What Is Inquiry-Guided Learning?

Virginia S. Lee

Inquiry-guided learning has widespread appeal for a variety of institutions of higher education throughout the world. As a suite of teaching strategies that defies a simple prescription for practice, inquiry-guided learning challenges practitioners to develop conceptual frameworks that describe inquiry as a site of student learning rather than of traditional scholarship.

The power of inquiry as a way of learning has had widespread appeal in the United States, Canada, the United Kingdom, New Zealand, and Australia. In the United States the publication of the 1998 Boyer Commission report, *Reinventing Undergraduate Education: A Blueprint for America’s Research Universities* (Boyer Commission on Educating Undergraduates in the Research University, 1998), heightened interest in inquiry-guided learning (IGL), particularly in research universities. Using inquiry as a mode of learning capitalizes on the strength of the faculty in research, the report argued: inquiry is part of the distinctive ecology of the research university in which faculty, graduate students, and undergraduate students should all participate.

The report provided inspiration for institutions outside the United States as well: the idea of the teaching and research nexus—that is, forging explicit connections between teaching and research—has caught hold in the United Kingdom, Australia, New Zealand, and Canada. In fact, in some of these countries federal mandates and significant resources exist to strengthen the links between teaching and research in institutions with a strong research component. Centralized support has also stimulated an active research agenda on the teaching and research nexus among a group of senior scholars in these countries (for example, Brew, 2003; Barnett, 2005; Spronken-Smith and Walker, 2010).

In addition, the appeal of IGL has extended beyond research universities to comprehensive universities, liberal arts colleges, and even institutions with a focus on professional studies. There are many reasons for the
broader adoption of IGL. From a theoretical standpoint, IGL is compatible with constructivism and research from psychology, education, and neuroscience on the dynamics of learning and its implications for educational practice that have gained greater credibility over the past ten to fifteen years. In recent years learning outcomes have become the recommended, if not widely accepted, starting point for planning courses and curricula and, coupled with assessment, ensuring accountability in higher education. Regardless of institutional type, most colleges and universities identify over and over certain outcomes, including critical thinking, problem solving, taking responsibility for one’s own learning, and the desire for lifelong learning, as being particularly important. IGL promotes these kinds of outcomes and the specific skills associated with them, for example, the ability to ask good questions, to analyze and interpret evidence, and to select and justify the best solution to a problem (Lee, 2011).

Further, IGL develops abilities and attitudes valued by proponents of both liberal and professional education and by those who feel that higher education should equip students for the varied demands of modern life including the requirements of the workplace. As students become increasingly skilled at organizing an inquiry or tackling a complex problem or issue with other people, they develop a set of capacities and attitudes relevant to work, home, and community (Lee, 2011). On a more philosophical level, through IGL students become increasingly comfortable with and able to make good decisions and judgments under conditions of uncertainty, a hallmark of intellectual growth and maturity.

Finally, the research university has become the aspirational model for many institutions of higher education whose previous focus was primarily teaching. As these institutions increase the expectations for their faculty to conduct research, they may also adopt IGL as a way to bridge the teaching and newly emphasized research missions of the institution and to enhance the intellectual culture on campus. In this volume the reader will find examples from a range of institutions: research and comprehensive universities, liberal arts colleges including those with a religious affiliation, and a university with an emphasis on professional programs.

What Is Inquiry-Guided Learning?

IGL promotes the acquisition of new knowledge, abilities, and attitudes through students’ increasingly independent investigation of questions, problems, and issues, for which there often is no single answer (Lee, 2004). As Figure 1.1 illustrates, IGL is a subset of so-called active learning strategies that also belongs to a group of strategies known as inductive teaching and learning methods (Prince and Felder, 2006). Problem-based learning is a specific type of IGL that arose in fields such as medicine and engineering in which problem solving is a dominant mode of
Implementing Inquiry-Guided Learning

Although IGL has an undeniable appeal for colleges and universities that value inquiry implicitly, many institutions adopt IGL, whether in first-year seminars, capstone courses, or points in between, even as they are struggling to understand what it is. Unlike popular teaching strategies such as team-based learning or cooperative learning, IGL comprises a suite of teaching strategies and defies definition as a single heuristic, a prescribed set of practices, or a formula for classroom practice. Frequently, the elusiveness of IGL is a frustration for faculty who want to know precisely what it is and how to implement it in their courses, which in turn can be an obstacle to its widespread adoption. Very broadly, IGL requires faculty members to reimagine their discipline as a framework for learning (Riordan and Roth, 2005) rather than a framework for scholarship. This is a very tall order, particularly in view of the inadequate preparation for teaching during graduate study and the recalcitrance of the conceptualization of teaching and learning as content delivery and memorization, respectively.

