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# Inquiry-based teaching and learning: What's in a name?

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**Abstract:** *This paper reports a research and development study on inquiry-based teaching and learning. Its genesis was in a faculty commitment to inquiry-based learning as a theme in undergraduate curriculum reform in the allied health sciences in the Faculty of Health Sciences at the University of Sydney. A working party charged with overseeing a project to produce resources to support staff in their on-going implementation of this theme discovered that members could not themselves agree on terms about concepts and the relationships among them in this area. Subsequent investigation of recent literature and a survey of university health sciences professional educators in Australia and New Zealand confirmed that this lack of agreement is a widespread phenomenon. In this paper we report on our findings and conclude that it is not the range of concept labels but rather the multi-dimensional nature of the concept of inquiry-based teaching and learning which can cause ambiguity and conflicting interpretations in academic dialogue and practice. This limits opportunities for identifying and disseminating good practice in inquiry-based teaching and learning.*

**Keywords:** *Inquiry-based teaching, problem-based learning, health sciences*

## Introduction

As educators in the health professions we often hear, and may use ourselves, the phrases ‘inquiry-based teaching and/or learning’ and ‘problem-based learning’. They roll off the tongue easily and everyone nods wisely. These are good things to do. But what do these phrases actually mean to university teachers in the health sciences, in theory and in practice?

Due to the sweeping changes that are currently taking place both in the higher education sector and in the health care sector, the Faculty of Health Sciences (FHS) at the University of Sydney embarked on a process of curriculum reform. An emerging theme was the need for a whole-of-faculty curricular framework, utilizing inquiry in the learning process. As a result of a study carried out in 2002 we know that there is no clear and common understanding among health sciences academics in either their articulation of the theory underpinning practice or of their practice itself in the area of what we call inquiry-based teaching and learning (IBTL). There is a wide range of terms about concepts related to IBTL used with considerably overlapping and blurred meanings, especially in regard to ‘problem-based learning’. This poses a dilemma for curriculum management and for collegial discourse about the suite of strategies identified as supporting inquiry-based teaching and learning.

In this paper we begin with the origins of this study and our inquiry methods. We then discuss our 2002 results, their implications for understanding the practice of inquiry-based teaching and learning, and the challenges they imply for university teaching in the health sciences.

## Background to the study

The Faculty of Health Sciences (FHS) comprises nearly 5000 undergraduate and postgraduate students undertaking studies across a wide range of allied health areas. It forms part of the University of Sydney’s College of Health Sciences comprising five Faculties: the others are Medicine, Nursing, Dentistry, and Pharmacy. (For more information on the Faculty visit its website at <http://www.fhs.usyd.edu.au>.)

Current undergraduate curriculum reform in the Faculty of Health Sciences includes a raised profile for IBTL. This was first acknowledged as ‘Theme 2 -Inquiry and evidence based curricula’ in the foundation curriculum vision document (Mahony, Mullavey-O’Byrne & Higgs, 2000) and was subsequently extended by Everingham and Harris (2000). In 2001 other priority areas for undergraduate reform were addressed to enable implementation in 2002 of revised curricula addressing all ten themes of undergraduate curriculum reform to commence. Supporting the on-going implementation and improvement of IBTL practice in the faculty became a priority in 2002 and continued over the next three years as the reformed undergraduate curriculum is progressively rolled out. That priority was envisaged as supporting IBTL through professional development activities and providing teaching resources, and a small grant was obtained to support this work. The ultimate aim of this project is to further inform inquiry-based teaching at FHS by the development of a comprehensive compilation of existing good practice approaches and associated professional development activities.

## Our phases of inquiry

Three phases of inquiry occurred during 2002. In the first phase a working group discovered and explored its own multiple understandings of inquiry-based teaching and learning. The wide range of *local understandings* prompted an initial *literature search*, which was extended

as the project progressed. In the second phase a survey questionnaire was designed and piloted prompting further reflective discussion and debate about what this IBTL phenomenon was. In the third phase the questionnaire was used in a *survey of health sciences educators* in Australia and New Zealand.

### **Local understandings**

IBTL approaches have been used in curricula and teaching strategies across the faculty for many years. Extension and a more systematic use have been encouraged as part of the undergraduate curriculum reform project. When a self-selected working group (representing a range of allied health professional areas) was convened to oversee this project, it was, however, immediately obvious that only a very loose theoretical framework about IBTL was commonly held. If discussion among working group members was confused by different individually held meanings and labels (such as inquiry-based teaching and learning, problem-based learning- PBL) and related pedagogical strategies had different connotations, then what did this mean for Faculty of Health Sciences members at large (over 200 full and part-time lecturers)? How were we to identify, support and effectively communicate good practices in the area? It became necessary to address the lack of consistency and clarity as part of the project before providing examples of good practice for professional development purposes. A similar experience has been reported by Mifflin, Campbell and Price (2000) in regard to self-directed learning in a problem-based learning (PBL) curriculum.

