Gonzalez, J. J. (2013). My journey with inquiry-based learning. *Journal on Excellence in College Teaching, 24*(2), 33-50.

My Journey With Inquiry-Based Learning

Joseph J. Gonzalez
Appalachian State University

The author chronicles his experiments with inquiry-based learning (IBL) as he applied lessons from the literature and assessed the results. He describes a difficult journey with the result that, with the help of the literature, supportive colleagues and patient, creative students, he learned how to design courses that invite undergraduates to become more critical, more complex, and more autonomous thinkers. Readers of this article will, he hopes, avoid some of the pitfalls that he encountered.

I had a problem. I saw it in my students every day. Their faces, their postures, and their incessant checking of electronic devices all told me that they wanted to be somewhere other than in my class—whatever it happened to be. No matter how high my standards, or how polished my lectures, most of my students engaged with my courses only when required to do so—for an exam or paper, for example. On those days, my courses resembled an exercise in pedagogic dentistry, with me as the puller of teeth. I had my successes, of course. From time to time, a student would become intrigued by history, but such students were too few to satisfy me. Making matters worse (I say only half in jest), I could not bring myself to blame the students; as a graduate student, I had seen faculty blame undergraduates when their courses did not "work," and I knew that student blaming offered only false consolation and no solution.

Eventually, I found a way out of this situation. My road to recovery ran straight through teaching and learning conferences (like the Lilly Conference on College Teaching), journals (like this one), and institutes (like Ken Bain's; see Bain, 2004) In those settings, surrounded by faculty confronting problems similar to mine, I found an answer to the problem of student engagement: the inquiry-driven classroom. If I turned my classroom into a place where students answered questions, rather than memorized answers, so I was told, they would become more engaged in

the learning process and learn more deeply. Three books, in particular, which I read early in my career, opened my eyes to what I was not doing, but could do: Fink's *Creating Significant Learning Experiences* (2003); Tagg's *The Learning Paradigm College* (2003), and Wineberg's *Historical Thinking and Other Unnatural Acts* (2001). Armed with new insights from these texts, I gradually adopted methods of inquiry, and after no small amount of trial and error, I discovered that my students were doing better work, learning more, and, *just as important*, feeling more accomplished.

A couple of years ago I again felt dissatisfied. My pedagogy had come far, but only *so* far, and I knew that I was still leaving some students behind. I expressed this concern to a colleague immersed in the scholarship of teaching and learning (SOTL). He, tongue planted firmly in cheek, suggested that I take the "unusual" step of reading the literature on classroom inquiry. I took his advice, and the more I read about an approach called inquiry-based learning (IBL), the more I wanted to read—and the more I wanted to contribute to the literature, offering a bridge between the "wisdom" of personal accounts and more qualitative analyses (Weimer, 2006). The result is this piece: the story of my encounter with the literature on IBL, as I read and experimented, tried and failed, and tried again. Before beginning, I should note that I am neither a scholar of higher education nor a faculty developer. Rather, I am a historian by training, an interdisciplinarian by inclination, and an engaged pedagogue by necessity—and curiosity. I am, in short, a practitioner, and my purpose here is to help other practitioners, providing them with the article that I wish I had read before I experimented with my students.

Definitions

In an IBL environment, students behave like scholars, using accepted methods of inquiry to answer questions they or their faculty design. Hmelo-Silver and Barrows (2006) call this process of guided inquiry a "cognitive apprenticeship," and it was very different from the courses I taught before becoming acquainted with classroom inquiry. In those courses, I alone acted like a scholar; my students were passive recipients, more like stenographers than learners. Gradually, I embraced more active pedagogies, and over the years, I have found that inquiry can take many forms. At first I questioned my students, much like Socrates questioned his students in the Agora of Athens, but this technique tended to provoke more fear than engagement. (I wonder how Socrates's students handled it.) Later, inspired by a presentation I saw at a Lilly Conference, I decided to assign students to groups and have them collaboratively answer

questions using lectures and assigned readings. That worked better, but by far my most satisfying method—for the students and for me—proved to be when I constructed a process by which students generated content of their own, usually collaboratively, "as a necessary step to solving authentic, ill-structured problems, and cross-disciplinary problems" that they designed (Walker & Leary, 2009, p. 12). My interest in classroom inquiry naturally led me to become better acquainted with other aspects of active learning, such as undergraduate research, cooperative learning, and team-based learning, approaches closely related to, but nevertheless different from, IBL. I also read deeply in problem-based learning (PBL), a pedagogy with origins in medical education and similar enough to IBL to confuse even the closest observers on any given day (Hmelo-Silver, Duncan, & Chinn, 2006). Any scholar interested in IBL can draw, much as I did, from any or all of these pedagogic strategies while remaining true to IBL's principal aim: teaching students to act like scholars.

