

# From the International Desk

Philippa Levy  
University of Sheffield, UK

## Embedding Inquiry and Research into Mainstream Higher Education: A UK Perspective

Methods for enhancing the role of student inquiry and research within the mainstream undergraduate curriculum are currently drawing considerable interest across higher education in the UK. Inquiry- and research-based instructional approaches are seen as offering rich opportunities to improve student engagement and learning in all disciplines, as well as fostering attitudes and skills relevant equally to research careers, many other careers based on knowledge work, and engaged citizenship (e.g. Jenkins and Healey 2007; Neary and Winn 2009; Ramsden 2008).

Within this context, the Boyer Commission's far-reaching blueprint for enhancing the status of teaching in American research universities more than 10 years ago (Boyer 1998) has provided an influential point of reference for UK initiatives concerned with making inquiry and research central to undergraduate education, whether in research- or teaching-intensive environments. A key feature of the Boyer report was its recommendation that student learning through inquiry and research should be embedded throughout the undergraduate experience, beginning in the freshman year. A number of innovative curricular changes at North American universities have reflected this perspective (e.g. Hodge et al. 2008) and have informed similar developments in the UK.

Following is an overview of insights from one institution-level initiative, at the University of Sheffield, designed to extend the role of student inquiry and research in undergraduate arts, humanities, and social-sciences curricula. This initiative at Sheffield, a research-intensive institution in the north of England, was funded over a five-year period by an award from the government's Higher Education Funding Council for England, under the auspices of its national Centres for Excellence in Teaching and Learning (CETL) program (2005-10). This program included support for several different universities to undertake work related to inquiry-based learning (IBL).

Among these, the University of Sheffield's Centre for Inquiry-based Learning in the Arts and Social Sciences (CILASS) conducted developmental activities and research that included a focus on developing information literacy related to IBL and, in recognition of the

importance of the digital world in the practice of scholarship and research, on the use of digital media in this context (Levy 2007). CILASS also developed a special interest in questions and practice relating to the adoption of IBL in the first undergraduate year. Following the end of the national CETL program in 2010, the University of Sheffield continues to support the development of IBL at the institutional level as part of its strategic commitment to research-led learning.

In what follows I define IBL from the CILASS perspective and discuss some key findings of research undertaken by CILASS into the first-year student experience of inquiry and research. These findings fed into the development of a conceptual framework for IBL in the undergraduate curriculum that differentiates between "inquiry for learning" and "inquiry for knowledge-building." A goal is to contribute to the international debate on the relation among different forms of inquiry and their impact on undergraduate research (Jenkins and Healey 2010). I discuss two short case studies of IBL developed by the University of Sheffield's Information School (iSchool) for its first-year curriculum in information management, to illustrate instructional design that focuses on inquiry for knowledge-building for first-year students.

### Defining Inquiry-based Learning

As reflected in the wider academic literature, IBL is generally seen as a flexible instructional approach that can suit different educational purposes and take a variety of forms. It can be used to enable students' acquisition of clearly defined, factual knowledge; alternatively, it can be used to engage students with uncertainty and contested issues through exploration of open-ended questions to which right answers do not yet, or cannot, exist. IBL frequently is regarded as an umbrella term for a variety of related active learning approaches, including problem-based learning (PBL). It is less frequently acknowledged that through IBL, active learning can extend toward and well into the arena of genuine scholarship and research. In the course of its work, CILASS reached a view of IBL that included of both those perspectives (Levy et al. 2010). Reflecting this, IBL is defined for the purposes of this article as *a cluster of related pedagogies in which student inquiry or research drives*

*the experience of learning and participation in knowledge-building.* The terms “inquiry” and “research” are used in combination to refer to all forms of scholarly exploration and investigation carried out by students as part of studies in any discipline. Following Bereiter (2002), “learning” and “knowledge-building” are used to signal, on the one hand, individual conceptual change and, on the other, contribution to improved thinking or knowledge in a domain. A growing body of literature highlights the importance of fostering in undergraduates the qualities and capabilities that are associated with participation in knowledge-building, in order to achieve the higher-order outcomes of higher education that we desire (e.g. Barnett 2007; Baxter-Magolda 2009; Brew 2006). In light of this, Hodge et al. (2008) argue that a transition needs to be made in undergraduate education from a “learning paradigm” to a “discovery paradigm.”