### **Views from the literature**

A survey of relevant databases for the period 1995 to 2002 using the keywords *inquiry based learning*, *inquiry based teaching* or *inquiry teaching* or *inquiry learning*, with subsequent tracking backwards, confirmed the dilemma. This search on inquiry-based learning primarily led to literature targeting primary and secondary education particularly in the sciences (e.g., Edelson, Gordin, & Pea, 1999, Saskatchewan Education 1991, Llewellyn 2002). 'Inquiry' is the umbrella concept partnered with teaching, learning, or teaching and learning. This may reflect a greater emphasis at the school level on the process of learning and the development of an understanding of science as inquiry. University-level reporting on inquiry-based approaches was more closely tied to achievement (solving a problem or improving a situation) usually within a specific discipline or profession.

Exploration of the university-level literature more often revealed links to literature using 'problem-based' rather than 'inquiry-based' as the concept label. An exception was a suite of reports on educational approaches across a range of health professions at the University of Hawaii which all drew on the conceptual work of Feletti (1993).

At university level the more tightly specified PBL approaches found in medical education have been highly visible and influential. These approaches make use of carefully facilitated small group tutorials in a resource-rich environment, usually designed and implemented across an entire course curriculum. The school-based understanding of IBTL was more closely aligned with our range of views about inquiry than the generally narrower view of PBL discussed in the literature in the tertiary sector.

Feletti (1993) further assisted our theorizing when he distinguished PBL and what he called inquiry-based learning (IBL) in terms of precision of **methods, intentions**, and the **teaching and learning environment** in which it is delivered. He compared PBL in medical education with IBL developed for nursing education. He thought that PBL starts with a tightly structured problem using tutorial processes in a resource-rich and appropriate professional

education context with a small and select group of high-achieving and well motivated students, whereas with IBL the tutorial process is less tightly structured, the environment is less well provided for, there are larger student numbers, with most of a more average academic achievement. Broadly Feletti indicates that PBL and IBL commonly promote observational skills, use simulations or experience of professional practice, encourage student collaboration, foster student-directed learning, encourage independent study, and foster reflection on the learning process. They differ in that PBL is more often a whole curriculum approach controlling all aspects of the curriculum whereas Feletti's IBL is a more open-ended and adaptive process. This work began to open up the PBL approach by considering the possible advantages of taking an expanded viewpoint.

Everingham and Harris (2000) considered an inquiry-oriented curriculum grounded in health science professional practice models. Their focus was less on problem-solving and more on the processes and meta-processes of inquiry and the pedagogy that might best engage these. In proposing a site-specific structure whereby existing dimensions of 'inquiry' might be given a sharper and more consistent curriculum focus across multiple health professional curricula they used the term 'inquiry framework' to flag the curricula intent. This framework is a two-dimensional matrix. One dimension develops from inquiry grounded in foundational sciences to application in specific professional practice and ultimately enveloping interprofessional perspectives. The other dimension includes course design issues, the focus of inquiry and the cognitive processes to be developed.

Inquiry based teaching has recently taken on a new importance within research led teaching. In a recent book by Jenkins et al. (2003) it is suggested that inquiry based learning in the context of research-led teaching relates to teaching which incorporates the processes of research and that this drive to strengthen the nexus between research and teaching is probably one of the most significant developments in thinking about teaching and learning in higher education.

## **Surveying university health sciences educators**

What then was the view of university health sciences educators more widely?

### ***The method***

The literature search produced a definition (see Figure 1 below) of IBTL which encompassed a range of conceptualisations of this term and could act as the trigger for the survey participants' thinking and responses. A survey was then constructed with the aim of identifying the extent and manner in which IBTL is understood and is currently practised in Health Sciences Education.

The survey was piloted in the Faculty of Health Sciences, University of Sydney, to ensure validity and reliability. Following some revisions the final survey was developed (see <http://surveys.med.usyd.edu.au/fhs/> for the full questionnaire). Ethics approval was obtained from the Sydney University Human Ethics Committee.

A list of Faculties of Health Sciences in Australia, New Zealand and overseas was compiled. The survey was then sent electronically to the deans of these faculties. Information attached to the survey detailed the purpose of the study and how confidentiality of responses was ensured. Also included with the survey was a letter from the dean of the Faculty of Health Sciences, University of Sydney, requesting that the survey be sent by email to the appropriate staff within their Faculty.