The Role of Faculty

Thanks to my encounter with the literature on classroom inquiry, I am not the teacher I was several years ago. Early in my career, right after graduate school, I did for my students what my teachers had done for (or to) me: I delivered content by means of lectures and assigned readings, with heavy emphasis on the former. I assumed, as many of us do early in our teaching careers, that *my* lecturing resulted in *their* learning. Of course, I had no idea as to how this happened, but I took it on faith that it did, principally because I had learned this way. After reading Fink (2003), Tagg (2003), and Wineburg (2001), however, I changed my role, becoming the designer of the learning experience, more of a "guide on the side" than a "sage on the stage." In this capacity, I eventually found myself creating assignments that required students to generate and present content of their own, all the while integrating what they learned with common course content. I took on other unfamiliar tasks as well, such as mentoring student groups. Inspired by the literature on cooperative learning, I often had students working in groups and asked them to reflect on what they learned and how they learned it, meta-cognitive questions that promote deep learning (Bransford, Brown, & Cocking, 2000). I will say more about each of these approaches later; for now, let me say that after a few years of experimentation, my classroom looked nothing like it had before: Students were writing more, talking more, even arguing more, and I was talking a whole lot less.

I adopted this role with some trepidation. After all, my mentors had

always delivered "The Content" from the podium and from the reading list. How could I, then, allow, even require, students to generate content on their own? What if they didn't learn anything? Fortunately, the literature encouraged my transformation and helped me understand the erroneousness of my assumptions (Weimer, 2002). My mentors (and I) had assumed that the presentation of content, whether by lectures or readings, guaranteed learning; in fact, neither the presence nor the presentation of content guaranteed anything of the kind (Wineburg, 2004). Rather, it is what students *do* with content that produces learning. Nelson (1999) says,

> If one measures teaching by what the teacher presents or "covers," then time spent on anything else than lecturing on content is, by definition, a reduction in coverage. However if one asks how to maximize student learning, then covering as much as possible is a seriously flawed approach. (p. 168)

And so I pressed on. There were bumps and bruises along the way, to be sure, but with time, I found that my students learned more and enjoyed learning more. I also found that I was not alone in my discovery that guided inquiry produces more learning and more engagement, while doing nothing to decrease students' ability to meet so-called "objective" markers, such as certification exams (Cooper & Mueck, 1991; Denton, Adams, Blatt, & Lorish, 2000). It may even reduce plagiarism and other forms of academic dishonesty (Houtman & Walker, 2010).

Once I stopped relying on my lectures, or on the students to read and understand on their own, I found a variety of ways both to provide content and promote learning. I took Shadle (2010) as a model. In her chemistry class, she designed collaborative exercises to provide content, refusing to resign herself to lecturing. The exercises asked the students to take content from the readings and then, in subsequent exercises, apply that content in increasingly sophisticated ways. "I deliver the content," says Shadle (2010), "by choosing or writing well-constructed activities for the students to do during class" (p. 41). Shadle also provides content through mini-lectures, designed to answer common questions and remedy common misperceptions—when the need arises, but not before. "Instead of providing students with information (delivering the content)," comments Shadle (2010), "I spend time working with students on the process of understanding the content" (p. 44). According to the literature, there is another benefit to have students dig for themselves. Edwards and Bowman (1996) as well as Fleck and Hussey (2009), claim that by reporting to their peers, students are able to put course content in their own voices and "actually speak the language of the discipline" (p. 56).

Having adopted many of these strategies, my classroom now rings

with student voices. In the first half of the semester, students usually work in groups, making sense of the readings with the help of questions I provide—and later, they provide. I still lecture, but I do so at carefully chosen times: At the beginning of class, for example, I introduce the day's activities; in the middle, I clarify points and reinforce connections the students have made; at the end of class, I bring closure, drawing relationships between what we have done and what we will do. In the second half of the semester, students will work in collaborative research groups, answering questions that they design. We still meet as a class, however. Class time is group work time, and I meet with each group to review its progress. At the end of the semester, I always have my students make their learning public, whether in the form of a presentation that relies on a variety of media or in a short documentary film. All along, both in class and out of class, I have the students journal, writing about what they are learning and how they learning it, as well as making connections between what they are learning in other classes. Though I teach different subjects, from history to the theory and practice of interdisciplinarity, all of my classes tend to look this way – with emphases on group work, inquiry, and metacognition.