## Exploring First-year Students’ Experiences

There is a fast-growing body of evaluative case studies across the academic disciplines that provide “snapshots” of single IBL initiatives. However, students’ experiences of engaging in inquiry and research over time, throughout their college careers, has received little research attention and, with some exceptions (including Justice et al. 2007a; 2007b; Justice, Rice and Warry 2009; Sambell 2008), few reported studies have focused specifically on the first-year undergraduate experience of either inquiry in general, or of IBL specifically. Against this background, and with the aim of contributing to the theory and practice of instructional design for IBL, CILASS embarked on a longitudinal study of students’ evolving perceptions and experiences of curriculum-based inquiry and research—whether or not explicitly labeled “inquiry,” “research,” or “IBL”—and extending from the first to the final undergraduate year. Over-arching research questions were:

1. How do students in arts, humanities, and social sciences experience and understand curriculum-based inquiry and research?
2. What are the implications for the conceptualization and practice of IBL?

We adopted a qualitative methodology, based on in-depth interviews with 29 students—20 females and 9 males, 12 from arts and humanities disciplines and 14 from the social sciences—conducted at three points in each academic year. This article focuses on key findings from the study on first-year students; the full findings of this first-year study are reported by Levy and Petrulis (2011).

From the outset, the students in the study described two broadly distinct understandings (and experiences) of curriculum-based inquiry and research, which we labeled respectively *inquiry for learning* and *inquiry for knowledge-building*. All first-years reported engaging in inquiry in order to learn from an existing knowledge base (*inquiry for learning*), described in terms of *gathering information* and/or *exploring others’ ideas*. Students often said that these forms of inquiry afforded them a rewarding sense of independence, achievement, and—especially when tasks allowed students to frame their own lines of inquiry—ownership.

However, some students also expressed a sense of engaging in inquiry in order to move toward bringing something personal or new to an area of study (*inquiry for knowledge-building*). They described this in terms of “evidencing and developing my own ideas” and/or “making discoveries” during opportunities for what students often referred to as “doing real research.” By that they meant engaging with questions or problems that they understood to be open-ended. The primary focus of inquiry as “evidencing and developing my own ideas” was not on gathering information or exploring others’ ideas (although these processes clearly were involved) but rather on finding justification for and expanding students’ own, potentially original, interpretive insights and arguments.

Experiences of inquiry described by students as leading to making discoveries typically arose out of opportunities to gather and interpret primary field data outside the classroom in introductory research-methods courses in the social sciences. Over the course of the first year of the study, there was evidence of increasing sophistication in some students’ understanding and experiences of inquiry; other students, however, continued to understand and experience inquiry solely in the comparatively less sophisticated sense of information-gathering.

Students identified experiences of open inquiry (inquiry for knowledge-building or, in their terms, “real” research) as especially empowering. Additional benefits, beyond those of inquiry for learning, included: a growing sense of intellectual freedom, self-belief, and personal authority; a strengthened identification with academic and professional disciplines; an increase in engagement and motivation. Some students reported having their views of their role as learners challenged in positive ways through their engagement in open inquiry; they welcomed what they described as development toward intellectual and personal “growing up.” Some students reported as especially rewarding the opportunities to frame their own lines of open inquiry.

