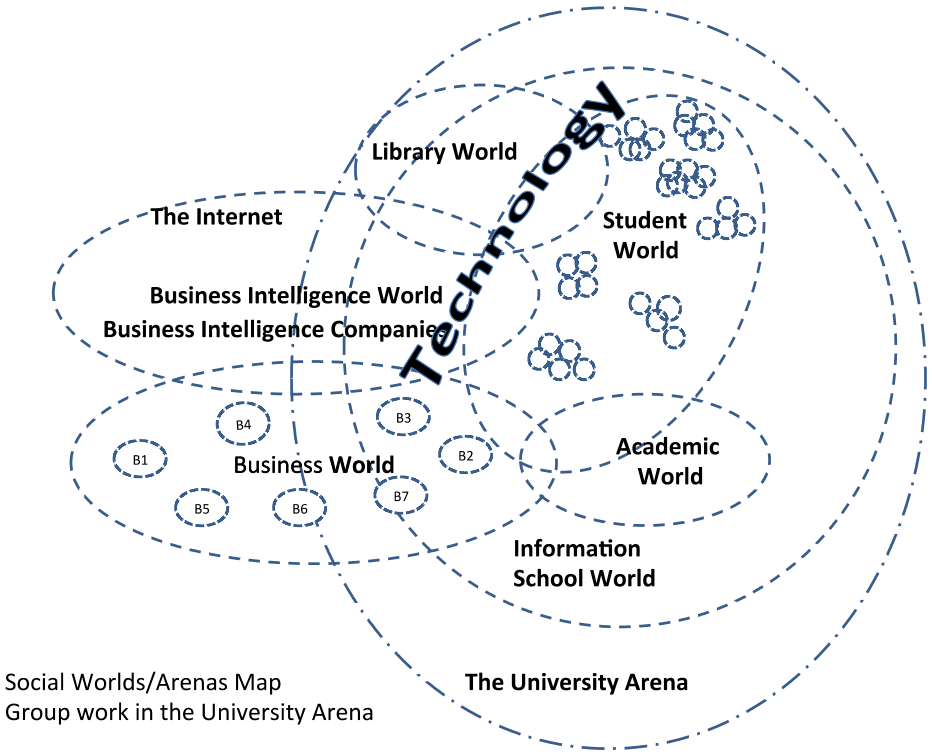

Figure 3: The Social Worlds/Arenas map.

In the Arenas map we can see the multiple worlds occupied by the students and understand this particular group project as a way for students to interact with the business world. Students enjoyed working with and for their business partner clients:

> "After every decision made, we sent our meeting feedback to client to improve, then preparing new improved topic for next meeting. Keeping communication with client, it is essential part to improve and correct project direction." (9)

The intersection of the academic world and the business world is facilitated not only through the actual project, but also through the reflective assignment where students are encouraged to think to the future and reflect on the skills they have gained for their future careers. Technology is a prominent overarching theme in this map, evidenced through the numerous references made to electronic

communication technology e.g. Facebook (38 mentions); WhatsApp (21 mentions) and email (40 mentions). Students wrote analytical reflections on the value of communication technologies and how they would use them in the future:

> "In order to try and resolve this issue I suggested that we should create a group on Facebook. I did this because I believed that this would act as a message board for the group on which we could all openly share our views and opinions. This proved to be a very effective method of communication as everything would be written down and referred back to if needed. In the future I would now suggest this communication approach at the outset as I believe it proved to be very beneficial and effective." (3)

6 Discussion

In the support session that students attended that covered reflective writing they were encouraged to write deep reflections that looked both forward and back based on the models of reflection developed by [19]. Some of the deeply reflective writing did exactly this and it was possible to see how students could relate their group learning at University to their future careers, as recommended in the literature [2],[4]. Wharton [16] suggests that students may not fully explore negative aspects of group work in their reflective writing and present a non-critical account. However while others in some groups are singled out for criticism, there is significant critical self-reflection in this data set where students not only identify where their own behaviour could be improved, but also where the group practices could be improved. There is reflection on where the successes of the group lay, particularly in how effective communication was achieved, however this is far from simply presenting a positive account of the group work.

Situational Analysis invites the researcher to consider the non-human actants that have agency, that "matter" in the situation being investigated. In this data it was evident that the tools that students use and the particular software applications that students use are important actants in the situation of group work. In common with the findings of [40] and [43], students used their phones to connect with each other and engage in team work in multiple locations, with the expectation that

communication would be rapid and that responses would be quick. However these students still value face-to-face communication, and when team members do not attend meetings or are late this is problematic, which is consistent with the findings of Hassanien [31] who also reported on the difficulty that students have in arranging these important meetings. Technology therefore can enable the reduction in the "debilitating" factors of time, space and pace [59 p. 56] but not seemingly eradicate it.

Students in these cohorts seemed very comfortable with using a wide range of software applications and technologies in their group work, in contrast to these students who took part in Hogarth's [4] study. The reflections of the students in this study mirror more the findings of [40], which although a small scale study, found a similar flexibility and adaptability in students around their use of technology to support group working. The choice of which software or application to use seemed to be openly discussed within the group, and is more a process of negotiation grounded in the needs identified of the particular tasks or group members in this particular context.

> "We set up an online Facebook group in order to keep in contact and create an information sharing mechanism. Some group members claimed to use Facebook less than others so whenever information was shared, it was encouraged for each individual to forward the message to the rest of the group via Sheffield email". (19)

The VLE as a site of silence in the data corresponds to the findings of [46] who commented that students prefer to use applications that are "free and easy to use" (p.109). This behavior is consistent with Christensen's theory of disruptive innovation [60] where disruptive technologies (i.e. social media) are adopted because of qualitative differences to do with ease of use and cost from established "sustaining technologies" (i.e. the VLE). In Flavin's [46] study The VLE was not found to be easy to use and did not have a critical mass of users that encouraged engagement with it, and it can be inferred that the same is true for these Business Intelligence students.

In seeking a theoretical underpinning for the VLE as a site of silence and the preference of students for populist and popular communication applications in our data, we turn to Illich's theory of convivial tools [47]. Convivial tools are defined as those that can be easily used by anybody and that can be adapted to multiple uses, they are not controlled by the establishment. Students seeking tools to facilitate group working and communication find that the tools provided by the university are not convivial as they are controlled by the establishment (i.e. the university) and are bounded by the university environment. The VLE (Blackboard) is a proprietary tool and is unlikely to be one that can be used by students once they leave university. It can be inferred that students reject the (radical) monopoly of one communication tool and instead seek to negotiate shared group tools that fit particular group needs in a flexible and fluid way:

> "We stayed in contact via a number of different mediums with our primary vehicle of communication being through a mobile messaging application known as WhatsApp. Despite being able to keep in constant contact regardless of location, this was not my preferred method of contact as it was not the most reliable form of communication. For sharing documents between each other and occasionally assigning work, we relied upon our Google Mail accounts, as each of us was able to access this from both a computer and our phones if required*".* (18)

Illich [47] defines radical monopoly as existing "where a major tool rules out natural competence. Radical monopoly imposes compulsory consumption and thereby restricts personal autonomy. It constitutes a special kind of social control because it is enforced by means of the imposed consumption of a standard product that only large institutions can provide" (63). Instead students move fluidly between university provided tools that still have resonance in the 'outside' world (e.g. Google docs and email), and tools that are more truly convivial. Students reflect on the use of a range of free services such as Whatsapp and university email system to support group work, and although the is a material cost to the use of some services via smart

phones this is not reflected upon, although cost has been identified as an influence on student's use of mobile phones [10].

The use of mobile phones for learning is undeniably student led [41]. Students seek to be "efficient" and "effective" these two words were used many times (efficient 16 times; effective 51 times) in their reflections, and it is interesting that [41] also use these two words in reporting students' engagement with mobile learning. We assert that students make practical and pragmatic choices about the tools they use in their pursuit of "efficient and effective" learning that enables them to achieve their learning goals and achieve success in a convivial manner. The challenge for educators is in responding to this with our pedagogical approach and learning design that can cope with the blurred lines between formal and informal learning, social media, and establishment-led Virtual Learning Environments, and allow students to explore the tools that are openly available to them without constraints.

"Time" as in time management, conflicting timetables and timeliness of communication were also identified by [61] in their study of virtual teams. The reported desire for physical meetings begs the question "where do students meet with each other for learning activities?" The design of traditional university spaces into "formal" learning environments (e.g. classrooms, libraries), and "informal" social spaces (e.g. cafes, student lounges) has long been identified as needing to change in response to pedagogies becoming more learner-centred and focused on active and collaborative learning [62]. The concept of an "Information Commons", a technology rich multi-use mixed learning environment that contains study resources (including books), and physical space to support collaborative working is one way in which universities have sought to provide for the needs of the so called millenial learner [63]. Muti-use buildings such as these blur the boundaries between formal and informal learning spaces. The University of Sheffield opened its Information Commons library building in 2007, and the identification of space for group meetings as a site of silence in these reflections may well be because this building, and other newly designed spaces that support social learning, are meeting the needs of

students working in groups for face-to-face meetings and have become just part of an accepted and expected learning environment.

7. Conclusion

The data used in this study came from a small sample of undergraduate students studying in the information disciplinary context and their use of technology to support their group working may be influenced by this. The framework provided by Situational Analysis helped provide a structure to the data analysis that revealed interesting and diverse perspectives on the data. In this paper we attempt to answer the research questions:

- What do students think "matters" in this situation of assessed group work?
- What elements and activities are identified as contributing to group success or failure?

The focus on the actants in the situation facilitated by the SA framework allowed a detailed discussion of the technologies that students reflected on using. We argue that convivial tools are elements that matter in this situation of assessed group work. The choice of tools for group communication contributes to the success of the group as each group attempts to negotiate a shared understanding of which tools will work best for them. There are many other factors that impact on groups, but our results show that successful groups should have this explicit discussion about which communication tools are the most appropriate for that group in their particular situation. The identification of the sites of silence gave rise to reflections on the ubiquity of wireless networks and availability of suitable space for meetings. These students are studying information and technology related subjects and may therefore be more comfortable with using technology-based tools to support their collaborative working than others students. Nevertheless there is a steady rise in browsing and data access through mobile platforms in our "Smart phone society" [64]. The lack of use of the VLE as a site of group activity should be a cause for concern, particularly as this and many other institutions have invested so heavily in platforms such as Blackboard. The analysis gives rise to the following points of advice for the application of collaborative inquiry in Higher Education:

The difficulty experienced in arranging face-to-face meeting with group members who have different teaching timetables and a range of other responsibilities and commitments should be addressed by educators using assessed group work. More needs to be done to support students in this activity either at institutional level (e.g. with the provision of an integrated calendar/email/timetable tool); or at the individual student (group) level with advice on scheduling tools (e.g. Doodle poll) that can help students with arranging meetings. Simply mentioning this issue and opening up communication in groups about arranging meetings would be a support strategy easily implemented. Similarly students should be encouraged to discuss methods and means of communication in the initial stages of group work and should be encouraged to find a method/technology that works for them, rather then be recommended any particular methods (e.g. university email). This approach would support students in selecting convivial tools. Groups should also discuss the tasks that individual members are expected to perform and should attempt to ensure parity of workload. Face-to-face meetings and interactions are still important for group work, and technology is vital in arranging these opportunities for collaboration and in producing and sharing meeting output.

Reflective writing has been criticised as a method of assessment due to a view that students simply write what they expect the lecturer to want to read and don't present a critical view of group work.[16],[22]. However, as [52] found, the range and depth of the reflections in this data set is not consistent with this viewpoint, particularly as students have been deeply reflective about how they approached solving problems in their group. Through this analysis it can be shown that reflective writing is helpful for making sure students can see beyond the immediate context of their group work which they may find problematic, and look at the end result in terms of marketable skills for employers and their own personal development.

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Bibliography

1. Volet S, Mansfield C. Group work at university: significance of personal goals in the regulation strategies of students with positive and negative appraisals. High Educ Res Dev. 2006;25(4):341–56.

2. Race P. The Lecturer's Toolkit : A Practical Guide to Assessment, Learning and Teaching. 3rd ed. London: Kogan Page; 2007.

3. Livingstone D, Lynch K. Group Project Work and Student-centred Active Learning: two different experiences. Stud High Educ. 2000;25(3):325–45.

4. Hogarth A. Introducing a collaborative technology strategy for higher educatuon 26

students: Recommendations and the way forward. Educ Tnformation Technol. 2008;13:259–73.