In the eight institutions represented in this volume, readers will note the wealth of antecedents drawn upon and models and mechanisms created to delimit IGL sufficiently for implementation. For example, McMaster University, an early pioneer in inquiry-guided learning as problem-based learning, drew originally on Bell’s (1966) thinking on the reform of general education and the work of Knowles (1975) and Candy (1991) on self-directed learning. Other antecedents include Kolb’s (1984) experiential inquiry. Undergraduate research, properly structured, is also a type of IGL.
learning cycle as a general model of inquiry and various representations of critical thinking, a cousin of inquiry.

The development of inquiry models has been particularly active in Canada, the United Kingdom, Australia, and New Zealand, although there are examples of models generated in the United States. Possible reasons for the heightened activity include the greater emphasis on the scholarship of educational practice in those countries; federal mandates regarding the teaching-research nexus; the funding of national centers as hubs of practice and research on IGL; and the resulting number of researchers, some of them quite senior, who have made IGL a central focus of their research agenda.

The overwhelming challenge in model development is devising a single scheme that represents accurately and credibly the diverse processes of inquiry in the sciences, mathematics, humanities, social sciences, fine arts, and professional programs. Models that have wide application, such as Kolb's experiential cycle, may have little utility as instructional heuristics for a majority of faculty members, who seek greater explicit guidance within their discipline. Models that offer explicit guidance within a specific discipline or set of disciplines such as the sciences may have little perceived relevance for practitioners in other fields. Added to the challenge of model creation is the developmental aspect of IGL—that is, the degree to which students are able to engage in independent inquiry, how much guidance is permissible in IGL, and how to characterize or represent guidance at successive stages of student development toward independent inquiry.

Consequently, the models represented in this volume and elsewhere variously describe the process of inquiry itself, the progression from guided to independent inquiry, the instructional implications of IGL, or a combination. Not surprisingly, the scientific process (or its adaptation to the social sciences) is the inspiration for most of these models. Models that describe the process of inquiry (for example, Hudspith and Jenkins, 2001; Justice and others, 2007) typically account for most of the following stages of inquiry: exploration, question or problem identification, inquiry design including methods of investigation, collection and analysis of data or evidence, development of conclusions or solutions, and communication of results. An interesting early model, Gowin's Vee heuristic for understanding knowledge (Novak and Gowin, 1984), takes a different, epistemological approach: it attempts to deconstruct and make transparent the process of knowledge formation itself, particularly in the sciences, and thereby address directly students' misconception of knowledge as a reservoir of facts rather than a process.

Another set of models addresses the developmental implications of IGL: specifically, the nature and degree of guidance at successive stages of student development toward independent inquiry and expectations regarding student performance of the various stages of the inquiry process at each
developmental stage. For example, Bonnstetter (1998) describes an inquiry continuum that progresses from “traditional hands on” inquiry in which the teacher controls all stages of the process of inquiry, through structured, guided, student-directed, and finally independent student-research inquiry. From two dimensions, tutor- or client-framed versus student-framed inquiry and exploring existing versus building new knowledge, Levy (forthcoming) derives four modes of inquiry—Identifying, Pursuing, Producing, and Authoring. Beginning with tutor- or client-framed inquiry that explores existing knowledge, the modes progress to student-framed inquiry that builds new knowledge.

Models that describe expectations regarding student performance of the various stages of the inquiry process and the conditions of performance at different developmental levels are essentially developmental rubrics. These frameworks include the Research Skills Development (RSD) Framework (University of Adelaide, 2006) and the Association of American Colleges and Schools (n.d.) Inquiry and Analysis VALUE rubric. For example, the RSD Framework comprises six facets of inquiry and five levels of student autonomy. In Facet E (“Students synthesize and analyze and apply new knowledge”), Level I is “Synthesize and analyze information/data to reproduce existing knowledge to prescribed formats. Ask questions of clarification and curiosity” and Level V is “Synthesize, analyze, and apply information/data to fill self-identified gaps or extend knowledge.”