### **The results**

Fifty-three surveys were returned representing a wide variety of health sciences disciplines from at least 19 universities (some respondents replied anonymously). About half were in the older age group (over 50 years) with more than ten years of teaching experience.

Approximately half of the respondents held qualifications in education. Full results of this survey will be reported in other forums. Our purpose here is to report on how university health sciences educators understand IBTL and what their views in general are on its practice, as indicated by response to the questions set out in Figure 1 below.

Respondents were presented with the following statement:

While we cannot possibly encompass all aspects of inquiry-based teaching and learning in one definition, the following statement touches on elements and ideas characteristic of the practice of learning and teaching we would like to know more about. Please read this statement and answer the questions below.

*Inquiry learning provides opportunities for students to experience and acquire processes through which they can gather and critically appraise information about the world. This requires a high level of interaction among the learner, the teacher, the area of study, available resources, and the learning environment. Students become actively involved in the learning process as they:*

- *act upon their curiosity and interests*
- *develop questions*
- *think their way through controversies or dilemmas*
- *look at problems analytically*
- *inquire into their preconceptions and what they already know*
- *develop, clarify and test hypotheses*
- *draw inferences and generate possible solutions*
- *collaborate and interact with peers, educators and/or professionals.*

*Questioning is the heart of inquiry learning. Students must ask relevant questions and develop ways to search for answers and generate explanations. Emphasis is placed upon the process of thinking as students interact with issues, data, topics, concepts, materials and problems.*

*Divergent thinking is encouraged and nurtured as students recognise that questions often have more than one “good” or “correct” answer. Such thinking leads in many instances to the development of additional questions. In this way, students come to the realisation that knowledge may not be fixed and permanent but may be tentative, emergent, and open to questioning and alternative hypotheses.*

Adapted from Saskatchewan Education (1991)

Respondents were then asked:

- For any general comments on the statement
- If the statement needed clarification, what alternations would they make?

**Figure 1: What is IBTL?**

Generally the respondents thought that the statement was useful when describing such a “multidimensional concept” (respondent 49). While several respondents commented that it is too wordy, others suggested additional elements that should be included.

Some commented that there needed to be greater emphasis on the inquiry nature of the learning, not merely questioning and thinking but at **deeper and higher levels of questioning**

such as critical thinking and analysis followed by reflection. Clinical reasoning processes including moral reasoning were also mentioned.

It was also suggested that inquiry learning enabled the use of a **wide variety of teaching strategies** that can readily adapt to individual learning styles and hence work well where students may approach the learning process in a variable way depending on their age and experience. The need to link IBTL to the **technological age** also needed to be addressed.

Some respondents thought that a definition of IBTL should mention the **role of the educator** in the process and the need for the educator to be a proficient facilitator and mentor.

The **community the me** was also seen to be important in the health care setting whereby students may not only collaborate with peers, professionals and educators but also with community organizations.

Next they were asked:

Now, please read this list of examples of inquiry-based teaching and learning methodology, methods and/or processes from literature and practice known to us and answer the following questions:

- Problem-based learning
- Case-based learning
- Work-based learning
- Project-based learning
- Contract-based learning
- Issues-based learning
- Process-inclusive curricula
- Portfolio assessment
- Evidence-based practice
- Clinical reasoning
- Critical thinking
- Interdisciplinary learning

Does this list make you want to change your answers to the questions above?

What if anything would you add to the list?

What, if anything, would you delete from this list, and why?

**Figure 2: Response to some examples of IBTL methodology, methods and/or processes**

In response to the list of examples of IBTL methods/teaching strategies (Figure 2), participants commented as follows:

- *Would they change their response to the original definition of IBTL [provided in the survey]?* The majority said no (40/53). Additional comments included the close and often confusing link between PBL and IBL, stating that the examples are ‘pseudonyms for PBL’ (respondent 9), ‘had equated enquiry learning with PBL’ (respondent 7), or that they didn’t ‘like the phrase PBL’ (respondent 34).
- *Would they add to the list?* There were several suggested additions to the range of activities that constitute IBTL. They ranged across the following areas:
  - Reflective practice, evaluation, critical reflection