I don't think I have suffered any loss in terms of student learning; in fact, I think that my students now learn more than they did before. Their work is better—better researched, better reasoned, better written, and better presented. According to the literature, much of the learning with IBL comes from the difficult process of integration: weighing evidence, critiquing sources, examining counter-arguments, and, usually, constructing limited, highly provisional arguments, much as scholars do (Walker & Leary, 2009). Such tasks take both time and space, and if I still felt compelled to put my delivery of content ahead of other cognitive goals, my students would achieve neither. Thanks to the literature, however, I understand that how people learn is as important as what they learn, and that "the tradeoffs between the teaching of processes and the teaching of content that once seemed so evident are . . . as imaginary in practice as unicorn horns" (Nelson, 1999, p. 180).

Scaffolding

In an IBL environment, students assume a high degree of responsibility for their learning. I have found that for many students, if not most, this represents a significant change from their previous classroom experiences. The literature, therefore, recommends that faculty "scaffold" our courses, gradually initiating students into what it means to be a scholar: "To be

effective, students must have sufficient guidance and scaffolding through the inquiry process" (Nilson, 2010, p. 176). More specifically, the literature urges us to divide the scholarly process into a series of discrete, but interrelated, steps, from formulating questions, to gathering knowledge, and, eventually, to constructing and presenting arguments based on evidence (much as I described above). When done correctly, "scaffolding," say Hmelo-Silver et al. (2006), "makes the learning more tractable for students by changing complex and difficult tasks in ways that make these tasks accessible, manageable, and within students' zone of proximal development" (p. 100). The gradual, yet sustained, nature of scaffolding allows for "an incremental series of major reorganizations in our students' views of knowledge and knowing" (Nelson, 1999, p. 169). The literature also encourages faculty to make their scaffolds explicit, explaining how and why they have structured the class as they have (Conway & Little, 2000).

When I began teaching, I never considered my students' cognitive lives. Instead, I divided them into "good" and "bad," "motivated" and "not motivated." That was until I encountered the work of Kegan (1994), who helped me understand that I could either help or hinder my students' development depending on the mixture of challenge and support I chose to provide. That said, I initially failed to appreciate the value of scaffolding. In fact, in my very first experiment, I employed almost no scaffolding at all. When the "inquiry" portion of the course arrived, I allowed the students to form themselves into groups (more about that mistake later), told them to design questions, and then turned them loose, with the deadline for essays and presentations some weeks hence. The results were not pretty. Though the questions held promise, the research was shallow, the arguments obvious, and the presentations weak—full of the kinds of elementary errors that say to an audience, "We know this is a careless, last-minute job, but please don't point out that fact." I was disappointed (no doubt the students were too), but after the end of term, my errors seemed clear to me. Despite overwhelming evidence to the contrary, I presumed that my students understood how to behave like scholars with little guidance from me; their work, however, showed me that they needed not only guidance, but *sustained* guidance at every step of the research process. In short, I would have to teach my students how to think like scholars, a commitment that I now make each semester to each new group of students.

In perhaps the most common variety of scaffolding, faculty break the investigative process into a series of manageable, but increasingly difficult, tasks. Van Eeden-Moorefield and Walsh (2010) describe a scaffolded course in which faculty introduce students to each step in the research

process, including generating of ideas, proposal development, and literature review. With each step, the students received feedback and revised their work. As a consequence of this scaffold, van Eeden-Moorefield and Walsh (2010) reported increased investment by students. Ukpokodu (2009) and Bolton (2009) also describe courses premised on revision: Students completed some section of a larger project, receive feedback, often from peers and faculty, and then revised that work. Ukpokodu has his preservice teachers design interdisciplinary units premised on a model of transformative pedagogy, while Bolton has his students write research proposals on topics of interest to them. According to Bolton, this process allowed students not only to "get it right" before moving to the next step, but also to discard ineffective approaches and ideas: "One of the most important parts of problem solving and creativity," says Bolton (2009), "is recognizing bad ideas" (p. 78).