How institutions and instructors actually use these models as they integrate IGL into courses and the curriculum is another matter. As I noted earlier, the models, in whatever form, bring necessary conceptual clarity to the term IGL: for researchers, including assessment specialists, the development of models is both an end in itself and an essential tool for analyzing patterns of implementation and student performance in courses, across the curriculum, and between institutions; for instructors the models are suggestive of pedagogical practice at various developmental levels; and for institutions as a whole, a compelling model contributes to a common language about IGL.

Although they are suggestive of classroom practice, the models do not provide explicit guidance on specific learning activities and experiences. For example, in one of Levy’s four modes of inquiry, producing, “students explore open questions, problems, scenarios, or lines of inquiry, framed by teachers or others such as an external ‘client’ in interaction with a knowledge base.” An instructor might well ask: How? What kinds of open questions, problems, or scenarios? How does the knowledge base come into play? How do I present it? and so on. Similarly at Level II of Facet E of the RSD Framework students “organize information/data using a recommended structure and process”: What data? Where do they come from? What recommended structure and process? How and when does the instructor introduce it? and so on. Often instructors who are comfortable
with traditional teaching that emphasizes the lecture want guidance of this kind.

Consequently, another, less common approach to the creation of models for IGL acknowledges the developmental level of instructors rather than students. For example, Lee (2011) created a developmental rubric on the use of IGL that reflects the varied conceptualizations of teaching that instructors hold (see Exhibit 1.1). The rubric recognizes that how instructors implement IGL depends as much on their own frequently unexamined assumptions about teaching as their instructional response to the developmental level of their students. So an instructor who sees himself as a presenter of knowledge and trusts primarily his own control over knowledge delivery will implement IGL quite differently from an instructor who sees herself as a collaborator with students in the process of inquiry and trusts the process of inquiry itself as a force in learning regardless of the level of the students. As a supplement to the rubric, Lee (2011) also provided selected semester patterns in IGL courses that may loosely correspond to the stages in the developmental rubric (see Table 1.1). So instructors at the Experimenting stage may use patterns 1 and 2, Pseudo- and Emerging-IGL, when implementing IGL; at the Developing stage, patterns 3–6; and at the Committed stage, patterns 6 and 7. Some readers may argue that semester patterns 3–6 also correspond to student developmental levels: that is, less instructor guidance toward independent inquiry as students progress through the curriculum. The semester patterns also offer instructors more pedagogical guidance on how to implement IGL, while still falling short of absolute prescription.

Model development notwithstanding, readers will observe a common finding regarding implementation in the eight institutional examples in this volume: the importance of instructor and program discretion in the interpretation and implementation of IGL. It is indeed a paradox of educational development that as much as instructors ask for explicit guidance on the implementation of IGL, they also require flexibility in how they ultimately interpret and incorporate it into their courses. Further, the paradox holds regardless of institutional type or country. Possible reasons for the requirement of flexibility include the importance of the value of autonomy in the academy and, as noted earlier, the distinctive cultures and methods of inquiry of the academic disciplines and the varied conceptualizations of teaching and learning held by instructors.

Instead of the conceptual clarity afforded by models, over time many institutions develop a broad, common understanding of IGL that guides implementation across the institution. The common understanding frequently takes the form of a consensus definition or a set of student learning outcomes. In my own experience at North Carolina State University, four broad student learning outcomes—taking responsibility for one’s own learning, critical thinking, developing habits of independent inquiry, and intellectual growth and maturity—as well as a common definition of IGL

NEW DIRECTIONS FOR TEACHING AND LEARNING • DOI: 10.1002/tl
### Exhibit 1.1. Holistic Developmental Rubric on the Use of Inquiry-Guided Learning by Instructors

**Committed**

- Inquiry is the dominant mode of learning and the primary stimulus for knowledge acquisition.
- Seamless development of the skills of inquiry and the acquisition of knowledge through the process of inquiry itself.
- Skillful, and often invisible, balance of challenge and support in ways appropriate to the developmental level of students; enables students to function with a high degree of independence.
- Primary source of trust is in the process of inquiry as a mode of learning and the outcomes and products of inquiry as credible or valid assessment.
- Instructor exhibits a tolerance for uncertainty in the inquiry process and openness to unexpected directions set by students.
- Instructor functions chiefly as a collaborator with students in the process of inquiry.