The Sheffield study was exploratory, and there will be value in testing and building on its findings in different contexts. However, the findings do appear broadly consistent with those of the few reported other studies that have explored students’ experiences of inquiry and research in the first year of college (Justice et al. 2007a; 2007b; Justice, Rice and Warry 2009; Sambell 2008). They also mirror those of a study conducted in New Zealand by Spronken-Smith and colleagues as part of their own work to conceptualize IBL and embed inquiry in the curriculum. This work revealed more positive student attitudes toward opportunities to experience IBL in an “open inquiry” (knowledge-building) mode than in other modes (Spronken-Smith 2010; Spronken-Smith and Walker 2010). Our study’s findings also appear broadly consistent with the widely reported benefits of co-curricular research opportunities (e.g., Laursen et al. 2010).

In the Sheffield study, first-year students’ accounts of their experiences illuminated the difficulties as well as the benefits related to efforts to engage in both *inquiry for learning* and *inquiry for knowledge-building*. Many described challenges in developing information literacy, such as using library services and the Web effectively to search for information. Those who understood learning solely as a process of assimilating and reproducing explanations of known facts or accepted perspectives found the purposes of open-ended exploration puzzling and unsettling. Having freedom to frame their own inquiries made some students anxious about their personal intellectual capabilities and about being “on the right track.” Students frequently cited problems with interpersonal

dynamics and organizational logistics in trying to work with peers on inquiry assignments. While most students were positive about the role of inquiry and research in their first-year experience, they typically very strongly emphasized their desire for plenty of guidance and formative feedback.

## A Conceptual Framework for IBL Design

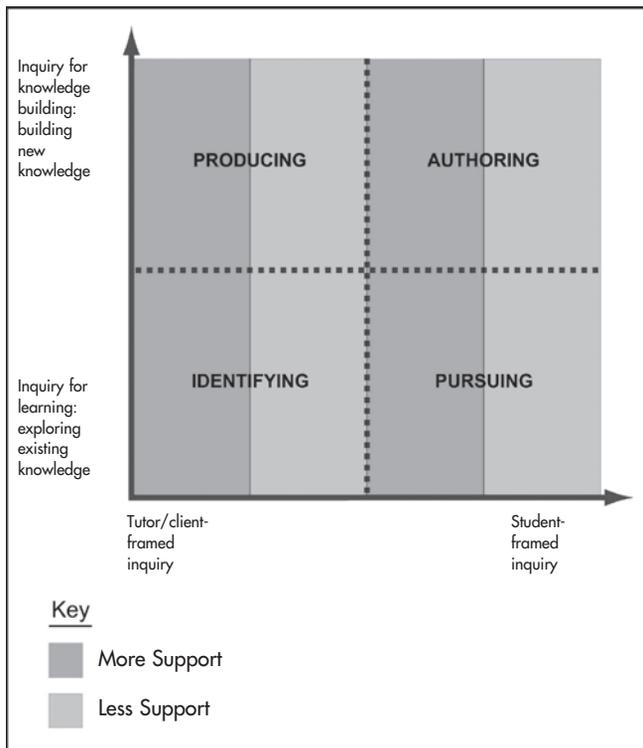
The Sheffield study fed into the development of a conceptual framework for the design of IBL that adapts Healey’s (2005) matrix-based representation of the different ways that research and teaching can be linked in the student experience (see also Jenkins and Healey 2010). Whereas Healey’s matrix portrays IBL as one of four ways in which this relation can be experienced, the CILASS matrix (Levy 2009) identifies four modes of IBL.

Figure 1 reflects key dimensions of undergraduates’ experiences of inquiry and research as illuminated by the Sheffield study. The vertical axis distinguishes between students’ *inquiry for learning* and *inquiry for knowledge-building*. In an earlier version of the framework, as drawn upon by Spronken-Smith and Walker (2010), we used the labels “information inquiry” and “discovery inquiry” to refer to the two approaches.