For my part, I find revision to be particularly valuable, perhaps the most valuable aspect of scaffolding. Inspired by the literature, I also break down a research assignment into its constituent parts: question design, research methods, research, writing, and presentation. With each step, I require students to receive feedback from their peers and from me, and then they revise their work before moving on to the next step. The key to the success of this component is a rubric, a document that explains what the assignment is about and how I will evaluate it. Absent that, students cannot provide helpful feedback to each other, and they cannot assume responsibility for revising their work. Such revision, though time consuming for the students and for me, ensures that most of them will have gotten a given step "right" before proceeding to the next step.

There are other ways to scaffold. Some faculty require students to make connections to the course material at certain times or to introduce "complicating" factors into their research, factors that inevitably will lead them into more challenging and profitable directions. Other faculty ask them to master course content and then apply it to unfamiliar situations. Whatever the professor's approach, the literature urges us to immerse our students in the process of inquiry gradually and intentionally—or else risk significant student resistance. To be sure, some students come to us ready to learn independently and interdependently; most students, however, come ready to memorize knowledge that faculty present. It is their "default" setting. Without an intentional structure that both challenges and supports, students will become uncomfortable, then frustrated, and, ultimately, disengaged. "If they're not uncomfortable, they won't learn," said Greenfield (2009), "but if they're too uncomfortable, they won't learn" (p. 44).

I wish I had read Greenfield's (2009) words before teaching a course in our history department some years ago. On the first day, I made clear to students my intention to "teach you how to be historians," not "teach you history," and I set about applying all that I had learned about scaffolding. With some lecturing for context, I taught the class how to use primary and secondary sources; I used exams to teach students how to integrate knowledge drawn from a variety of sources into coherent arguments. Half way through the term, the students divided themselves into groups, and I taught them how to research and make a documentary film on a topic they defined, step-by-step, just as the literature advised me to do. The films were very good, but the class evaluations were very divided: Half of the students thanked me for allowing them to learn how to "make history"; the other half castigated me for failing to teach them "history." Several students called the class at utter waste of their time, wondering if I actually "knew" any history. The results troubled me, and after re-reading Richlin's (2006) book on course design, I realized that I had failed to meet my students where they were "at." At least half of my students expected lectures and exams that tested their ability to memorize information and apply concepts drawn from the lectures. If I had it to do all over again, I would have scaffolded the course differently, offering students more of what they expected—lectures, exams, and perhaps a research paper—while still nudging them, step by step, toward thinking like historians.

Groups

When I began using IBL, I underestimated the cognitive demands that the new pedagogy placed on my students—a common mistake, according to the literature. When asked to learn for themselves, students often feel adrift, afraid that they are not learning what is "right" and possibly jeopardizing their success in future courses, much like my history students had felt two years earlier. I have come to understand a profound truth: By asking students to think critically, and to view knowledge as socially constructed, we are asking them to "set aside modes [of thinking] that have served them well and still tie them to family, friends, and prior teachers" (Nelson, 1999, p. 178). We are, in short, asking them to change not only how they learn, but who they are.

Much like scaffolding, effective peer collaboration can help students rise to these cognitive challenges; for this reason, says Cottell (2010), cooperative learning and inquiry-driven learning "are ideally suited for each other" (p. 12). Functional student groups increase student motivation by making students feel a greater sense of accountability to each other and

to the cognitive goals of the course (Chapman, 2000; Millis, 2010; Millis & Cottell, 1998). Working in groups, students' mastery of content improves, as they recall, use, and, ultimately, reinforce content *for each other* (Fleck & Hussey, 2009). Groups can also serve the revision process, as students evaluate each other's work and then revise with their peers' feedback in mind (van Eeden-Moorefield & Walsh, 2010). In short, collaboration can be a powerful tool, *if* the professor establishes appropriate values and procedures (Fleck & Hussey, 2009). The literature suggests that the professor must make sure that all group members feel responsible to each other, rewarding the entire team for group success, while preserving individual accountability (Fleck & Hussey, 2009; Millis & Cottell, 1998). The problem, or perhaps the opportunity, is that students—much like faculty—do not come to our classrooms naturally predisposed to collaborate. Instead, they must learn how to work effectively with others, and for that to happen, faculty must establish structures and values that strengthen the students' commitments to each other and the goals of the course, teaching them, for example, how to "actively listen" as well as other practices that promote healthy interdependence (Cooper & Mueck, 1991).