5. John-Steiner V, Mahn H. Sociocultural Approaches to Learning and Development-A Vygotskian Framework. Educ Psychol. 1996;31(3/4):191–206.

6. Doel M, Sawdon C. The essential groupworker: teaching and learning creative group work. London: Jessica Kingsley publishers; 1999. 278 p.

7. Johnson DW, Johnson RT, Smith K. The state of cooperative learning in postsecondary and professional settings. Educ Psychol Rev. 2007;19:15–29.

8. Palmer S, Hall W. An evaluation of a project-based learning initiative in engineering education. Eur J Eng Educ. 2011;36(4):37–41.

9. de Freitas S, Conole G. The influence of pervasive and integrative tools on learners' experiences and expectations of study. In: Rethinking Learning for a digital age: How learners are shaping their own experiencesearning for a digital agl. Abingdon: Routledge; 2010.

10. Benfield G, De Laat M. Collaborative knowledge building. In: Rethinking Learning for a digital age: How learners are shaping their own experiences. Abingdon: Routledge; 2010. p. 223.

11. Facer K, Selwyn N. Social networking: key messages from the research. In: Rethinking Learning for a digital age: How learners are shaping their own experiences. Abingdon: Routledge; 2010.
12. Clarke AE. Situational Analysis: London: Sage; 2005.
13. den Outer B, Handley K, Price M. Situational analysis and mapping for use in education research: a reflexive methodology? Stud High Educ. 2013;38(10):1504–21.
14. Clarke A. Situational Analysis: Grounded Theory After the Postmodern Turn. Symb Interact. 2003;4(4):83–144.
15. Clarke AE, Friese C. Grounded Theorising using situational analysis. In: Bryant A, Charmaz K, editors. The SAGE handbook of grounded theory. London: SAGE; 2007.
16. Wharton S. Presenting a united front : assessed reflective writing on a group experience. Reflective Pract Int Multidiscip Perspect. 2012;13(4):489–501.
17. Boud D. Avoiding the traps: seeking good practice in the use of self assessment and reflection in professional courses. Soc Work Educ. 1999 Jun;18(2):121–32.
18. Greenall J, Sen BA. Reflective practice in the library and information sector. J Librariansh Inf Sci. 2014;1–14.
19. Sen B, Ford N. Developing reflective practice in LIS education: The SEA-change model of reflection. Educ Inf. 2009;27(4):181–95.
20. Sen BA. Reflective Writing: a management skill. Libr Manag. 2010;31(1/2):79–93.
21. Mckinney PA. Reflection for learning : understanding the value of reflective writing for information literacy development. J Inf Lit. 2012;6(2):110–30.
22. Moon JA. A handbook of reflective and experiential learning: Theory and practice. Abingdon: RoutledgeFalmer; 2004.
23. Rai L. Social Work Education : The Owning (up to) Reflective Writing in Social Work Education. Soc Work Educ Int J. 2006;25(8):785–97.
24. Nevalainen MK, Mantyranta T, Pitkala KH. Facing uncertainty as a medical student-A qualitative study of their reflective learning diaries and writings on specific themes during the first clinical year. Patient Educ Couns. 2010;78(2):218–23.
25. Moate J, Sullivan P. The moral journey of learning a pedagogy: a qualitative exploration of student–teachers' formal and informal writing of dialogic pedagogy. Pedagog Cult Soc. 2015;23(3):411–33.

26. Braun UK, Gill AC, Teal CR, Morrison LJ. The utility of reflective writing after a palliative care experience: can we assess medical students' professionalism? J Palliat Med. 2013;16(11):1342–9.
27. Mayne L. Reflective writing as a tool for assessing teamwork in bioscience: Insights into student performance and understanding of teamwork. Biochem Mol Biol Educ. 2012;40(4):234–40.
28. Clarke N. Emotional intelligence and learning in teams. J Work Learn. 2010;22(3):125–45.
29. Belbin RM. Management teams: why they succeed or fail. 3rd ed. Butterworth-Heinelen; 2010.
30. Egolf DE, Chester SL. Forming Storming Norming Performing: Successful communication in groups and teams. 3rd ed. Bloomington: iUniverse; 2013.
31. Hassanien A. Student Experience of Group Work and Group Assessment in Higher Education. J Teach Travel Tour. 2006;6(1):17–39.
32. Pang E, Tong C, Wong A. Key determinants of student satisfaction when undertaing group work. Am J Bus Educ. 2011;4(10):93–104.
33. Fearon C, McLaughlin H, Eng TY. Using student group work in higher education to emulate professional communities of practice. Educ + Train. 2012;54(2/3):114–25.
34. Thomas D, Seely Brown J. A new culture of learning: cultivating the imagination for a world of constant change. CreateSpace Independent Publishing Platform; 2011.
35. Ali A, Murphy HC, Nadkarni S. Hospitality students' perceptions of digital tools for learning and sustainable development. J Hosp Leis Sport Tour Educ. Elsevier; 2014;15:1–10.
36. Lightfoot JM. A comparative analysis of e-mail and face-to-face communication in an educational environment. Internet High Educ. 2006;9:217–27.
37. Kennedy GE, Judd TS, Churchward A, Gray K. First year students ' experiences with technology : Are they really digital natives ? 2008;24(1):108–22.
38. Middleditch P, Moindrot W. Using technology to enhance the student experience in large cohort settings: evidence from a journey of innovation at the University of Manchester. J Perspect Appl Acad Pract. 2015;3(2):58–71.
39. Khan MMH, Chiang JCL. Using mobile devices & social media in supporting engineering education. 2014 IEEE Glob Eng Educ Conf. 2014;(April):1077–81.

40. Nortcliffe A, Middleton A. The innovative use of personal smart devices by students to support their learning. Cutting-edge Technologies in Higher Education. 2013. 175-208 p.
41. Gikas J, Grant MM. Internet and Higher Education Mobile computing devices in higher education : Student perspectives on learning with cellphones , smartphones & social media. Internet High Educ. 2013;19:18–26.
42. Lauricella S, Kay R. Exploring the use of text and instant messaging in higher education classrooms. Res Learn Technol. 2013;21(19061):1–17.
43. Robinson S, Stubberud HA. Communication preferences among University stduents. Acad Educ Leadersh J. 2012;16(2):105–14.
44. Greenhow C, Lewin C. Social media and education: reconceptualizing the boundaries of formal and informal learning. Learn Media Technol. 2016;41(1):6–30.
45. Lampe C, Wohn DY, Vitak J, Ellison NB, Wash R. Student use of Facebook for organizing collaborative classroom activities. Int J Comput Collab Learn. 2011;6:329–47.
46. Flavin M. Disruptive technologies in higher education. Res Learn Technol. 2012;5(Supplement: ALT-C 2012 Conference Proceedings):102–11.
47. Illich I. Tools for Conviviality [Internet]. 2007. Available from: http://www.preservenet.com/theory/Illich/IllichTools.html
48. Barnett R. Higher education: a critical business. Buckingham: Society for Research into Higher Education; 1997.
49. Spronken-smith R, Walker R, Batchelor J, O'Steen B, Angelo T. Enablers and constraints to the use of inquiry-based learning in undergraduate education. Teach High Educ. 2011;16(1):15–28.
50. Creme P. Should student learning journals be assessed? Assess Eval High Educ. 2005;30(3):287–96.
51. Ross J. Performing the reflective self: audience awareness in high-stakes reflection. Stud High Educ. 2014;39(2):219–32.
52. Fetherston AB, Kelly RHS. Conflict Resolution and Transformative Pedagogy: A Grounded Theory Research Project on Learning in Higher Education. J Transform Educ. 2007;5(3):262–85.

53. Bryant A, Charmaz K. Grounded Theory in Historical Perspective: An Epistemological Account. In: Bryant A, Charmaz K, editors. The SAGE handbook of grounded theory. London; 2007.
54. Corbin J, A. Strauss. Basics of qualitative research: Techniques and procedures for developing grounded theory. 4th ed. Thousand Oaks: SAGE; 2015.
55. Ford N. Introduction to information behaviour. London: Facet; 2015.
56. Perez MS, Cannella GS. Situational Analysis as an Avenue for Critical Qualitative Research: Mapping Post-Katrina New Orleans. Qual Inq. 2013;19:505–17.
57. Sen BA, Spring H. Mapping the information-coping trajectory of young people with long term illness: An evidence based approach. Vol. 69, Journal of Documentation. 2013. 638-666 p.
58. Dey I. Grounding categories. In: Bryant A, Charmaz K, editors. The SAGE handbook of grounded theory. SAGE; 2007. p. 166–91.
59. Mlitwa NB. Technology for teaching and learning in higher education contexts : Activity theory and actor network theory analytical perspectives. Int J Educ Dev using Commun Technol. 2007;3(4):54–70.
60. Christensen C, Horn M, Johnson C. Disrupting Class How disruptive innovation will change the way the world learns. New York: McGraw-Hill; 2008.
61. Gapp R, Fisher R. Undergraduate management students' perceptions of what makes a
31
successful virtual group. Educ + Train. 2012;54(2/3):167–79.
62. Jamieson P. Designing more effective on-campus teaching and learning spaces: a role for academic developers. Int J Acad Dev. 2003;8(1-2):119–33.
63. Lippincott J. Information Commons: Meeting Millennials' Needs. J Libr Adm. 2010;50(1):27–37.
64. Ofcom. The communications market 2015 [Internet]. 2015. Available from: http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr15/

11.5. Appendix 5: Paper 5 McKinney, PA. & Cook, C. (in press) Student conceptions of group work: visual research into LIS student group work using the draw and write technique. *Journal of Education for Library and information science.*

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Abstract

The use of collaborative pedagogies is a well-respected and common feature of Higher Education and the ability the work well in a team is a desirable graduate and professional attribute. However, tutors can often experience significant issues with the support and management of student group work, and students can find group work difficult to manage and have very negative perceptions of group work. This paper examines LIS students' conceptions of group work as revealed through the students' drawings. 146 drawings of group work were collected from taught Postgraduate and Undergraduate students in an Information School. The drawings reveal a wide range of conceptions of group work from very process and tool driven conceptions; to more metaphorical conceptions of idea generation, puzzle, or a site of strength. Students were concerned with group structures and the role of leader. Group work is negatively affected by stress and perceptions of unequal contribution of group members . Implications are drawn for LIS educators, and suggestions aremade for the use of drawing as method of group support.

Keywords: Group work, collaboration, draw and write, Visual methods, group roles

Introduction

It is widely acknowledged that people learn instinctively and naturally from others, and that much meaningful student learning happens in the small group context (Race, 2007). Research has shown that group work has a positive impact on studentsengagement and performance, leading to work of a higher quality and better marksthan individual students can achieve on their own (Arendt & Gregoire, 2006). Students value the opportunity to share ideas and viewpoints and understand different perspectives (Gagnon & Roberge, 2012). One role of Higher Education is to prepare students for their careers as LIS professionals, and as such, group work can be seen as a vital aspect of university study. Employers actively seek graduates who can work well with others (Race, 2007; Volet & Mansfield, 2006), and working together in small groups at University gives students the opportunity to build team working skills and prepare for professional team-working (Rafferty, 2013). LIS professional bodies recognize that skills for cooperation, networking and partnership working are important aspects of LIS professionals (CILIP, 2017), as is understanding the social interaction aspect of learning (Bertot & Sarin, 2016).

However, students themselves have expressed varying, and often negative, opinions about working in groups in Higher Education (Hillyard, Gillespie, & Littig, 2010). It is not always possible for students to see the transferability of student group work experiences to their professional lives, (Arendt & Gregoire, 2006). Issues of fairness in group work make assessment problematic, particularly if there is “free-riding” where some group members do all the work and others do none (Slavin, 1990). The prospect of dealing with free riding can cause students to dread modules with group work (Freeman & Greenacre, 2010).

Educators and theorists are convinced of the personal and professional benefits of group work, however, students are concerned with the realities of managing group work and achieving good grades. In this paper, the contested landscape of student group work is examined through the medium of student-created drawings, contributed by students in the Information School at The University of Sheffield The drawings were collected and analysed using the “draw and write” methodology,

which has been widely used with children(e.g. Weber & Mitchell, 1996), and is being increasing used to collect data from adults in a both a Higher Education context (Dean, 2015; Hartel, 2014a), and in LIS research (Pollak, 2017). In this research, aprotocol designed and implemented by Hartel (2014a) to study student conceptions of information, was used to provide a methodological framework for the collection and analysis of the data.