The horizontal axis in Figure 1 represents where the primary responsibility lies for establishing the inquiry question or theme (that is, whether with the student or with an academic instructor or someone else such as a client for a student project). The amount and nature of support that students receive during the process (that is, guidance and structure aimed at helping students engage productively in inquiry, including developing appropriate information literacy) is represented as a third dimension mapped onto each quadrant. In this way, four ideal-type modes of IBL are labeled respectively as *authoring*, *producing*, *pursuing*, and *identifying*. In each mode, the nature and amount of process support will differ according to the context. Questions in the *producing* and *authoring* modes may be entirely new to the discipline or simply new to the student, but in either case are authentically open.

This matrix offers a framework onto which the orientation of different IBL experiences and instructional designs can be mapped, onto just one of the quadrants or across two or more. All four IBL modes are presumed to be equal-

Figure 1: Modes of IBL



**Key for Figure 1**

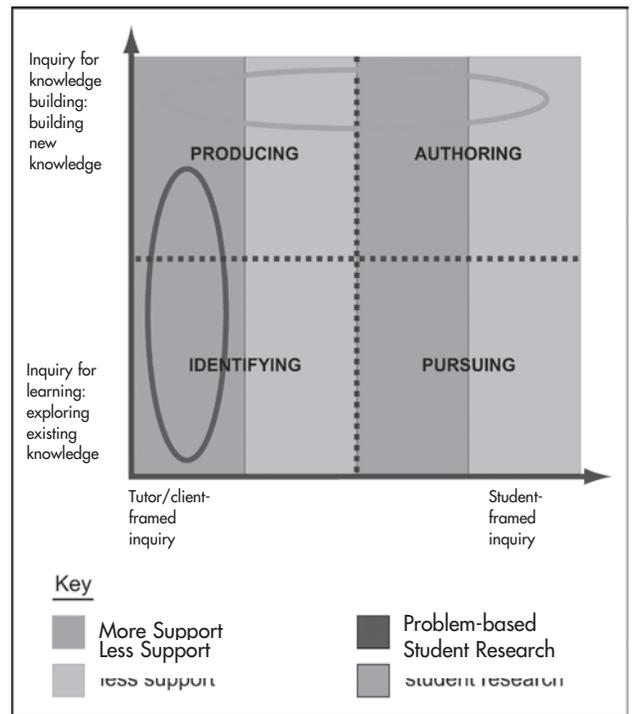
**Authoring:** Students explore their own open questions, problems, scenarios, or lines of inquiry, in interaction with a knowledge base (“How can I answer my open question?”).

**Producing:** Students explore open questions, problems, scenarios, or lines of inquiry, as framed by teachers or external “clients,” in interaction with a knowledge base (“How can I answer this open question?”).

**Pursuing:** Students 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:** Students 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 2: Modes of IBL and the relation to PBL and research



ly valuable, depending on the educational purposes and context. During a given inquiry, the student’s activity may well encompass both conceptual change (learning) through interaction with an existing knowledge base and also result in a move toward participation in knowledge-building.

This conceptualization of IBL is an inclusive one in that it encompasses curriculum-based undergraduate inquiry and research in different modes and at different levels of sophistication. Figure 2 illustrates this by mapping both PBL and advanced-level undergraduate research—as typified in the UK by the final-year research dissertation (research capstone)—onto the matrix. PBL is mapped here onto the “tutor framed” and “strongly supported” dimensions; however, given that some approaches to PBL invite students to devise problem scenarios themselves, or offer looser structure and guidance, this mapping could look different depending on contextual factors.

Figures 3 and 4 represent alternative approaches to designing progression in the undergraduate-inquiry curriculum in terms of the three dimensions identified by the matrix: first, as a sequential process through the