- Clinical education strategies: clinical reasoning, journal clubs, narratives, clinical conferencing
  - Action research, any activity that uses research
  - Peer learning
  - Web based PBL, on line education
  - Context based learning, context driven learning
  - Interdisciplinary learning, group learning
  - Interactive learning, action learning
- *Would they delete anything from the list?* There was a general lack of understanding of the range of terms that were listed, and the fact that they do not describe the methodology used. Comments highlighted that whether IBTL actually occurs in any learning situation can depend on the teaching process used. Some participants expressed concern about some of the terms being included under the umbrella of IBTL. This included:
    - Evidence-based practice with its reliance on quantitative research methodologies and acceptance of only certain types of evidence. A participant commented that it is a ‘mode of professional practice not necessarily a method of learning critical thinking’ (respondent 26).
    - Portfolio assessment did not always cover inquiry learning: comments included: ‘needs to be more than assessment’ (respondent 37), ‘could be completed without the necessary level of engagement in critical thinking by the learner’ (respondent 50).
    - That ‘issues based learning’ and ‘process inclusive curricula’ be deleted from the list.
    - That the term ‘interdisciplinary learning’ describes the context and not the process of learning.

## Discussion

That IBTL in some form is highly desirable (conceptually, practically) was strongly supported in all aspects of our study. What IBTL meant was much less clear. Further, “I’d like to do it, but...” was sometimes the refrain to questions about their use of IBTL, yet the reasons for not doing it appeared more often linked to a narrowly held definition of IBTL more associated with the medical model of PBL, than to barriers to IBTL as we were coming to understand it. Some of the responses received include: “funding cuts have made this teaching method too expensive” (respondent 26), “not enough scope in the course to be able to employ these ideas” (respondent 8), and “ability to monitor 40 students working in possibly very divergent ways is daunting” (respondent 5).

Feletti’s (1993) distinctions provided a clue through his acknowledgement of contextual factors as much as by the two models of pedagogical approach that he so usefully describes. Drawing on our survey results and our considerations of the literature, we have concluded that IBTL is a multi-dimensional construct.

We currently list the emergent elements as follows:

- Settings for teaching event (university, professional practice locations, other workplaces and community settings)
- Professional context (within one profession, between several professional groups, other members of the community)

- Curriculum goals, principles and design and level (whole of course, one unit of study, or a teaching event)
- Pedagogical and professional role/s undertaken in curriculum delivery (e.g. facilitator, mentor) and who undertakes them (e.g. university lecturer, practitioner)
- Learning processes (e.g. collaborative, metacognitive)
- Resource support (e.g. funding, physical facilities, staffing numbers, staffing skills, information and communication technology)
- Student attributes (e.g. academic capability and expectations, cohort numbers, student/group culture)
- Teaching strategies (e.g. simulation activities, reflective exercises, experiential learning)
- Assessment strategies (e.g. learning contract, simulated client assessment, assignment submission, practical exam, verbal presentation)

Our future work will address their inter-relationships and emphasis from which we expect to develop an IBTL framework.

Our study has made clear that there are several challenges facing university teachers in regard to inquiry-based/problem-based education. Our response to the challenge is not unlike that of Mifflin et al (2000), aiming to:

1. Achieve a greater consensus on the related terms used and their underpinning meaning
2. Use that consensus on the meanings and concept terms to support academic dialogue, academic practice (in particular curriculum development and management) and self- and peer critical review
3. Promulgate/implement effective strategies in response to identified barriers to practice.

Establishing dialogue between academics provides a social context for professional development about education in which staff come to understand and to use the conceptual and cognitive foundations of education as well as the disciplines of their health profession. This will facilitate the necessary collegial “transactional process” involving “collaboration, support, respect, freedom, equality, critical reflection, critical analysis, challenge and praxis” (Galbraith, 1991, p.3).

Within our expected framework clear distinctions between whole of curriculum approaches (where collegial agreement and documented curriculum mapping are essential) and individual instructional strategies must be made. Essential to all levels is acknowledgment of the potential for different understandings and consequent dialogue to ensure mutual understandings among university health sciences educators (and their students). The outcomes of this effort are likely to include more integrated curricula, and, for us at least, a framework for academic dialogue and the communication of good practice in IBTL through a range of professional development activities and resources.

## **Conclusion**

Our study drew from our own experiences, the literature and the survey responses of university health science educators. It confirmed IBTL is multi-dimensional, and that it is this multi-dimensionality which leads to multiple interpretations and lack of consensus in academic dialogue about inquiry in teaching and learning, whether it is called IBTL or PBL.

Consequently, our next step is to focus on the dimensions of inquiry-based learning rather than on the terms used to name the concept/s. The general nature and diversity of these dimensions reported earlier has emerged through our consideration of the literature and our survey results. In the next stage of our project, these dimensions will be refined and their relationships clarified through a process of comparative analysis with teaching strategy descriptions identified in the literature and by survey respondents as being in some way IBTL. Through this we expect to move beyond the constraints of terminology to the real task of increasing the use of inquiry in teaching and learning.

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