The central research question addressed in this paper is "what conceptions do students have about working in groups". In addition, the study aims to discover how students work together in their groups, and the positive and negative aspects of group work that are expressed.

The significance of this study

Previous studies that have sought to understand group work have collected quantitative survey data (e.g. Hall & Buzwell, 2013), others have collected qualitative data in the form of interviews and focus groups (e.g. Volet & Mansfield, 2006). Much previous research has focused on students' experience in a single module or class (Kimmel & Volet, 2010). This large study, which involved participants from across an Information School, attempts to understand LIS students' broader conceptions of group work, going beyond their experience in a single module or class. It is the first study of student group working to use drawings as data, and this novel methodological approach reveals a range of unique perspectives on this challenging yet extremely valuable aspect of learning in LIS Education.

Structure of this paper

The theoretical literature on how students work together in groups is discussed; and the multi-disciplinary and LIS-specific literature on the perceptions and opinions that students have about working in groups in the Higher Education context is reviewed. Previous research using the draw-and-write methodology is explored, before the particular method applied in this research is discussed. A content and thematic analysis of the drawn data is presented, and the results are discussed with reference to the literature.

Literature review

Theories of collaborative learning

Social constructivist theorists assert that cooperative learning is more successful than individual learning (Slavin, 1990). This social constructivist view of learning in Higher Education argues that students, through engaging in group work, take responsibility for their own learning and are given the opportunity to develop important abilities to analyse, evaluate and synthesise (Ayres, 2015). In their extensive research on group learning, Johnson and Johnson (1992; 1999; 2002; Johnson, Johnson, and Smith 2007) define cooperative groups as those where members work actively for the benefit of all, leading to higher achievement for all. Cooperative learning, (compared with competitive or individualistic learning), "results in higher achievement, greater long term retention of what is learned, more frequent use of higher level reasoning (critical thinking) and metacognitive thought, more willingness to take on difficult tasks and persist (despite difficulties) in working towards goal accomplishment, more intrinsic motivation, transfer of learning from one situation to another and greater time on task" (Johnson et al., 2007 p.19). The challenge for LIS educators is in ensuring that group work at university achieves the happy state of cooperative learning.

Models of group roles and group functioning

It is often the case that group members take on different roles within the group, and sometimes these can be both formal (e.g. leader, secretary), and informal (Johnson & Johnson, 2003). Clearly defining roles and responsibilities at the start of a group work can have a positive impact on the experiences of group members (Gagnon & Roberge, 2012). Groups can really struggle with issues of authority and leadership (Cartney & Rouse, 2006), and identifying a leader can be problematic (Fearon, McLaughlin, & Eng, 2012). Freeman and Greenacre (2010) advised that having defined student roles for groups complete with explicit skill sets was one way that free riding could be addressed by tutors. Belbin (2010) categorised nine team roles that describe tendencies people have to behave in certain ways when they interact with other in a team environment. In Higher Education, students are often invited to self-assess their preferred Belbin team role, furthermore the roles can also be used

as a stimulus to discuss potential problems in groups and how they can be addressed (Smith, Polglase, & Parry, 2012).

A further view of group functioning is to look at the phases of group development, and the most influential of these is Tuckman's (1965) five stage model (Forming, Storming, Norming, Performing and Adjourning), which is widely cited in both themanagement and educational literature (Egolf & Chester, 2013; Johnson & Johnson, 2003). However there are concerns raised that the model is overly simplistic and does not represent iterative group processes, or what happens if the group does not achieve success – some groups do not move beyond the "storming" stage (Bonebright, 2010). Conversely others do not go through it at all (Asgari, 2017).

How students work together

Students working together in a shared space is seen to offer much greater benefits than dividing up the task and working individually (Mayne, 2012). Research has shown that there is a connection between discourse and learning, i.e. that discussions with peers can help students gather and clarify information, can support knowledge construction, can increase motivation and engagement and reinforce learning (Askell-Williams & Lawson, 2005). However, establishing suitable times and places for meetings can be difficult, and is adversely affected by students' different and conflicting academic and personal commitments (Fearon et al., 2012; McKinney& Sen, 2016). When not meeting face-to-face students flexibly use a range of modern communications hardware (smart phones, tablets etc.), and software (Facebook, email, WhatsApp etc.) to work collaboratively (McKinney & Sen, 2016; Nortcliffe & Middleton, 2013). Even if students are working in co-located teams, much student group work is "heavily mediated by technology" (Benfield and De Laat 2010 p.188) In particular mobile phones enable communication at the point of need and facilitate
rapid communication (Lauricella & Kay, 2013).

Students with differing academic goals can disrupt group work, e.g. some students simply want to achieve a pass grade, others who aim for higher grades can feel that

they take on a disproportionate amount of work (Belluigi, 2014). It has been found that students identify that poor attendance at group meetings is a barrier to effective group work (Hassanien, 2006).

Free riding or social loafing

Free riding is present as a phenomenon in many disciplines and contexts and various solutions have been tried (e.g. creating greater group cohesion and modifying the distribution of grades within the group) to attempt to address the problem (Hall & Buzwell, 2013). Groups where all members receive the same grade experience greater problems with free riding (Clark & Baker, 2011). Free riding can be incredibly destructive to groups, and those perceived as free riders are punished by giving them tasks they are unsuited to, arranging meetings at times they are unable to attend, excluding them from email exchanges and setting unrealistic deadlines(Freeman & Greenacre, 2010). Students can struggle though to understand the reasons why their peers are not contributing well to a group, and may not distinguish between laziness and other reasons for non-engagement (Freeman & Greenacre, 2010). Differing work styles can cause perceptions of free riding, as can low self-esteem and low opinions of work quality (Hall & Buzwell, 2013).

Multicultural groups

Collaborative working enables students to work with people from different backgrounds, be exposed to different perspectives and benefit from diversity in the student population (The Boyer Commission, 1998). Culturally diverse groups had a more positive perception of the interpersonal, cognitive and management aspects of their group work, and seemed better able to create a good group working environment (Kimmel & Volet, 2010).

Students from different cultural and national backgrounds have different prior educational experiences, different cultural norms that can make working in multicultural groups problematic (Popov et al., 2012). Chinese students , who often have a teacher-centered, didactic and individualistic educational background, favour hierarchical structures in group work and seek to have a designated group leader,

which is one way they attempt to deal with variable levels of contribution to a group. They seek compromise in conflict situations, and while comfortable working in study groups, find that cultural norms around status and "face" limit their ability to be open about disagreements in group discussions (Chan, 1999; Clark & Baker, 2011; Wang, 2012). Research into multicultural groups in the University of Sheffield Information School, the same site of research as this study, found that culturally specific academic attitudes, difficulties in communicating effectively (exacerbated by poor competence in English), the complexity of the task and amount of support available had a major impact on the performance of multicultural groups (Asgari, 2017).

Group working in LIS education

There is a small body of literature relating to group work in LIS education, however research tends to focus on aspects of group functioning related to the LIS research areas; e.g. a number of studies focus primarily on information behavior in a collaborative setting (Hyldegård, 2006; O'Farrell & Bates, 2009). Other studies focus on use of learning technologies or online tools to support collaboration, for example Elgort, Smith, & Toland, (2008) describe the use of a wiki as a platform for student collaborations, and Virkus (2008) comments on the range of web 2.0 technologies that have value in LIS education to support constructivist collaborative pedagogies. LIS students are adept at using a range of communication technologies, yet still value face-to-face meetings (McKinney & Sen, 2016). Teaching Information literacy using collaborative pedagogy librarians to students in varied disciplines is also a feature of the LIS literature (e.g. Ashley, Jarman, Varga-Atkins, & Hassan, (2012). In this study, various approaches were trialed to ensure that groups were well supported in the enquiry projects e.g. individual and group journals, and personal tutor support for groups. A further sub-set of literature focuses on the differing experiences of distance and face-to-face LIS learner, including their experience of collaboration (Bernier & Stenstrom, 2016; Dow, 2008; Haigh, 2007). Nevertheless, it is apparent from the LIS specific literature that many of the issues encountered by educators and students with regard to the support and management of group work mirror those in the multidisciplinary literature. For example groups in LIS education have

found it difficult to manage their time and communicate effectively (O'Farrell &nBates, 2009); have experienced frustration and disappointment due to differences in motivation and ambition between group members (Hyldegård, 2006).
In summary, the large body of research about group working in Higher Education presents theoretical and empirical evidence of the positive aspects of student group working in an education context. However, factors such as variable levels of contribution, leadership, planning and communication can have positive or negative impact on how the group works together, and ultimately the educational achievement of individual students. Research has shown that students from different nationalities have differing, often culturally driven, expectations of the group work process, which can lead to tensions in multicultural groups. Models of group working have focused on roles adopted by group members (e.g. Belbin), and the stages groups go through (e.g. Forming), however little previous research has attempted to understand the detail of group processes and activities, or students' conceptions of group work.

Methodology

The increasing importance of imagery and visual culture in modern society has led to the development of visual research methods, which encourage deeper reflection of visual culture and understand the diversity of human experience (Prosser & Loxley, 2008). The Draw and Write technique is a creative methodology that has been used in diverse ways to collect standalone data, or as a precursor to interviews or discussions with participants (Angell, Alexander, & Hunt, 2014). The methodology allows participants to express ambiguous and contradictory ideas and opinions that cannot be easily expressed in writing (Weber & Mitchell, 1996); and can capture and reveal complex and abstract thoughts and emotions (Angell et al., 2014; Bagnoli, 2009). The drawing is a visual product that enables researchers to understand a participants' understanding of the world (Guillemin, 2004).

Participants in this study were all current students at the University of Sheffield, and the study was granted ethical approval by the Information School. In the data collection process the students studying the selected modules were emailed in

advance regarding the research project. For each module, the researcher arrived at the beginning of the teaching session, and following the Hartel (2014a) protocol, students were given a 10cm x 10cm piece of white card (known as an isquare) and a high-quality black rollerball pen. The use of a specific size of paper restricts drawings from "sprawling" and aids in manipulation and display of the images (Hartel, 2014a). The provision of a standard pen ensures consistency and limits the image to a monochrome representation so that analysis can focus on shape rather than colour (Hartel, 2014a).

The isquares, pens and ethics consent forms were distributed and then collected after approximately 10 minutes. Students were simply asked to "draw group work" on one side of the isquare, and asked to "write something about their drawing" on the reverse. The framing was left deliberately vague so as to invite students to contribute drawings about any aspect of group work that they wished. In this way their feelings, thought and opinions were not constrained by the researcher, and it was possible to gather snapshots of what the students (rather than a tutor) felt was important or interesting about group work (Pridmore & Bendelow, 1995).

Demographic information was not collected from participants, however table 1 gives details about the students registered on each module included in the data collection:

Module	**Level of study**	**Total number of students**	**% International**	**Number of isquares collected**
Business Intelligence	UG	38	34.2% (n=13)	11
Data Mining and Visualisation	PGT	22	63.6% (n=14)	8

Business Intelligence	PGT	168	94% (n=158)	135
Academic & workplace libraries	PGT	33	69.6% (n=23)	9
		261		163

Table 1: characteristics of students registered on the modules

As can be seen from the table, there is a high percentage of international, primarily Chinese, students who studied in the modules where data was collected. Thus, the literature on multicultural groups in general, and Chinese students in particular, was reviewed and the issues arising incorporated into the analysis and discussion. 163 isquares were collected, 17 of which only included text, with no drawing, thus 146 drawings form the corpus for analysis.

Data Analysis

In the data analysis phase an undergraduate student (Cook) was recruited to work on the project; funded by the University of Sheffield's Undergraduate Research Experience (SURE) scheme. This provided a valuable student perspective on the drawings and facilitated productive discussions on the interpretation of the data. The Information School's International student support officer was also invited to contribute to the analysis, in particular to identify Chinese cultural symbolism present in the drawings that might aid their interpretation. The analysis followed a distinct series of phases:

1. The isquares were numbered, photocopied, scanned and saved as image files.
2. A quantitative content analysis was performed to quantify the type of images and graphical representations used in the isquares (Dean, 2015; Horstman & Bradding, 2002)
3. A thematic analysis was undertaken by both members of the research team, to identify common themes and conceptions of group work represented in

the isquares. An Excel spreadsheet was used to record details of each isquare and the analysis in stages 2 & 3.

4. The “written description” and any text that had been written on the drawing was transcribed and recorded in the spreadsheet, and the descriptions used to support the interpretation of the drawing.