Figure 3: Sequential progression in IBL

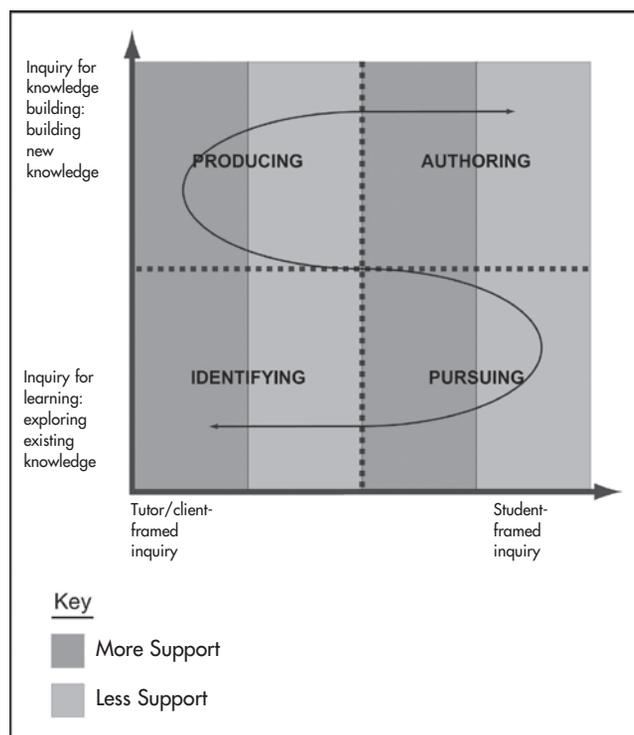
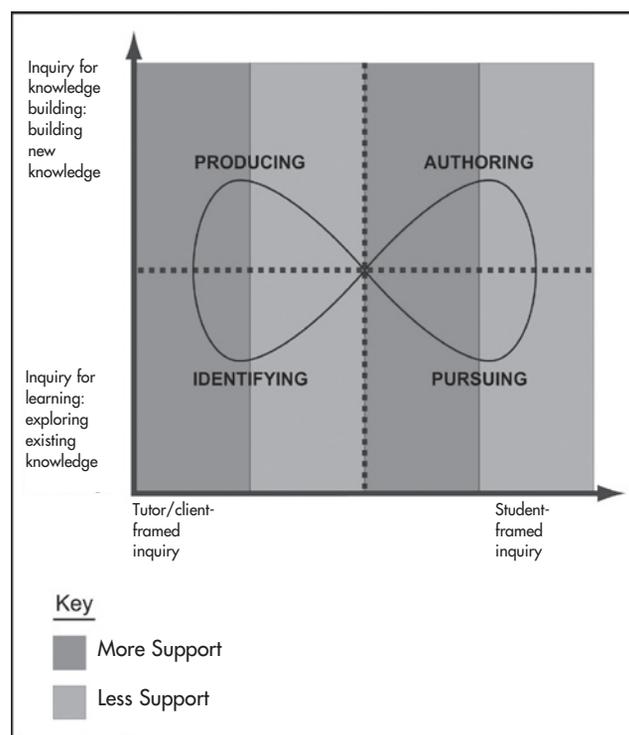


Figure 4: Spiral progression in IBL



identifying, pursuing, producing and authoring modes—culminating in student-framed, open inquiry at a more advanced level of study; and, second, as a spiral process whereby students might be introduced to open inquiry (*producing, authoring*) at more introductory levels of study. As regards the third dimension (the level of process support provided), there appears to be strong empirical evidence in favor of providing higher levels of structure and guidance in IBL at less advanced levels of study; at the same time, it is worth noting evidence that suggests that enhanced learning outcomes may be achieved when students experience a cycle of low-structure, followed by high-structure, followed by low-structure inquiry activity (Kapur 2008).

### Toward Knowledge-building from the Freshman Year

The bachelor’s program in information management offered by the iSchool at the University of Sheffield provides examples of IBL that are intentionally ori-

ented toward engaging first-year students in inquiry for knowledge-building. The instructional design introduces students to open-ended inquiry and to the challenge of framing meaningful inquiry questions at an early stage. Cox et al. (2008) and Webber (2010) describe these initiatives in more detail, and the short descriptions that follow are based on the descriptions in *The Sheffield Companion to Inquiry-based Learning* (Levy et al. 2010).