When I began my journey with IBL, I knew very little about how to mentor groups effectively. I was fortunate, therefore, that the literature on cooperative learning has grown. One recent collection, edited by Millis (2010), perhaps the field's foremost expert, offered a case study by Shadle (2010) from a discipline unlike my own that particularly impressed me. Susan Shadle is professor of chemistry and biochemistry at Boise State University. She rejects the notion that the "content-rich" nature of chemistry, which requires a new vocabulary and sophisticated mathematical skills, also requires lecture-driven content. To avoid being the primary deliverer of content, Shadle organizes groups in the service of inquiry, forming them quickly. On the first day, she assigns students at random to groups of four. Students provide information about themselves on index cards; these cards allow her to create heterogeneous groups that are balanced with regard to gender, interest in the subject, major, and other demographic data as well as their interest in chemistry and previous grades in the subject. Sometimes these groups stay together for the entire term, sometimes not. Shadle may shuffle them in order better to meet the needs of individual students, matching, for example, more introverted students with those more skilled in communication, or those who struggle more with those who struggle less. Such intentionality is important; as Shadle (2010) reminds us, "Simply putting students in groups does not result in cooperative learning" (p. 42).

Shadle (2010) uses folders for the groups that contain handouts and

written feedback and, from the students, assignments. Each group is assigned a number, and within each group, each student is assigned a letter (A, B, C, D). Shadle uses this letter system randomly to assign group members individual roles for the day—for example, a "manager," who is responsible for the folder and for handing in the group's work, and two recorders, one who records the group's activity, the other who records "big ideas" and posts them on the course website. Perhaps most interesting, Shadle assigns the one person in the group the role of reflector, who, after a time, evaluates the group's process. When mentoring her groups, Shadle encourages and questions, but she avoids giving answers. Instead, she conducts herself as "a facilitator in an environment that is designed to challenge students to work cooperatively" (p. 37). Even in an IBL environment, Shadle gives quizzes: If every student in a given group meets a certain threshold on the quizzes, then every student receives additional credit. This helps students see the value in working together. Group work is difficult, and if faculty neglect to structure group work carefully, then students will revert to what they know best: working alone.

When I began having students work together, I made beginner's mistakes—most notably, failing to teach the students *how* to work together. Now, however, I employ many of the strategies the experts suggest: I assign roles to students within groups (so as to keep everyone engaged); I assign students to a series of different groups before they embark on collaborative research (so that they will work with a variety of people); I now include individual assignments with individual grades (so as to promote continued investment and accountability). I also employ two other techniques worthy of note. First, during the first half of the course, while the students engage with the course's common content, we develop a "code of conduct" for group work. This code, the product of many class discussions, outlines what the students will expect of each other during the collaborative research process. After forming collaborative groups later in the term, the students must incorporate this code into a group contract; everyone signs their names to this contract with the understanding that part of their group project grade rests on how well they have lived up to our code's letter and spirit.

Second, I hire undergraduate teaching assistants. Perhaps "hire" is the wrong word, given that students who serve as my teaching assistants receive credit hours, not cash. Nonetheless, teaching assistants are essential because group members are very reluctant to hold each other accountable, despite the presence of a code of ethics. For this reason, I assign one teaching assistant to each group, and it is his or her job to make sure that the group confronts persistent problems. At the semester's end,

the teaching assistant assesses the group's commitment to our ethical code. Over the past three years, I have found that this practice helps my students become better-functioning groups, and my teaching assistants become more self-aware students.

I do deviate from the literature's recommendations in one significant way: I allow students to form their own collaborative research groups. Let me explain. In my class, a research group will execute a project lasting almost half the semester. With so much at stake, I believe that students must have the freedom to choose those with whom they work. To be sure, I prepare them carefully for that fateful day. Before group selection, for example, we review our "code," and the teaching assistants (all of them students who have had me before) offer advice: Don't choose your friends; don't work with your roommate; don't work with someone you are dating (or want to date). My students also take, and thoroughly discuss, the Meyers-Briggs Type Inventory, an instrument that, for all its purported weaknesses, nevertheless makes clear that groups need people with different strengths in order to succeed. This is a difficult construct for undergraduates, who want to work with people like themselves, to grasp. After such preparations, students make their choices, and when problems arise (and they always do), I find that students are more likely to "own" the problems ("No one forced me to work with these people") and the solutions ("I guess I better find a way to get along with them") than if I had picked their groups for them. (Note: On those few occasions when I have deviated from my practice and assigned students to groups, they accepted *much* less responsibility for learning how to work together; their problems were *my* fault.)