Meanings and themes from the analysis phase were then surfaced for discussion and presentation in this paper.

There is no commonly agreed approach to the analysis of data collected using the draw and write technique, and researchers need to be explicit about the extent to which any written data accompanying the drawings is used to support the data analysis (Angell et al., 2014). Weber & Mitchell, (1996) strongly assert that drawings can be as communicative as written text, albeit while offering a different perspective on human sensemaking. For this reason, the paper focuses on the presentation and interpretation of the drawn data. The textual descriptions were read and discussed by the research team, and used to support the visual interpretation of the drawings. For the vast majority of the isquares the text did not discredit or contradict the interpretation of the drawings, and supported the researchers’ interpretation of the drawing. In effect, this paper presents and discusses the drawn data, not the textual descriptions.

Results

Content analysis

Motifs and graphical representations in the isquares were counted, and the results of this content analysis are shown below in table 2. In addition, the number of isquares that were categorised with a particular theme were also counted, and this data is included in the thematic analysis section.

Motif/Graphic representation	Number of isquares this appears in
Stick figure	82
Arrows	59
Circles	53
Table/Desk	26
Thought/Speech Bubbles	26
Paper/Writing	18
Technology (laptops, computers, phones)	16
Reading/Books	13
Hands	10
Building/Structure	8
Parts/Puzzles	7
Question Mark	5
Lightbulb	4
Whiteboard	4
Trees	4
Bamboo	3

Table 2: Content analysis

Many stick figures, representing members of the group, varying from very simple depictions of the human form, to much more detailed figures that featured expressive emotions, clothing or holding objects were present. People were often depicted with thought and speech bubbles, modelled on cartoons and graphic novels. Verbal communication therefore was seen to be a key aspect of group work, and 52 isquares contained explicit representations of communication between individuals. It was also interesting to see thoughts represented, both as thinking

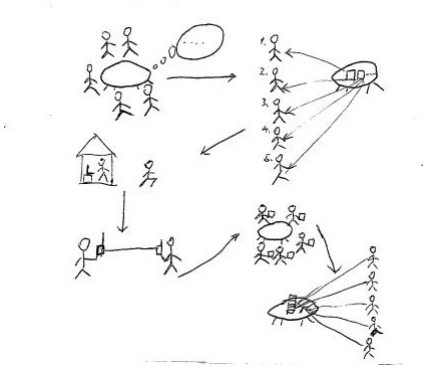
processes and also private thoughts and opinions on the group work, presumably kept unsaid.

Arrows were commonly used as connectors to link items in the drawings, and to represent a process or a set of stages. Arrows often indicated communication and connectivity, and were used to indicate the sequence of events that took place as part of a group work project. The motifs present in the content analysis are explored in more detail in the thematic analysed below.

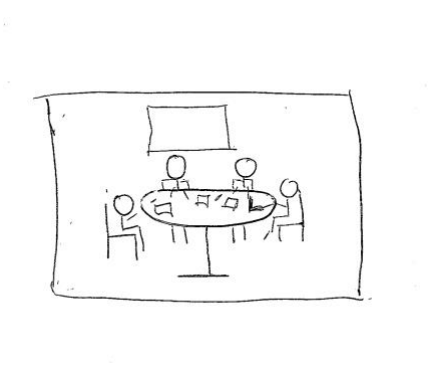
Thematic analysis

Group work means working together face-to-face

26 of the isquares feature group members working collaboratively face-to-face, using tables or desks as a focus of the group activity. In some isquares (e.g. 28 below) the drawing simply depicts one meeting. However in others the face-to-face meeting is represented in the context of other group work activities, as in isquare 41, which show a series of meetings interspersed with individual work. Communication and ideas generation are often specifically labelled in these drawings of meetings, either with speech bubbles, or thought clouds and with lines linking members with each other.



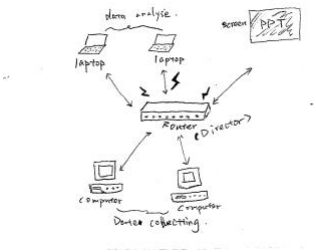
isquare 41

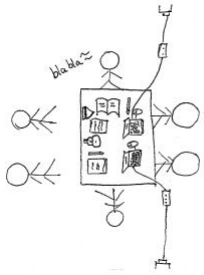


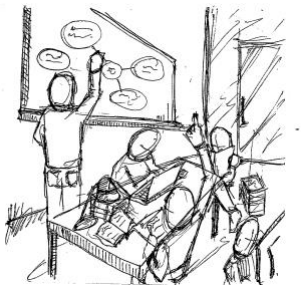
isquare 28

The tools to support collaboration are an important aspect of group work

It is evident from the isquares that students use a variety of technological and nontechnology-based tools to support and facilitate their group work. In isquare 17 we can see a detailed depiction of hardware, software, and even power supply. People are not represented.





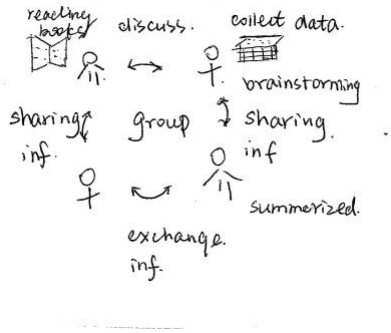


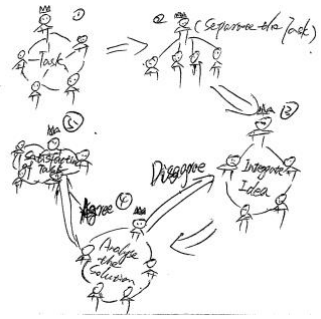
Isquare 17 isquare 63 isquare 38

In isquare 63, similar consideration is given to the need for power for devices in the collaborative space, but here people meeting as a group provides the central image. Books and writing implements can be see, an indication that the group work is not solely conceived as being mediated by technology. In isquare 38 we can see a dynamic representation of a group meeting, likely taking place in a dedicated bookable group meeting space typical of libraries and learning centres, where students are making use of a whiteboard to frame and share their ideas. In total 4 isquares contained whiteboards.

Group work is a process and involves a set of distinct phases

19 isquares depicted group work as a series of defined stages where groups meet, then work individually then come together to share progress and exchange ideas. In these phases, there is often a process of information searching, information gathering, and information sharing shown in isquare 120. In isquare 41 (above) different locations, including the home are shown, and while the whole group is shown communicating face-to-face, we can also see two members communicating by phone.



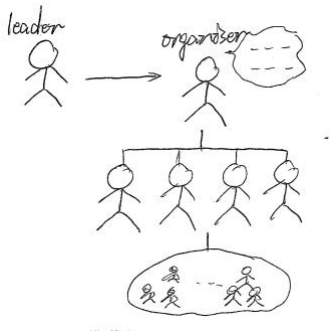


isquare 120 isquare 109

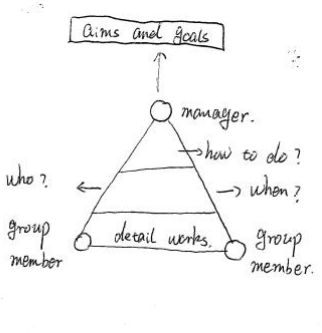
In isquare 109 the student is explicit about the fact that the group task is sub-divided into individual tasks which are worked on separately, and there is a subsequent process of rationalizing and integrating information. The student recognizes the potential for disagreement in this process. There is some evidence of the Tuckman (1965) stages of "Forming, Norming, Storming and Performing", but more emphasis is given to tasks, rather than the interpersonal aspect of the stages of group work. The different activities that take place at certain stages in the group process are shown e.g. defining the task, assigning tasks to members, having a meeting, sharing information and progress, dispersing to work further and coming together to create the final product.

Leadership is important, and groups can have hierarchical structures

26 isquares contained drawings of a leader, and often these were represented in a type of hierarchical structure reminiscent of an organisation chart or organogram, as seen in isquare 34. In some isquares the leader is represented with a little crown demoting their status and authority in the group, and is depicted delegating specific tasks to individual members, or defines the timeline of the group activity as in isquare 54

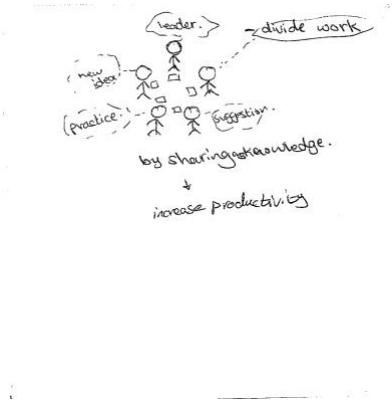


isquare 34

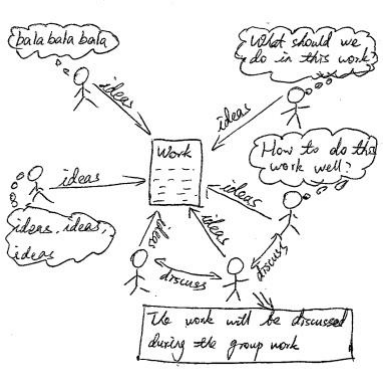


isquare 54

Some labels on drawings indicate that the group leader is responsible for defining the timetable of the group work, and is in charge of synthesizing information found by other members. The leader seems to be analogous to the Belbin team role of "coordinator" (someone who delegates roles in the team), combined with "Implementer" (someone who plans a strategy and ensures it is carried out). Other depictions of the leader are more egalitarian, with the leader represented in a circle, or sitting at the same table as the other members of the group. Members, and the leader, are shown as having defined responsibilities commensurate with their abilities, skills and experiences which although quite different, are equally valued as in isquare 70



isquare 70



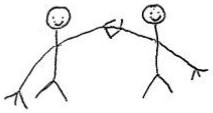
isquare 108

It is not possible to see the full range of the Belbin team roles represented in the isquares, and often the activities represented in the isquares could be assigned to

one of the Belbin roles descriptions, but not to an individual in the team. More often the action of "resource investigator" is carried out by more than one member of the group. Often all members are depicted contributing to the shared output (as in isquare 108 above), rather than this being the role of a "completer finisher".

Group work is about connecting with others

23 isquares were identified as expressing overtly positive representations of group work, and many of these showed hands, and group members connecting with each other by holding hands. Even where students do not have a positive perception of group work, they are shown united in their unhappiness (isquare 77).

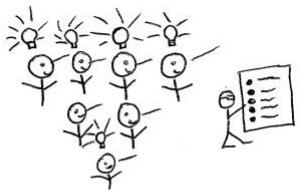


isquare 6

isquare 77

Group work is about generating ideas

A commonly used image seen in 5 isquares were lightbulbs, used to represent the generation of ideas and the positive experience of working together e.g. isquare 5.

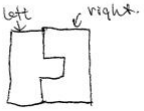


isquare 5

isquare 81

Group work is a puzzle with interlocking parts

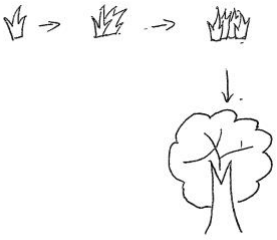
Seven isquares depicted group work as a puzzle, with interlocking parts indicating the necessary contribution of all members towards the share goal as in isquare 155. Two isquares (e.g. isquare 149) showed two tessellating Chinese characters (named in the written description), showing how different parts of the group fit together.



isquare 155 isquare 149

There is strength and growth in the group

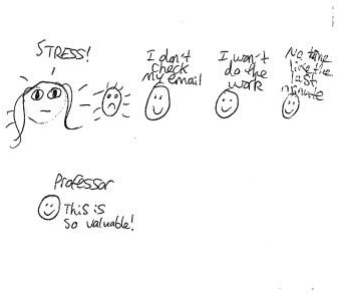
Eight isquares were categorized as showing strength in the group, although a variety of objects were drawn that were interpreted as depicting “strength”. Three isquares (e.g. 36) contained drawings of bamboo which a common Chinese symbol for showing that that all group members are equally important. When the bamboo bucket is filled up with water, all the bamboo pieces are important to keep the water from leaking outside. Other images of strength and growth included trees (e.g. isquare 92) and buildings (e.g. isquare 141).



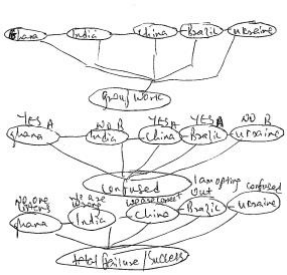
isquare 36 isquare 92 isquare 141

Group work is stressful, it is a negative experience

Apart from freeloading, a number of other isquares presented a negative view of group work. In isquare 20 the tension between the positive framing of group work by academic staff, and the stress and time management problems experienced by students is powerfully depicted. Communication problems experienced in multicultural groups is the theme of isquare 161.