*Identifying and Producing* In their first semester, first-year information management students take a module that introduces them to concepts and research on the topic of “human information behavior,” (that is, the ways in which people interact with information in different social contexts according to different purposes and needs). The students explore an existing body of research knowledge and pursue new research questions framed by their academic tutors. In groups, they investigate people’s information needs and practices in the 3D virtual world, Second Life. Second Life users (called “residents”) interact with each other through avatars to engage in individual and

group activities. The University of Sheffield is among many universities across the world that own virtual property in Second Life, and the Sheffield iSchool holds a range of academic events in this environment. For this inquiry task, the students conduct research interviews in Second Life with “residents.” The support and guidance they are given includes a structured series of activities introducing them to relevant research methods and to the Second Life environment (e.g., conducting research interviews, navigating the virtual world). The students compare their findings with those of classic studies of information behavior and reflect critically on the strengths and limitations of their inquiry and the development of their research understanding and skills. They display the outputs of their inquiries in a public exhibition space in Second Life. Assessment of this approach to IBL indicated positive effects on student engagement and achievement (Webber 2010).

*Pursuing and Authoring* In their second semester, the same first-year students in information management take a module that introduces further principles of research design and practice; it develops their understanding of key concepts and themes in organizational information management. Students work in groups on small-scale research projects around the broad theme of “the university as an information environment.” Following a series of preparatory workshops over four weeks, the student groups are required, with support, to develop their own worthwhile research questions and to design and carry out a focused study investigating these questions.

They are required to include a small-scale literature search and review, gain ethics approval for their research if needed, design data-collection instruments, analyze data, and present findings at a mini academic conference. Guests at the mini-conference include faculty, research staff and doctoral students in the iSchool, all of whom participate in the assessment of students’ research posters, using criteria that the students themselves have established previously in negotiation with their academic tutors. The module also features input from practitioners in the field, who share their experience of information management and comment from their perspectives on the value and design of the students’ research. Assessment of this approach to IBL also

indicated positive effects on student engagement and achievement (Cox et al. 2008).

## Conclusion

This article has highlighted some findings from a qualitative study of the first-year undergraduate experience of inquiry and research in arts, humanities, and social sciences disciplines. It also has presented a conceptual framework, informed by the study at Sheffield, that proposes three fundamental considerations for instructional design in embedded IBL: the epistemic purposes and orientation of students’ inquiry; the primary responsibility for establishing the inquiry question or theme; and the level and nature of support that is provided for the process of inquiry. The research suggests that, at least in the disciplines in question, significant educational benefits in terms of engagement and intellectual/personal development may be gained from building in opportunities for students to engage in inquiry designed to introduce building of new knowledge at an early stage in their undergraduate careers. These inquiry activities should be strongly supported but open-ended and potentially also student-framed. Two first-year IBL modules from the University of Sheffield’s iSchool were used to illustrate this instructional approach in one social-sciences context. More research is needed to investigate these themes in different disciplines and to inform instructional design for IBL both in the first year and in first- to final-year progression in a mainstreamed undergraduate “inquiry curriculum.”

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### Philippa Levy

Information School  
University of Sheffield  
Regent Court, 211 Portobello  
Sheffield, S1 4DP  
[p.levy@sheffield.ac.uk](mailto:p.levy@sheffield.ac.uk)

*Philippa Levy, PhD, is professor of higher education development and head of the Information School at the University of Sheffield, England. From 2005 to 2010 she was academic director of the University's Centre for Inquiry-based Learning in the Arts and Social Sciences, a national Centre for Excellence in Teaching and Learning. Her research focuses on learning, teaching and educational development in higher education, including themes related to e-learning and the role of information specialists in supporting learning. In recent years, she has contributed to numerous UK and international initiatives on the development of inquiry-based learning and undergraduate research in universities, including the first British Conference of Undergraduate Research (BCUR 2011) and the First Australian Summit on the Integration of Research, Teaching and Learning (2009).*

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