I also find that students surprise me. In the fall of 2010, for example, I allowed a group to form that violated all our precepts: It was composed of friends who lived on the same hall, complete with a roommate pair and a dating couple. Usually such intimacy spells nothing less than disaster, but this group held each other accountable and executed a fine project. Had I chosen their groups, these students would never had the pleasure of working together—or the pleasure of proving me wrong.

Metacognition

When I began teaching, I knew nothing of metacognition. The research, however, told me that as students learn new content and skills, they must also reflect on how they learn in order to become better, more self-aware learners. In this way, meta-cognition makes "learning visible" to students, giving them "an ability to think not only about *wha*t is being learned, but

also about *how* it is being learned" (Ryan, 2000, p. 228). More specifically, as Ryan (2000) has argued, if students are required to state what they learned and how they learned it, they are better able to recall both content and skills, provided that their reflections are "perfected through active, repeated, and guided practice . . . [as well as] associated in the learning process with the acquisition of course-related information" (p. 228). A number of tools encourage metacognitive learning. Journaling and other reflective, "low stakes" writing, for example, ask students to write about what they learned, how they learned, and their thoughts about what they are learning. Online discussions can have a similar impact, allowing students to discuss what they are learning and how this learning is or is not changing their worldviews (Ukpokodu, 2009). Debriefing is also helpful: After an activity, scholars recommend asking students to reflect on its relevance to course's content and concepts (Ukpokodu, 2009).

I do my best to incorporate meta-cognitive reflection in all my classes. For example, I ask students to journal fairly regularly in response to questions designed to enhance their reflective abilities, both in class and online. Usually, I will ask the students about what they have learned that seems significant to them, or how their opinions about research or the material have changed as a result of their work. I always ask them to tell me what is proving easy or difficult for them, along with any questions or suggestions they may have. During the research process—and there is always some kind of research in my classes—I ask students to consider how their views of knowledge are changing. This last point is particularly important, because inquiry-based learning requires a cognitive shift on the part of students, a "mental transformation," if you will—from passivity to increased autonomy, from simplistic dichotomies to an increased awareness of the contingent nature of knowledge—and the uncertainty of much of what they have always considered Truth (Nelson, 1999). This new understanding about knowledge usually comes with a substantial cost, a loss of certainty, however false, and the need to renegotiate relationships, especially with parents and mentors. Reflective writing can help students "process the loss" of what they once they believed, all the while acknowledging and accepting their increased uncertainty as part of becoming more fully adult (Herbers & Mullins Nelson, 2009, p. 29).

When presenting their research to an audience, I require students to assess the strengths and weaknesses of their research processes, making clear what they believe is their strongest and weakest claim(s). I also ask them to discuss what, if they had the project to do over again, they would do differently, and why. These requirements usually surprise students who are unaccustomed to acknowledging "imperfections" when presenting

their work—that, they assume, is for faculty to ferret out when they read and grade. After explaining myself, however, I find that students find it valuable to publicly own what they have done, uncertainly in all, in front of faculty and peers alike.

Assessment

I believe that inquiry-based learning works. Both the literature and my experience tell me so. Indeed, if IBL did not "work"—if teaching students to behave as scholars did not promote their intellectual growth—then inquiry would not promote our intellectual growth as scholars. That said, "like every other teaching method, the benefits of inquiry-guided learning depend on its implementation" (Nilson, 2010, p. 176). And how do we know the extent to which IBL is in fact beneficial? That is a job for assessment.

I was surprised to discover that there are many ways to assess the effectiveness of IBL. Miller and Snelbecker (2000), for example, state that scholars agree that IBL should be assessed in multiple ways involving "the collection of multiple sources of evidence to produce a multidimensional representation of student learning" (p. 134). Self- and peer assessments, as well as faculty assessments, can contribute to this picture in addition to the students' finished work. Whatever the tools used, it is imperative that a faculty member's assessment process explore not only what the students produced, but also how they produced it.