**Developing**

- Inquiry as a mode of learning but often after explicit preparation of students using more traditional instructional methods.
- Separate development of the skills of inquiry and the acquisition of knowledge through explicit instruction.
- Balance of challenge and support in ways appropriate to the developmental level of students; mechanisms of support are visible.
- Primary source of trust is in the guidance of the instructor with guidance taking a variety of forms.
- Instructor exhibits some tolerance for uncertainty within anticipated boundaries of student performance.
- Instructor functions chiefly as a guide to students during the process of inquiry.

**Experimenting**

- Some inquiry as a mode of assessment but only after explicit preparation of students using traditional instructional methods.
- Acquisition of knowledge through explicit instruction with some experimentation engaging students in the skills of inquiry through isolated learning activities.
- Primary source of trust is in instructor control over knowledge delivery.
- Instructor exhibits little tolerance for uncertainty beyond isolated and carefully controlled opportunities for student engagement.
- Instructor functions chiefly as an organizer and presenter of knowledge.

Table 1.1. Selected Semester Patterns in an Inquiry-Guided Learning Course

<table>
<thead>
<tr>
<th>Type</th>
<th>No.</th>
<th>Pattern</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudo-IGL</td>
<td>1</td>
<td>K, K, K, K, K, K, I</td>
<td>A very traditional course with a final inquiry-like project, often a research paper for which students have not been prepared.</td>
</tr>
<tr>
<td>Emerging IGL</td>
<td>2</td>
<td>K, i1, K, K, K, i2, K, K, i3</td>
<td>Instructor experimentation with inquiry by introducing inquiry exercises as in-class activities or assignments.</td>
</tr>
<tr>
<td>Guided Inquiry</td>
<td>3</td>
<td>K, i1, i2, I, K, i3, i4, I . . .</td>
<td>A series of units each built around an inquiry experience, structured by the instructor, for which students have been prepared through presentation of relevant content and inquiry skills development.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>K, K, K, i1, i2, i3, I</td>
<td>A final inquiry experience, perhaps with some opportunity for student choice and design, for which students have been prepared through presentation of relevant content and inquiry skills development.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Ia, Ib, Ic, Id, Ie, I</td>
<td>The course as a series of feeder assignments, designed by the instructor and on which students receive feedback, leading up to a final inquiry experience.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>I, K, i1, i2, I, K, i3, i4 . . .</td>
<td>A series of inquiry experiences, each designed to address a targeted content area and to develop the skills of inquiry. Typical of problem-based learning.</td>
</tr>
<tr>
<td>Inquiry</td>
<td>7</td>
<td>I, K, i1, i2, i3, i4 . . .</td>
<td>An inquiry experience, perhaps student designed, through which students acquire content relevant to the inquiry and further develop the skills of inquiry.</td>
</tr>
</tbody>
</table>

Legend: K = presentation of knowledge/content; I = inquiry; Ia = feeder assignment to inquiry; i1 = guided inquiry skill development.

Source: Lee, 2011.
(see Lee, 2004, pp. 9–10) provided just enough conceptual clarity while still permitting many variations in practice. Further, as instructors integrated IGL into courses, they drew upon varied sources of inspiration to guide their practice including course goals and objectives that interpreted the broad outcomes more specifically in the context of their disciplines, alternative models of inquiry and representations of critical thinking, information literacy outcomes, rubrics, compatible teaching strategies, and innovations adopted by other instructors.

Readers will observe a similar pattern across the institutions represented here: a broad, common understanding of IGL with a wealth of variations in practice across the academic disciplines.

**Conclusion**

IGL appeals to a range of institutions of higher education seeking variously to capitalize on the research expertise of their faculty, bridge their teaching and research missions, further a broad set of desirable student learning outcomes, and enhance the intellectual culture on their campuses. Particularly over the past fifteen years, it has been very much in the air as a compelling approach to learning and adopted widely even as colleges and universities struggle to understand what IGL is. Because IGL comprises a suite of teaching practices that defies a simple prescription for practice, practitioners have developed conceptual frameworks, models, and developmental rubrics as a necessary first step of implementation. Taken together these frameworks, models, and rubrics represent a collective effort to define inquiry as a site of student learning rather than faculty scholarship.

**References**


Virginia S. Lee is principal and senior consultant of Virginia S. Lee & Associates, LLC (Durham, North Carolina), a consulting firm that specializes in teaching, learning, and assessment in higher education.