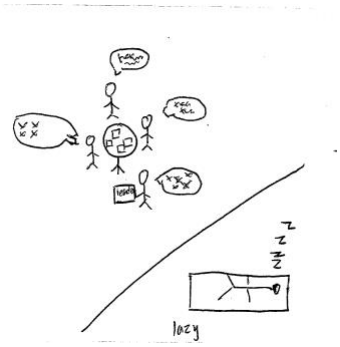
isquare 20



isquare 161

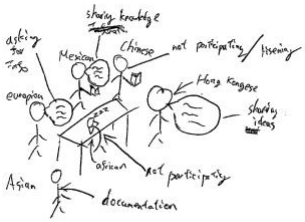
Freeloading is a problem with groups at University

Eight isquares contained drawings that showed freeloading, or unequal contribution of group members. In isquare 22 we can see a classic image of freeloading where four group members are having a meeting and a fifth group member is depicted as being at home, in bed, and is labelled “lazy”. However, freeloading does not necessarily involve absence, sometimes it is represented as non-engagement in a meeting. A more metaphorical view of freeloading can be seen in isquare 57, where the relative contributions of group members are weighed on a scale, indicating the injustice felt by students who have a group member who does not contribute as much as they might. In isquare 30 multicultural tensions around freeloading are revealed by the student who created this drawing, in which one group member is asleep at the table, and another reading a book labelled “not participating/listening”. Each group member has been given a nationality.



isquare 22

isquare 57



isquare 30

In summary, a very diverse range of images have been used to represent group work; from very literal drawings that show actual people working in groups; to drawings that show processes and activities and structures; to very abstract and metaphorical representations of group working. This diversity is explored in relation to the existing literature on group work below.

Discussion

Conceptions of group work

A strength of collecting drawn data is that it allows participants to express concepts through metaphors (Weber & Mitchell, 1996), and it is possible to see a variety of metaphorical representations of group work in this data set. Group work is "holding hands" and connecting with others, and these mages represent positive conceptions of group work that are echoed the literature around the perceived benefits of group working (Cartney & Rouse, 2006; D. Johnson & Johnson, 1992). Groups are represented as being "strong" through working collaboratively towards a shared goal, and this corresponds to a Chinese proverb "Only when all contribute their firewood can they build up a strong fire"(Clark & Baker, 2011). Group work is a puzzle, and a process, that involves people and activities fitting together in complex ways, and aspects of models of group roles and functioning (e.g. (Belbin, 2010b; Tuckman, 1965) can be seen in the data. Group work is about generating ideas, and developing shared understandings. Some of these graphical forms (e.g. lightbulbs,

trees), are similar to those evidenced in Hartel & Savolainen, (2016) and reflect popular culture images imprinted during childhood. However, this does not negate the interpretations that can be drawn from these images.

These metaphorical conceptions of group work seen in these drawings offer a qualitatively different representation of group work from research using more traditional data collection methods, although it would be possible for these methods to surface some of these conceptions. They give educators an insight into the different ways that students experience and view group work, which has implications for the way in which we support groups, and give positive points of discussion with students about how they view group work.

How students work together

It is possible to see evidence of successful cooperative groups, as defined by Johnson and Johnson (1992, 2002, 2003) in the drawn data. The interconnectedness of groups and the working towards shared goals of characteristic of "positive interdependence" is evident in the lines connecting group members, activities and outputs and the images of holding hands. It is possible to see the value students place on face-to-face meetings as "promotive interaction" by the large number (26) drawings of meetings. Previous research has also underlined the importance of the meeting as an integral aspect of group work (Hassanien, 2006). The student group with a hierarchical structure, with a clearly defined leader came through strongly in the drawn data, despite the problems discovered with group leadership in previous research (Cartney & Rouse, 2006). Many drawings reflect a more organization-like team structure mirroring the way that team structures are presented using diagrams in the workplace. The concept of a group leader was common in the data gathered from modules with high numbers of Chinese students, and this could be due to their preference for groups to have a defined leader noted in previous research (Chan, 1999; Clark & Baker, 2011). As noted above, the full range of Belbin team roles is not evident in the drawings, however there is evidence that members take on different roles in the group, and that this is an organized and successful process (Gagnon & Roberge, 2012).

The conception that group work is a process with defined steps of meeting, information search and individual working and producing is not present in the literature included in the review. Many drawings show a non-linear process, a complex interweaving of people and activities, and this reflects the difficulty inherent in explaining exactly how a group works together, and the complexity faced by students when they attempt to manage working together. The Forming, Storming, Norming and Performing stages of group work (Tuckman 1965) are represented in the data, but often we see only one stage per drawing e.g. just the storming is represented with a group disagreement. The drawings that do depict stages of group work tend to show the successful group functioning, and focus more on the different types of activity e.g. the meeting, communicating, resource discovery and production of artifacts.

The technological tools that students use to facilitate their collaborative working and represented in detail, and this mirrors previous research that has demonstrated the vital role played by modern communication technology, in general and specifically in LIS education (McKinney & Sen, 2016; Nortcliffe & Middleton, 2013).

Positive & negative aspects of group working

The connection between discussions and learning (Askell-Williams & Lawson, 2005) is well represented in the drawings. Students are clearly aware of the need for effective communication, and the need to work together face to face. Meetings generate those ideas and lightbulb moments that are shown in the drawings. Some researchers identify that meeting and working together face to face has advantages over dividing the task and working separately (Mayne, 2012). While good number of drawings do show these face-to-face meetings, there are also many that show task division. This is a more pragmatic view of group working, in that groups cannot accomplish every task while being in the same place, but also it shows a flexible and dynamic way of working. Therefore, while meetings are an essential aspect of group work, it is important to acknowledge that they are not the whole story.

Communication, represented metaphorically with lines and connectors, and more overtly with speech bubbles and words, is an important aspect of group work seen in the drawings. where communication goes well, the group work is a positive experience. Where there are communication difficulties, particularly where group members speak different languages or have different cultural backgrounds, this is problematic for group functioning. When groups don't function well we can see evidence of the stress and frustration found in previous research (Volet & Mansfield, 2006).

Free riding is a problem for groups, it causes much resentment and labels of "laziness" that (potentially) may not be justified (Freeman & Greenacre, 2010). In this data, a cultural element to perceived free-riding is seen, with group members of particular nationalities singled out for censure. It is important in LIS courses which feature large numbers of international students that educators acknowledge culturally diverse attitudes to group working and seek to support students through open discussion of roles, expectations, communication preferences and language issues (Asgari, 2017).

Conclusion

This data set reveals student views of group work that are different from those revealed through previous research, and offer new insights into how students work together. Models of group work have focused on the stages of group work and the roles of group members, but these are not necessarily the only features of student group working. In particular, the structure of student groups and how students have represented the different processes of group work, are novel insights into group working in Higher Education. The interactions with each other and with information sources and technologies shown in these drawings show a complex and hard-to manage experience of working together experienced by these LIS students.

The use of visual methods to explore student perceptions of group work offers the opportunity to contribute a differently nuanced understanding of what it is like to

work in groups (Dean, 2015). By leaving the framing deliberately open, a more idealized view of group work was invited, and this may have facilitated some of the more abstract and metaphorical representations of group work present in the data set.

The drawings have been used to support student groups in the Information School. Student groups were presented with a selection of drawings, and were invited to discuss their meaning in the initial stages of a group task. This enabled groups to open up discussions with each-other about how they plan and manage their group work, and enabled group members to be open about their preferences. It also facilitated discussion in multicultural groups about the culturally different ways in which students from different nationalities experience group work, which supported group cohesion. These kinds of discussions, if facilitated by educators, can have real benefits for LIS students engaging in group work. Issues can be surfaced, and students can begin to negotiate effective ways of working. The value placed on face-to-face meetings raises issues for the support of group work in LIS education.

Students need to be able to meet in groups, and have access to suitable institutional space for this specific purpose. They also need support in being able to hold effective meetings. There is no "right" way for students to work together in groups in a higher education context, and these drawings reveal a huge variety of opinions and conceptions about group working. Our challenge as LIS educators is to ensure that students' different
expectations, methods and practices around group work are understood and discussed openly, and that we acknowledge the difficulties as well as the benefits of group working.

References

Angell, C., Alexander, J., & Hunt, J. a. (2014). "Draw, write and tell": A literature review and methodological development on the "draw and write" research method.

Journal of Early Childhood Research, 1–26. https://doi.org/10.1177/1476718X14538592

Arendt, S. W., & Gregoire, M. B. (2006). Group Work and Leadership : Perception of FCS Students. Journal of Family and Consumer Sciences, 98(3), 32.

Asgari, S. (2017). Conceptualising cultural issues and challenges within a UK Information School context. University of Sheffield. Retrieved from http://etheses.whiterose.ac.uk/16100/

Ashley, J., Jarman, F., Varga-Atkins, T., & Hassan, N. (2012). Learning Literacies through collaborative enquiry; collaborative enquiry through learning literacies. Journal of Information Literacy, 6(1), 50–71. https://doi.org/10.11645/6.1.1655

Askell-Williams, H., & Lawson, M. (2005). Students'knowledge about the value of discussions for teaching and learning. Social Psychology of Education, 8(1), 83–115. https://doi.org/10.1007/s11218-004-5489-2

Ayres, R. (2015). Lecturing, working with groups and providing individual support. In H. Fry, S. Ketteridge, & S. Marshall (Eds.), A handbook for Teaching and Learning in Higher Education: enhancing academic practice (4th ed.). Abingdon: Routledge.

Bagnoli, a. (2009). Beyond the standard interview: the use of graphic elicitation and arts-based methods. Qualitative Research, 9(5), 547–570. https://doi.org/10.1177/1468794109343625

Belbin, R. M. (2010a). Management teams: why they succeed or fail (3rd ed.). Oxford: Butterworth-Heinelen.

Belbin, R. M. (2010b). Team roles at work (2nd.). Abingdon: Routledge.

Belluigi, D. Z. (2014). Group work as " terrains of learning " for students in South African higher education. Perspective in Education, 32(4), 40–56. Retrieved from http://hdl.handle.net/10520/EJC164258

Benfield, G., & De Laat, M. (2010). Collaborative knowledge building. In Rethinking Learning for a digital age: How learners are shaping their own experiences (p. 223). Abingdon: Routledge. Bernier, A., & Stenstrom, C. (2016). Moving from chance and "chemistry'' to skills: Improving online student learning outcomes in small group collaboration. Education for Information, 32(1), 55–69. https://doi.org/10.3233/EFI-150960

Bertot, J. C., & Sarin, L. C. (2016). The Value of American Library Association-Accredited Master's Programs in Library & Information Studies: Serving Our Communities Through a Professional Workforce. Retrieved from http://www.ala.org/educationcareers/sites/ala.org.educationcareers/files/content/ALAWhitePaper_01September2016.pdf

Bonebright, D. A. (2010). 40 years of storming: a historical review of Tuckman's model of small group development. Human Resource Development International, 13(1), 111–120. https://doi.org/10.1080/13678861003589099

Cartney, P., & Rouse, A. (2006). The emotional impact of learning in small groups: highlighting the impact on student progression and retention. Teaching in Higher Education, 11(1), 79–91. https://doi.org/10.1080/13562510500400180

Chan, S. (1999). The Chinese learner – a question of style. Education + Training, 41(6/7), 294–305. https://doi.org/10.1108/00400919910285345

CILIP. (2017). My professional knowledge and skills base: Identify gaps and maximise opportunities along your career path. Retrieved July 25, 2017, from https://www.cilip.org.uk/careers/professional-knowledge-skills-base/accessprofessional-

knowledge-skills-base

Clark, J., & Baker, T. (2011). It's not fair: Cultural attitudes to social loafing in ethnically diverse groups. Intercultural Communication Studies, XX, XX(1), 124– 140. Retrieved from http://www.uri.edu/iaics/content/2011v20n1/10JillClarkTrishBaker.pdf

Dean, J. (2015). Drawing what homelessness looks like: Using creative visual methods as a tool of critical pedagogy. Sociological Research Online, 20(1). https://doi.org/10.5153/sro.3540

Dow, M. J. (2008). Implications of social presence for online learning: A case study of MLS students. Journal of Education for Library and Information Science, 49(4), 231–242. Retrieved from http://www.jstor.org/stable/40323753

Egolf, D. E., & Chester, S. L. (2013). Forming Storming Norming Performing: Successful communication in groups and teams (3rd ed.). Bloomington: iUniverse.