For this reason, scholars tell us that assessment for IBL should concern not only outcomes, but also processes (Major, 2000). Major (2000), by way of example, describes the assessment efforts at Samford University, which inaugurated an inquiry-driven curriculum (in this case problem-based learning) and decided to employ a variety of assessment measures, including measures common in "traditional" (that is, non-inquiry driven) environments, such as short answers and multiple choice exams. According to Major (2000), such "traditional' measures work provided that the questions are germane to the content and cognitive goals of the course. One faculty member in pharmacy, for example, used these tests to evaluate student reasoning through "complex pharmacy patient case scenarios" (p. 119). These tasks are in addition to the more commonly expected methods of assessment in an inquiry-driven course, such as essays or presentations, in which students lay out their topics of inquiry, their methods, and their results. Major also recommends peer and self-assessments, provided that students understand how to assess themselves and each other fairly, perhaps with the aid of a rubric.

Over time, I have employed almost all of these assessment techniques, most notably presentations, essays, and peer and self-assessments. In fact, I devote the entire course final exam period to the writing of these assessments (and course evaluations) because I find them particularly valuable. I have also begun to employ more "traditional" methods, such as short papers, with some success. Whatever the measure, when it comes to student work, I employ a rubric: Such an instrument helps the students understand what I want, especially in terms of intellectual sophistication, and it helps me understand what I receive from them. Perhaps most important, a rubric also allows me, with confidence, to offer my students' work as evidence for my effectiveness as a teacher. Each semester I make changes to my courses based not only on what the students told me (in their self- and peer assessments as well as course evaluations), but also on what they have shown me in their work.

Conclusions: The Potential

Notwithstanding its criticisms, some of them blistering, IBL is not "unguided" instruction (Kirschner, Sweller, & Clark, 2004; Stalker, 2002). It does not consist of instructors turning their students loose without guidance to roam as they wish and perform as they will. Rather, an IBL environment is one in which students work within carefully prescribed parameters designed by the faculty. True, the students may feel more free—more free to pursue their interests, more free to use their peers for support, for example—but the inquiry process, at its best, is intentional. Simply put, there is no other way I have found to move students toward increased independence, competence, and cognitive sophistication.

This last point is important because higher education is under scrutiny as never before. Higher education's stakeholders—parents, students, accreditors, scholars, the private sector, legislators, to name but a few—want "results," though they may disagree as to what precisely constitutes "results" (Arum & Roska, 2011). IBL, when linked to demonstrable learning outcomes, is one way for us, as faculty, to present evidence that our students are learning to think more critically, with greater complexity, and with greater independence, all traits that employers claim to value.

There also are broader considerations at stake here. We live in a democracy, and democracy requires its citizens to think independently, critically, and with complexity. Scholars warn us that we are raising students who are both uninformed and unable to think in any but the most simplistic terms; such students are unable to function effectively in either the world of work or the world of democratic self-government (Graham & Hand,

2009; Jacoby, 2008; Shenkman, 2008). A democracy, says Nelson (1999), requires "minds that can grapple successfully with uncertainty, complexity, and conflicting perspectives, and still take stands that are based on evidence, analysis, and compassion, and are deeply centered in values" (p. 177). Engaging students in the process of producing and presenting their own knowledge—in other words, asking students to become good question askers, not simply question answerers—holds out the promise of better fulfilling our democratic mission as educators.

It is, therefore, encouraging that we may be on the verge of a new era in which faculty are expected to improve their pedagogic practices, no longer giving lectures from notes yellowed by years of use (Weimer, 2010). As Tan (2006) has explained, decades ago, when I was an undergraduate, good pedagogy meant "making content 'visible' to students" by means of the most coherent, most engaging explanations possible (p. 104). Now, according to Tan (2006), more and more often good pedagogy requires faculty to make "students' thinking visible" through learning environments that "enable students' ways of thinking and knowing to be manifested in active, collaborative, and self-regulated learning" (p. 112). This, as much as any statement I know, sums up inquiry-based learning: Making students thinking and learning visible—to us, to each other, and to themselves.

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Joseph J. Gonzalez, *Ph.D., is an assistant professor in the interdisciplinary studies and global studies programs at Appalachian State University, where he teaches courses on the social and historical construction of race, U.S.-Cuban relations, and the theory and practice of interdisciplinarity. He is currently at work on a historical monograph about the U.S. occupation of Cuba from 1898-1902, as well as a collection of essays on inquiry-based learning for Stylus Press.*