Information Literacy through inquiry: a Level One psychology module at the University of Sheffield

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.

Case study

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).

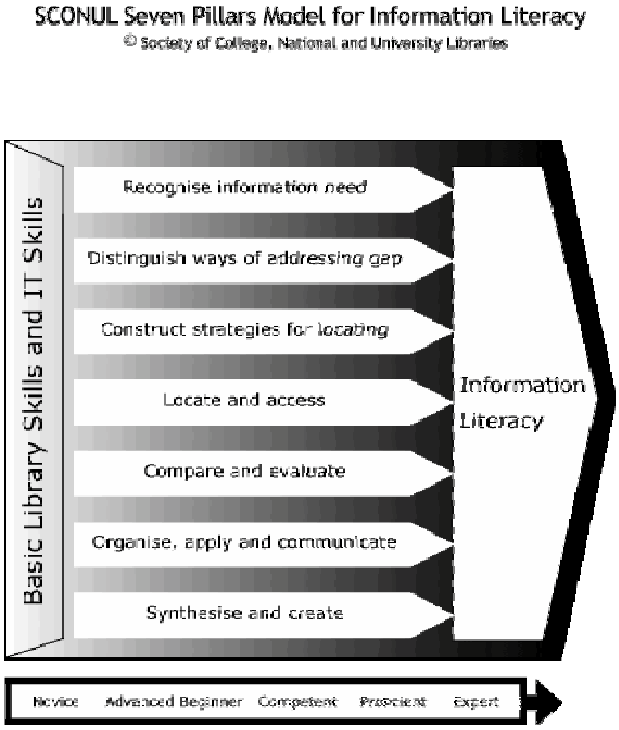
Fosmire and Macklin (2002) assert that a PBL curriculum not only requires that students demonstrate abilities that are concurrent with the Association of College and Research Libraries (ACRL) IL standards, but also that students engaged in PBL are more effective users and consumers of information than 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

The IL questionnaire explores the concept of peer review with two questions.

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 sites and peer reviewed journals is true?	L1 06/07 Pre IL intervention n=153	L2 07/08 Post IL intervention n=97
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	14.5%	18.5%

information		
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.

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