Elgort, I., Smith, A. G., & Toland, J. (2008). Is wiki an effective platform for group course work? Australasian Journal of Educational Technology, 24(2), 195–210. https://doi.org/10.14742/ajet.v24i2.1222

Fearon, C., McLaughlin, H., & Eng, T. Y. (2012). Using student group work in higher education to emulate professional communities of practice. Education + Training, 54(2/3), 114–125. https://doi.org/10.1108/00400911211210233

Freeman, L., & Greenacre, L. (2010). An Examination of Socially Destructive Behaviors in Group Work. Journal of Marketing Education, 33(1), 5–17. https://doi.org/10.1177/0273475310389150

Gagnon, L. L., & Roberge, G. D. (2012). Dissecting the journey: Nursing student experiences with collaboration during the group work process. Nurse Education Today, 32(8), 945–950. https://doi.org/10.1016/j.nedt.2011.10.019

Guillemin, M. (2004). Understanding Illness: Using Drawings as a Research Method. Qualitative Health Research, 14(2), 272–289. https://doi.org/10.1177/1049732303260445

Haigh, M. (2007). Divided by a common degree program? Profiling online and face-to-face information science students. Education for Information, 25(2), 93–110. https://doi.org/10.3233/EFI-2007-25202

Hall, D., & Buzwell, S. (2013). The problem of free-riding in group projects: Looking beyond social loafing as reason for non-contribution. Active Learning in Higher Education, 14(1), 37–49. https://doi.org/10.1177/1469787412467123

Hartel, J. (2014a). An Arts-Informed study of information using the draw-and-write technique. Journal of the Association for Information Science and Technology.,65(7), 1349–1367. https://doi.org/10.1002/asi.23121

Hartel, J. (2014b). Drawing Information in the Classroom. Journal of Education for Library and Information Science, 55(1), 83–85.

Hartel, J., & Savolainen, R. (2016). Pictorial metaphors for information. Journal of Documentation, 72(5). https://doi.org/https://doi.org/10.1108/JD-07-2015-0080

Hassanien, A. (2006). Student Experience of Group Work and Group Assessment in Higher Education. Journal of Teaching in Travel & Tourism, 6(1), 17–39. https://doi.org/10.1300/J172v06n01

Hillyard, C., Gillespie, D., & Littig, P. (2010). University students' attitudes about learning in small groups after frequent participation. Active Learning in Higher Education, 11(1), 9–20. https://doi.org/10.1177/1469787409355867

Horstman, M., & Bradding, A. (2002). Helping children speak up in the health service. European Journal of Oncology Nursing : The Official Journal of European Oncology Nursing Society, 6(2), 75–84. https://doi.org/10.1054/ejon.2002.0185

Hyldegård, J. (2006). Collaborative information behaviour-exploring Kuhlthau's Information Search Process model in a group-based educational setting. Information Processing and Management, 42(1 SPEC. ISS), 276–298. https://doi.org/10.1016/j.ipm.2004.06.013

Johnson, D., & Johnson, R. (1992). Positive interdependence: key to effective cooperation. In R. Hertz-Lazarowitz & N. Miller (Eds.), Interaction in cooperative groups: Theoretical anatomy of group learning. Cambridge: Cambridge University Press.

Johnson, D., & Johnson, R. T. (1999). Making cooperative learning work. Theory into Practice, 38(2), 67–73. https://doi.org/10.1080/00405849909543834

Johnson, D. W., & Johnson, F. P. (2003). Joining together: Group theory and group skills (8th ed.). London: Pearson Education.

Johnson, D. W., & Johnson, R. T. (2002). Learning Together and Alone: Overview and Meta-analysis. Asia Pacific Journal of Education, 22(1), 95–105. https://doi.org/10.1080/0218879020220110

Johnson, D. W., Johnson, R. T., & Smith, K. (2007). The state of cooperative learning in postsecondary and professional settings. Educational Psychology Review, 19, 15–29. https://doi.org/10.1007/s10648-006-9038-8

Kimmel, K., & Volet, S. (2010). Significance of context in university students' (meta)cognitions related to group work: A multi-layered, multi-dimensional and cultural approach. Learning and Instruction, 20(6), 449–464. https://doi.org/10.1016/j.learninstruc.2009.05.004

Lauricella, S., & Kay, R. (2013). Exploring the use of text and instant messaging in higher education classrooms. Research in Learning Technology, 21(19061), 1–17. https://doi.org/http://dx.doi.org/10.3402/rlt.v21i0.19061

Mayne, L. (2012). Reflective writing as a tool for assessing teamwork in bioscience: Insights into student performance and understanding of teamwork. Biochemistry and Molecular Biology Education, 40(4), 234–240. https://doi.org/10.1002/bmb.20621

McKinney, P. A., & Sen, B. A. (2016). The use of technology in group-work: A situational analysis of students' reflective writing. Education for Information, 32(4). https://doi.org/10.3233/EFI-160983

Nortcliffe, A., & Middleton, A. (2013). The innovative use of personal smart devices by students to support their learning. Cutting-edge Technologies in Higher Education. https://doi.org/10.1108/S2044-9968(2013)000006D009

O'Farrell, M., & Bates, J. (2009). Student information behaviours during group projects: A study of LIS students in University College Dublin, Ireland. Aslib Proceedings, 61(3), 302–315. https://doi.org/10.1108/09574090910954864

Pollak, A. (2017). Visual research in LIS: Complementary and alternative methods. Library & Information Science Research, 39(2), 98–106. https://doi.org/10.1016/j.lisr.2017.04.002

Popov, V., Brinkman, D., Biemans, H. J. A., Mulder, M., Kuznetsov, A., & Noroozi, O. (2012). Multicultural student group work in higher education. An explorative case study on challenges as perceived by students. International Journal of Intercultural Relations, 36(2), 302–317. https://doi.org/10.1016/j.ijintrel.2011.09.004

Pridmore, P., & Bendelow, G. (1995). Images of health: exploring beliefs of children using the “draw and write” technique. Health Education Journal, 54, 473–488.

Prosser, J., & Loxley, A. (2008). Introducing visual methods. ESRC National Centre for Research Methods Review Paper, (October). Retrieved from http://eprints.ncrm.ac.uk/420/1/MethodsReviewPaperNCRM-010.pdf

Race, P. (2007). The Lecturer’s Toolkit : A Practical Guide to Assessment, Learning and Teaching (3rd ed.). London: Kogan Page.

Rafferty, P. D. (2013). Group work experiences: Domestic MBA student experiences and outcomes when working with international students. Journal of Further and Higher Education, 36(6), 1–13. https://doi.org/10.1080/0309877X.2011.645470

Slavin, R. E. (1990). Cooperative Learning: Theory, Research and Practice. Needham Heights, Massachusets: Allyn & Bacon.

Smith, M., Polglase, G., & Parry, C. (2012). Construction of Student Groups Using Belbin: Supporting Group Work in Environmental Management. Journal of Geography in Higher Education, 36(4), 585–601. https://doi.org/10.1080/03098265.2012.692156

The Boyer Commission. (1998). Undergraduate education: A Blueprint for America’ s Research Universities. Boyer Commission on Educating Undergraduates in the Research University Stony Brook NY. Retrieved from http://reinventioncollaborative.colostate.edu/the-boyer-report/

Tuckman, B. (1965). Developmental sequences in small groups. Psychological Bulletin, 63, 384–399.

Virkus, S. (2008). Use of Web 2.0 technologies in LIS education: experiences at Tallinn University, Estonia. Program: Electronic Library and Information Systems, 42(3), 262–274. https://doi.org/10.1108/00330330810892677

Volet, S., & Mansfield, C. (2006). Group work at university: significance of personal goals in the regulation strategies of students with positive and negative appraisals. Higher Education Research & Development, 25(4), 341–356. https://doi.org/10.1080/07294360600947301

Wang, Y. (2012). Mainland Chinese students' group work adaptation in a UK business school. Teaching in Higher Education, 17(5), 523–535. https://doi.org/10.1080/13562517.2012.658562

Weber, S., & Mitchell, C. (1996). Ourselves Into Teaching: Studying the Images. Teaching and teacher education 12(3), 303–313.

11.6. Appendix 6: The INF304 module outline

The University of Sheffield

Department of Information Studies

Module Outline 2009-2010

Module Title:	**Business Information**
Module Code:	***INF304***
Online Teaching Resources:	MOLE
Pre-Requisites:	None
Status:	Core module: INFU01, MGTU17, MGTU18 Approved module: COMU02 Unrestricted module: any UG
Credits:	20 credits
Semester:	SPRING
Timetabling: Lectures Practicals	Weeks 1-12: Wednesdays Lectures 13.10 – 14.00 (IC, Collaboratory 1) Practicals 14.10-15.00 (IC, Collaboratory 1)
Module Coordinator:	Pamela McKinney
Other Lecturers:	Barbara Sen, Paul Clough
Version Date:	18 January 2010

Aims:

The module aims to enable students to understand the way in which businesspeople use information, so that the students can tailor services effectively to the needs of business, to identify key types and sources of information, to learn to use and key sources effectively and to synthesise information from a variety of sources to produce a valuable business tool The focus is on external information sources.

Learning Objectives:

By the end of the module students will have learnt:

- the types of, and channels for, information preferred by businesspeople
- purposes for which external information can be used within the organisation
- to understand models of information use within business
- to identify environmental factors affecting business information
- to identify key types of business information
- to search selected business information sources effectively
- to locate, collect, analyse, and synthesise information retrieved from a variety of sources into a client report
- [for information management students] to relate this learning to what students have learnt about information management and knowledge management in modules earlier in their studies

Learning Methods:

The lecture sessions will include interactivity, with work in small groups and feedback. The practical sessions will include relevant exercises.

Assessment:

The assessment for this module is to carry out a piece of business intelligence research from the standpoint of a researcher hired by the organisation, and provide an intelligence report to the organisation giving an analysis of the particular topic, problem or issue. Students will work in groups of four or five, as a research team. Each group will interview their "client" in order to determine their needs. On completion of the research exercise, students will submit a report of approximately 3,000 words, and in addition present their findings to the "client". Each individual student will also submit a short piece of reflective writing on the exercise and their learning, but this will to be seen by the "client".

Coursework submission date:	Client presentations Wednesday 12th May 2010

	Report & reflection hand in 2pm Monday 24th May 2010
Coursework reports will be returned to students by:	28th June 2010

Syllabus

	Lectures:	**Practicals:**
Week 1 Feb 10th	Introduction to the module. What is business Intelligence? **PM**	Mapping our business knowledge, key internet resources
Week 2 Feb 17th	Business models and their uses **PM**	Introduction to the assignment
Week 3 Feb 24th	Compiling an industry profile **PM**	Mintel and other industry sources
Week 4 Mar 4th	Business News **PM**	LEXIS-NEXIS and Newsbank for news information.
Week 5 Mar 10th	Information produced by a business and about a business: building up the corporate picture. **PM**	Negotiation and managing client expectations
Week 6 Mar 17th	Client interviews	Client interviews
Easter Break		
Week 7 April 14th	The business report, environmental scanning **PM**	Selecting and synthesising sources
Week 8 April 21st	Business intelligence and key technologies. **PC**	Time for group work

Week 9 April 28th	Competitive intelligence and competitor profiles **PM**	Time for group work
Week 10 May 5th	Reflective writing **BS**	Time for group work
Week 11 May 12th	Client presentations	Client presentations
Week 12 May 19th	No lecture	No practical

Books

Karen Blakeman. (2006) *Search strategies for the Internet***.** 6th ed. Caversham: RBA Information Services.

Bradley, P. (2000) *The business and economy internet resource handbook.* London: Library Association. *(I have kept this on the list as the general advice in the chapters (about issues to do with particular kinds of search, the kinds of information you can expect to find, who publishes, etc.) is still good. However, a lot of the websites listed have changed since then.)*

Burke, M. and Hall, H. (1998) *Navigating business information sources.* London: Library Association. *(This still has value in terms of general advice about company and market information.)*

Butcher, H. (1998) *Meeting managers' information needs* London: Aslib.

Choo, C.W. (2002) *Information management for the intelligent organization: the art of scanning the environment.* 3rd ed. Medford, NJ : Published for the American Society for Information Science by Information Today. His web site is also highly recommended at http://choo.fis.utoronto.ca/

Fleisher, C. S. and Bensoussan, B.E. (2002). *Strategic and competitive analysis: Methods and techniques for analyzing business competition*. Upper Saddle River, NJ: Prentice Hall.

Marchand, D. (2000) *Competing with Information.* London: John Wiley.

Journals

Journals which regularly have articles about business information are *Business information review* and *Marketing intelligence and planning*. Journals which regularly have articles about searching are *Searcher* and *Online*. These are all available electronically, as the library subscribes to them. Two free publications which cover business/searching topics are *Freepint* at http://www.freepint.com and *Information world review* at http://www.iwr.co.uk/.

Company information

Li, J., Oppenheim, C., McShea, J. and Powell, D. (2006) "An evaluation of UK credit ratings services: six agencies compared." *Business information review*, 23(3), 162-174. [Accessed 18 January 2010]

Murphy, C. (2006) "Competitive intelligence: what corporate documents can tell you." *Business Information Review*, 23 (1), 35-42. [Accessed 18 January 2010]

Competitive intelligence

Industry Canada. (2006) *ebiz.enable: Competitive Intelligence* [online]. Industry Canada. http://strategis.ic.gc.ca/epic/site/ee-ef.nsf/en/h_ee00499e.html [Accessed 18 January 2010] *(Good starting point! This includes a useful set of "what is" type guides and links.*

Weiss, A. (2002) "A brief guide to competitive intelligence: how to gather and use information on competitors." *Business Information Review* 19 (2), 39-47. [Accessed 18 January 2010]

Business use of information: core

Foster P. and Foster A. (2006) "Stability is not immobility: Business Information Resources Survey 2006." *Business information review*, 23(2), 83-107.

Institute for Employment Studies (2006) *Small Business Service annual survey of small businesses: UK 2005.* [online]. Falmer: Institute for Employment Studies.

http://www.employment-studies.co.uk/pdflibrary/dti389.pdf [selected pages xi-xii, 1-7, 159-168. [Accessed 18 January 2010]

London Development Agency and Business Link. [2006?] *The London annual business survey 2005* [online].. London: LDA. http://www.lda.gov.uk/upload/pdf/London_Annual_Business_Survey_2005.PDF [selected pages 1-4, 168-174] [Accessed 18 January 2010]

Marin, J. and Poulter, A. (2004) “Dissemination of competitive intelligence.” *Journal of information science*, 30 (2), 165-180. [Accessed 18 January 2010]

Wright, S., Pickton, D.W. and Callow, J. (2002) "Competitive intelligence in UK firms: a typology." *Marketing intelligence and planning*, 20 (6), 349-360. [Accessed 18 January 2010]

INF304 Business Information Coursework.

Part A

Aims of the assignment

The assignment aims to improve:

- Knowledge of key types of business information, and skill in searching those sources;
- Ability to synthesise information from different sources to present a clear and logical narrative;
- Ability to select, analyse and present information to create new understanding of problems and issues;
- Awareness of the environment in which businesses operate;
- Presentation skills
- Report-writing skills.

We will be looking for evidence that you have drawn material from an appropriate variety of sources (not just the internet), and sought alternative perspectives.

Value: **60**% of the module mark.

Group Assignment

Deadline: See specific deadlines below.

Description: An intelligence/business report. Your standpoint is that you are researchers hired by your organization to provide a detailed analysis of their particular topic/problem.

Group Project (60% total: 40% final report; 20% presentation)

Each group will be allocated an organization and a topic of interest to that organization for the group assignment for this class. Your task will be to provide your business client with an intelligence report based on your research of the problem or topic they present to you. The final report should include a synthesis and integration of your research, and also recommendations for your client.

Format: A report of 2,500 (groups of 3) or 3,000 words (groups of 4) including an Executive Summary; wordcount **excludes the** bibliography and appendices

Description: Your final project will be to conduct an analysis of the client's environment and business problem/topic of interest using appropriate techniques learned in this class. In addition, resources from online systems, the web, expert opinions, and any other appropriate print or online resources may be used. Review the materials retrieved, extract what you think are important trends, and write an analysis/final report. Groups will be formed early in the semester and a project allocated by 4 March. Students will need to familiarize themselves with the characteristics of the type of business as soon as possible after the allocation of the businesses and topic. Barry Maydom (b.c.maydom@sheffield.ac.uk) from the Sheffield Enterprise Centre will help with your liaison with the company. As part of your assignment you will have to interview representatives from the company to gain an understanding of their information problem, their business and markets to inform your business information research. This interview will take place in the timetabled session in week 6 (17th March)

Presentation (20%)

***Value*:** 20%

Deadline: Wednesday 12th May in class

Each group will present the findings of their analysis to their client and a module tutor on 11 May. The presentation will be limited to no more than 20 minutes and should include the following components:

1) Background of project/description of client
2) Statement of client's need (i.e., what is the goal)
3) Brief description of analytical technique(s) used
4) Results of analysis
5) Conclusion

Groups should expect to respond to any questions from the client and will receive feedback from the session to inform their report writing.

Report (40%)

***Value*:** 40%

Deadline: Monday 24th May 2pm

Submission method: electronic submission via Turnitin

Your report should contain the following information

1. **Executive summary** (not more than 350 words)

An executive summary is an informative summary of the aims, key findings and conclusions of a report. A busy executive should know what the key points are for his/her decision making, after reading this summary.

2. **Analysis of the client's information problem**

This section should include a summary of your interview with the company representative where you find about the company and their specific information problem. This should be no more than 500 words.

You should also include a brief summary of the information problem including:

- How it relates to the company's mission and objectives
- What is the business need driving the need for information

3. Your response to the client's information problem

- A summary of the information you have found that is relevant to the client's information need
- Include a description of the search strategy you used to find information and the sources you searched. It may be that the information that you don't find is as important as the information that you do find
- Place the information you find in the context of a framework such as PEST, this will help with the analysis of the relevance of the information

For section 3 you will be expected to synthesise material from a wide range of resources such as news stories, market research, official statistics, trade press.

4. **Conclusion** summing up what the information you have found means for the company, drawing on sections 1 and 2.

Bibliography and Appendices: **Make sure you use the guidelines to citation listed in the Departmental Student Handbook (n.b. there are guidelines on citing online resources and websites as well as printed items). Additionally, after each citation add information on how you found the item, for example [Dialog Profound search]; [Google search]; [Library catalogue search]; [Lexis-Nexis search]; [FT CD-ROM]; [Link from Karen Blakeman's portal website]; [Browsing newspapers]; [URL found in company brochure]**

Choice of company

- Your company will be allocated to you in Week 3.

Part B

Individual Reflective report

Value: 40% of the module mark

Submission method: electronic submission via Turnitin

Working as a group: 20% of the module mark

Format: A reflective analysis of your contribution to the group exercise (800 words, excluding references and appendices)

Description: Reflect on the process of **working as a group** to produce the business report and presentation. Your reflection can include, but is not limited to, the following topics:

Communication: How did your group communicate to complete the tasks? Was communication more effective face-to face or through other means (e.g. e-mail, phone)? How did you arrange meetings and follow up on decisions made? How could communication have been improved?

Work allocation: How did your group manage the workload? Did you divide the task or all work together? What was your most effective working mode?

Problems and solutions: What problems did you encounter and how did you as a group / personally overcome those problems

Outcomes: What experience/skills have you gained as a result of working in a group? What have you learned?

Information literacy: 20% of the module mark

Format: A reflection on the exercise of searching for information and producing the report (800 words including section headings given below, but excluding references and appendix)

Description: Reflect on your achievement, **and ways you could improve,** using the SCONUL *Seven Pillars of Information Literacy* model, using the following sections:

Section A: Recognising the information need & Distinguishing ways in which the information "gap" may be addressed (Pillars 1 and 2)

Section B: Constructing strategies for locating information & Locating and accessing information (Pillars 3 and 4)

Section C: Comparing and evaluating information obtained from different sources (Pillar 5)

Section D: (Pillar 6) Organising, applying and communicating information & (Pillar 7) Synthesising and build upon existing information, contributing to the creation of knowledge.

Appendix (Optional) You may want to give evidence, in particular, of the search strategies you used e.g. screenshots showing advanced use of search engines, or transcripts of commands used on Dialog.

Tips for reducing word length

Being able to write concisely and clearly is an important skill, and you must take the word limit seriously (see below). If you find you need to reduce the wordcount, consider the following:

- See whether there are any long lists (e.g. of products or events) or a very detailed account of something (e.g. of a deal, or of company finances) that could really go in as an appendix, leaving just a brief summary in the main report; n.b. the executive summary goes into the wordcount, but the appendices do not.
- If you have a lot of direct quotations, you could see whether you could summarise what is being said more concisely in your own words (you still need to reference the source).
- You could simply go through the whole report and just aim to tighten up the narrative, cutting out any adjectives or phrases that do not really add any extra important information. You can sometimes cut a surprising amount doing this.
- Finally, you could see whether there is any information that could be better conveyed in a chart or other graphic, rather than by a few paragraphs of text.

Submissions differing from the specified wordlength by more than 5% will be penalised as detailed at http://www.shef.ac.uk/is/current/length.html There are also penalties for late submission, as outlined at **http://www.shef.ac.uk/is/current/latesub.html**

11.7. Appendix 7: Presentations, workshops and posters relevant to this thesis

Bestwick, A., Taylor, C., O'Leary, A. and Murphy, T. (2009). Film: “The Reality of Information Literacy: Does Joe Student Actually Understand What's Going On?” LILAC Conference, University of Cardiff, 30th March–1st April.

Bing, P. and Levy, P. (2006). "Strategic Approach to Information Literacy: a CETL perspective". LILAC conference, University of Leeds, 27th-29th March. [Online] http://www.slideshare.net/cilass.slideshare/strategi-aproaches-to-information-literacy- development-a-cetl-perspective-presentation/

Corrall, S. and McKinney, P. (2009). Workshop: “Exploring information literacy through Inquiry”. LILAC Conference, University of Cardiff, 30th March–1st April

Corrall, S., McKinney, P. and Parker, L. (2008). "Exploring information literacy through inquiry" LTEA conference, University of Sheffield 25th-27th June. [Online] http://www.slideshare.net/cilass.slideshare/exploring-information-literacy-through-inquiry/

Corrall, S., Stubley, P, Scott, C., Levy, P. and McKinney, P. (2006). "Information Literacy: Essential skills to facilitate learning through inquiry". LTEA Conference, University of Manchester 29th June. [Online] http://www.campus.manchester.ac.uk/ceebl/events/archive/ltea2006/cilass.pdf

Corrall, S. (2006). "Embedding information Literacy in your DLTAS" Information Literacy Network event, University of Sheffield, 18th November.

Corrall, S., Stubley, P., Parker, L., Levy, P., Scott, C. and McKinney, P. (2006). "Embedding information literacy in your departmental Learning, Teaching and Assessment Strategy. Information Literacy Network event, University of Sheffield, 15th February

Corrall, S., Webber, S., Levy, P., Wood, J., Scott, C. Parker, L. and Jenkins, L. student ambassadors (2008). "Is number 5 alive? What does the `Information Literate Graduate´ mean to our students?" Spotlight on Teaching and Learning Conference, University of Sheffield, 14th January. [Online] http://www.slideshare.net/cilass.slideshare/2008- university-of-sheffield-learning-teaching-conference-cilass-iln-presentation

Freeman, M. (2007). "Let´s start at the very beginning: how can an inquiry-based learning approach facilitate induction?" LTEA Conference, University of Surrey, 25th-27th June. (HCS1 project from paper 2)

Jones, M. and McKinney, P. (2008). '"Journals contain facts, unlike the Daily Mail´: implementation of an inquiry-based learning task enabling evaluation of information sources". LTEA conference, University of Sheffield 25th-27th June. [Online] http://www.slideshare.net/cilass.slideshare/implementation-of-an-inquirybased-learning- task-enabling-evaluation-of-information-sources?src=embed

Jones, M. and McKinney, P. (2008). "Journals contain facts unlike the daily mail': Implementation of an inquiry-based learning task enabling evaluation of information sources". Psychology Learning and Teaching Conference, University of Bath, 1st-3rd July. [Online] http://www.psychology.heacademy.ac.uk/plat2008/html/programme_detailed.asp

Jones, Thomas, Jones, M. (2007). "Critical appraisal of the public presentation of psychology". 1st CILASS Staff-Student Symposium on Inquiry-based Learning, 30th April. [Online] http://www.slideshare.net/cilass.slideshare/critical-appraisal-of-the-public- presentation-of-psychology-cilass-staff-student-sympoisum-2007

McKinney, P (2016) “Student conceptions of group work” University of Sheffield Learning and Teaching conference, January 2016

McKinney, P. & Sen, B**.** (2014) Supporting information literacy educators: reflective pedagogic planning improving information literacy practice”. LILAC conference 2014 Sheffield Hallam University

McKinney, P. & Sen, B. (2014) “Situational analysis of group work” Teaching Excellence in the Social Sciences conference” 19th March 2015

McKinney, P. & Sen, B. (2012) “Reflection for learning: understanding the value of reflective writing for information literacy development”. LILAC conference 2012, Glasgow Caledonian University 11-13 April 2012. http://www.slideshare.net/infolit_group/mckinney-sen

McKinney PA (2011) Information literacy and inquiry – what have we learnt? A meta-analysis of the information literacy activities of a centre for excellence in teaching and learning. LILAC conference 2011, 18th-20th April 2011, London School of Economics. In: . Available from: https://www.slideshare.net/infolit_group/mc-kinney.

McKinney, P. (2009). “Information Literacy week at the University of Sheffield” (Poster). LILAC Conference, University of Cardiff, 30th March–1st April

McKinney, P. (2008). "Inquiry-based Learning and Information Literacy". LILAC conference 2008, Liverpool John Moores University, 17th-19th March [Online] http://www.slideshare.net/cilass.slideshare/inquirybased-learning-and-information-literacy-presentation/

McKinney, P (2008). "`Journals contain facts unlike the daily mail': Implementation of an inquiry-based learning task enabling evaluation of information sources."

"Teaching tips for Librarians day", University of Huddersfield. 23rd July. [Online] http://www.slideshare.net/cilass.slideshare/librarian-teaching-day/

McKinney, P and Turkington, S. (2007) "The critical appraisal of the public presentation of Psychology: building information literacy skills in first year undergraduate students in the Department of Psychology.". LILAC conference 2007, Manchester Metropolitan University, 26th-28th March. [Online] http://www.slideshare.net/cilass.slideshare/the- critical-appraisal-of-the-public-presentation-of-psyhology-building-information-literacy- skills-in-first-year-undergraduate-students-in-the-department-of-psychology-presentation/

McKinney, P (2006) "Developing Partnerships for Educational Development from a CETL Perspective". SEDA conference, Birmingham, 21st- 22nd November. [Online] http://www.slideshare.net/cilass.slideshare/developing-partnerships-for-educational- development-from-a-cetl-perspective-presentation/

McKinney, P. (2006). "CILASS and Information Studies: Inquiry-Based Learning Curriculum Development Projects" (Poster). ICS Subject Centre Conference, Dublin, 29th August. [Online] http://www.slideshare.net/cilass.slideshare/cilass-centre-for-inquirybased- learning-in-the-arts-and-social-sciences-presentation/

McKinney, P. (2006) "CILASS: a Centre for Excellence in Teaching and Learning" (Poster). Partnership for Learning event, University of Central England, 19th July. [Online] http://www.slideshare.net/cilass.slideshare/cilass-centre-for-inquirybased-learning-in-the- arts-and-social-sciences-presentation/

McKinney, P. (2006). "CILASS: Centre for Inquiry-based Learning in the Arts and Social Sciences" (Poster). SEDA Conference, Liverpool 8th June.

McKinney, P. (2006). "CILASS and Information Literacy" Yorkshire Universities Information Skills Group meeting, University of Sheffield 26th May. [Online] http://www.slideshare.net/cilass.slideshare/cilass-and-information-literacy-presentation/

McKinney, P. (2006). "Partnership for information literacy development" (Poster presentation). Information Literacy: Recognising the Need, Staffordshire University, 17th May. [Online] http://www.slideshare.net/cilass.slideshare/partnership-for-information- literacy-development-presentation/

Parker, L. and Mawson, M. (2010). “How can the Library help with IBL?” 4th Annual Staff- Student Conference, University of Sheffield, 13th April 2010. (Library1 project, paper 2)

Walker, S. & Harrison, D. (2009) The ISSAC project: integrating study skills into the architecture curriculum.). LILAC Conference, University of Cardiff, 30th March–1st April

A full list of publications I have authored can be found at https://www.sheffield.ac.uk/is/staff/mckinneyallpubs

11.8. Appendix 8: Quantitative citation data for the papers included in this thesis

Paper 1

Altmetrics: 12 citations, 13 readers on Mendeley

Scopus: 13 citations

Web of Science: 12 citing articles

Paper 2

Almetrics: 2 tweet mentions, 60 readers on Mendeley, has an Altmetrics attention score of 2, and is ranked for attention in the 51st percentile for research outputs

Scopus: 2 citations; 486 abstract views; 163 link outs

Web of Science: 1 citing article

Google Scholar: 14 citations

Paper 3

Altmetrics: 1 blog and 3 twitter mentions, 33 readers on Mendeley, has an Altmetrics attention score of 11, and is ranked in the top 10% of research outputs ranked on Altmetrics.

Scopus: not indexed (coverage for this journal began in 2014)

Web of Science: 3 citing articles

Google Scholar: 14 citations

Paper 4

Altmetrics: 2 tweet mentions, 5 readers on Mendeley, has an altmetrics score of 2 and is ranked for attention in the 53rd percentile for research outputs.

Scopus: 0 citations; 577 abstract views; 198 full text views; 77 link outs; 27 export-saves.

Web of Science: Not indexed

Google Scholar: 0 citation

11.9. Appendix 9: Case study for teaching Excellence in the Social Sciences award

Pam McKinney: Scholarship informed group work support and assessment in the Information School

In my role as a learning developer with CILASS I supported many curriculum development projects that featured group work. Collaborative inquiry was a pedagogy much favoured with CILASS project leaders and I had the opportunity to support a number of projects that developed innovative approaches to the support and delivery of group projects at all levels of study at the University of Sheffield. It is clear to educators and theorists that working together in groups enables students to develop important team working skills, much prized by employers. The opportunities for peer learning are enhanced, and research has shown that students working in groups get higher marks. However, group work does not always go smoothly, and many students encounter significant challenges in coping with issues such as time management and fair workload allocation, and can resent the perceived lack of control in their own learning destiny.

As a new lecturer I was keen to involve my students in group work, and was excited at the prospect of designing a group task that led to positive group work experiences, that developed those all-important employability skills while avoiding the well know problems associated with group work. In my level 3 Undergraduate "Business Intelligence" module I designed a group inquiry-based learning activity where students would work together to address a project brief set by a local business, entrepreneur or 3rd sector organisation. This "real world" scenario, and the need to interact on a professional level with a "client" gave the students a more work-ready experience of working collaboratively. This group project was restricted to 50% of the students' mark for the module, so I needed to design an individual assessment that fulfilled the remaining 50% of the module mark. Research in CILASS showed that often only the "product" of group work is assessed, not the "process", which is hidden from educator. I designed a reflective assignment with 3 aims: 1) to enable me to understand in more detail the process of group work; 2) to enable students to gain individual credit for their group processes and 3) to encourage them to reflect on their personal development. Students had to write an 800 word reflective account of their group work, and were invited to reflect on the way their group worked together, how they supported their group-working, the issues they faced, and what they thought they had learned through the process.

Research in CILASS has also shown that appropriate support is vital for the success of inquiry-based learning. I developed a detailed plan of support for the group-inquiry and assessment, and for the individual activities that accompanied them. Students self-selected their groups using sign-up sheets on MOLE in the first 2 weeks of the module, and were then encouraged to work in their groups during in-class inquiry-activities. This allowed me to observe group functioning and intervene if necessary. We had a frank and open student-led discussion in week 3 about problems students can face when working in groups, solutions they can attempt and what positive outcomes can be experienced through group work. Time was set aside in a number of face-to-face sessions for students to do activities that contributed towards the assessed group project e.g. working on the questions they would use in the interview with their business-partner. Dedicated support sessions were delivered on reflective writing and report writing. Student feedback demonstrated the positive experience of most students e.g. in 2013-14 a student wrote "The group work effectively practices my critical analysis skills and communication skills" and another commented "Group work was the best piece of group work I've ever been set." 4 other students specifically commented on the group work as a useful aspect of the module.

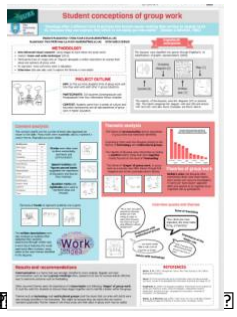
A group of Business Intelligence students with their Business partner

While it was interesting and insightful to read the students' reflections on how they worked together in their groups, I wanted to go a step further and actively research group functioning using the reflective writing as data. My colleague Barbara Sen and I undertook a situational analysis (Clarke 2005) of the reflective writing, which allowed us to map the important actors, actants (non-human actors), discourses and sites of silence in the data. It became apparent that the technological tools (e.g. mobile phones), apps and software platforms (and the way groups negotiated how to use them to suit all members) was an important aspect of

group work. Although students were provided with a group working area on MOLE, this was not used, with students preferring the conviviality of platforms such as Facebook and Whatsappp. Students really value face-to-face meetings, but the organisation of these and coordinating multiple schedules of group members is problematic and time consuming. This research has been published in in the journal Education for Information (McKinney & Sen 2016).

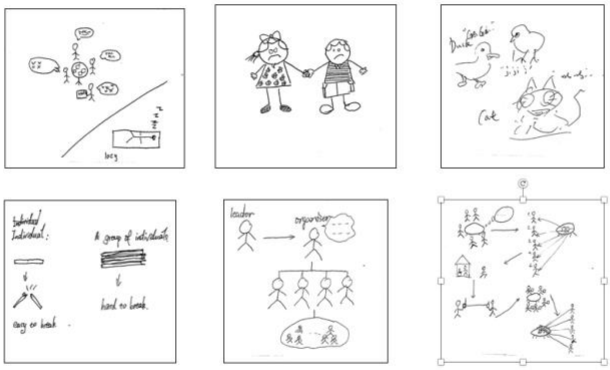
These insights have been fed into the design of group work in subsequent modules that I have taught on and led. For example, encouraging students on the Information Literacy and Libraries, Information and Society modules (both taught on-campus and distance learning) to discuss their communication preferences and the software platforms that would be most useful for the group as an initial task when groups are formed. It isn't possible for our distance learning students to meet face-to-face, however we can replicate the face-to-face meeting through our videoconferencing platform Adobe Connect. When I covered the Libraries, Information and Society distance learning module I increased the access that student groups had to specific virtual rooms in Adobe Connect to facilitate online group meetings.

The research I undertook with reflective writing piqued my interest in understanding students' differing perspectives on group work. I designed a research project that used the draw and write methodology (Hartel 2014) to collect data from PGT and UG students from across the Information School. Students were asked to "draw group work" on a 10cm x 10cm piece of card. I secured funding through the Sheffield Undergraduate Research Experience scheme to recruit a student to assist with the analysis of these drawings, which provided a much-needed student perspective. My researcher presented about the research at the British Conference of Undergraduate Research and won "best poster dissemination" award at the SURE Showcase.



SURE Researcher Chloe Cook with the poster

The drawings revealed a variety of conceptions of group work including group work as a puzzle, strength in the group, group work as a process, a series of well-defined activities. Consistent with my previous research, the need for face-to-face meetings came through strongly in the data. The idea that groups should have a leader was represented in many of the drawings, and this, according to the literature, may be due to the large number of Chinese students in the Information School. This research produced many interesting insights into group work which have been shared at the Learning and Teaching conference, however I wanted to use the data with students. I reproduced a selection of the drawings and presented them to students on the on-campus and distance learning Information Literacy modules. The students were able to discuss the drawings in their groups which allowed me to introduce issues such as free-loading, communication in multicultural groups and the mechanics of working together in a non-threatening and student-led way. It was clear from student discussions that they were able to surface potential problems and begin to negotiate agreed ways of working before these became critical.



Handout created for INF6350 to start discussion about group work

Clarke AE. (2005) Situational Analysis: London: Sage

Hartel, J. (2014). "An Arts-Informed Study of Information Using the Draw-and-Write Technique." *Journal of the Association for Information Science and Technology*. 65 (7)

McKinney, P and Sen, BE (2016) The use of technology in group-work: A situational analysis of students' reflective writing. Education for Information 32 (4) p. 375-396