The inquiry cycle

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Inquiry cycle
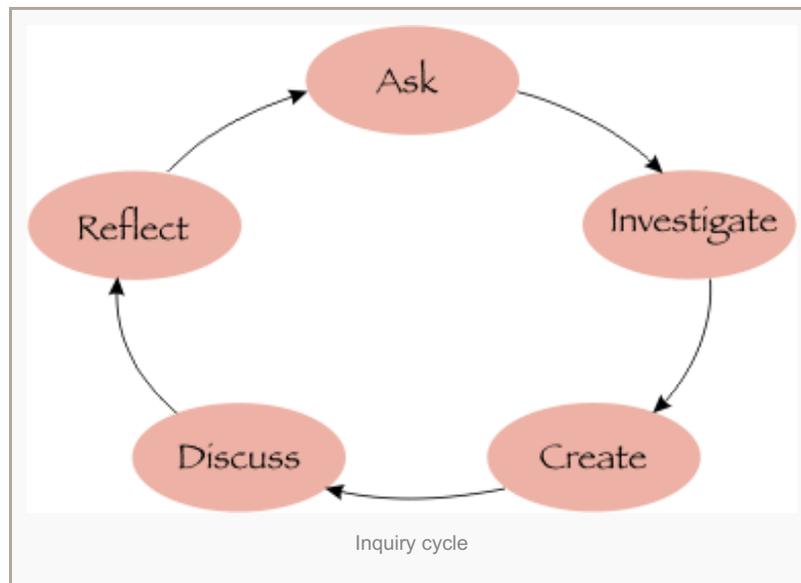
Drawing from Dewey's four impulses of the learner in *The School and Society*; the stages of reflective action from *How We Think*, and the fundamental idea that learning begins with the curiosity of the learner, we can envision a spiral path of inquiry: asking questions, investigating solutions, creating, discussing our discoveries and experiences, and reflecting on our new-found knowledge, and asking new questions (Bruce & Bishop, 2002). Each step in this process naturally leads to the next: inspiring new questions, investigations, and opportunities for authentic "teachable moments." Each question leads to an exploration, which in turn leads to more questions to investigate (Bruce & Davidson, 1996).

We need to interpret the cycle as suggestive, neither the sole, nor the complete, characterization of inquiry-based learning. Inquiry rarely proceeds in a simple, linear fashion. The five dimensions in the process—ask, investigate, create, discuss, reflect—overlap, and not every category or step is present in any given inquiry. Each step can be embedded in any of the others, and so on. In fact, the very nature of inquiry is that these steps are mutually reinforcing and interrelated. Thus, reflection on solving a problem may lead to reformulating the problem or posing a new question. Similarly, action in the world is closely tied to dialogue with others.

Despite these complexities, the steps and cycle outlined can be helpful in highlighting aspects of an otherwise opaque process.. It presents some of the aspects of inquiry that need support in a successful learning environment. It serves as a boundary object (Star & Griesmer, 1989), allowing us to relate theory with ordinary practices or to look across modes and contexts of learning. Together, they comprise a cycle that can be used to inform and guide educational experiences for learners.

Ask

Ask reminds us that inquiry develops from a question or problem arising out of experience. Meaningful questions are inspired by genuine curiosity about real-world experiences and challenges. The indeterminate situation Dewey refers to is part of that experience, including an individual's participation in a community. It is not something that can be delivered from "outside" this participation. This is why there is "an enormous pedagogical difference between

answering someone else's question and formulating your own" (Olds, Schwartz, & Willie, 1980, p. 40).

Viewed in process terms, one can say that a question or a problem comes into focus, and the learner begins to define or describe what it is, for example:

- "What makes a poem poetry?"
- "Where do chickens come from and how does an egg 'work'?"
- "Why does the moon change shape?"

But it is important to caution that inquiry does not always start with a well-articulated question. In fact, questions themselves arise from reflection and action in the world, including dialogue with others. Elspeth Huxley states this well:

The best way to find things out .. is not to ask questions at all. If you fire off a question, it is like firing of a gun – bang it goes, and everything takes flight and runs for shelter. But if you sit quite still and pretend not to be looking, all the little facts will come and peck round your feet, situations will venture forth from thickets, and intentions will creep out and sun themselves on a stone; and if you are very patient you will see and understand a great deal more than a man with a gun does.

Investigate

Investigate relates to the varieties of experience possible and the many ways in which we become part of an indeterminate situation. It suggests that opportunities for learning require diverse, authentic, and challenging materials and problems. Because experience includes interactions with others, there is also a moral dimension to inquiry. Similarly, physical, emotional, aesthetic, and practical dimensions are inherent in inquiry, and are not merely enhancements or add-ons.

Through investigation, we turn curiosity into action. Learners gather information, study, craft an experiment, observe, or interview. The learner may recast the question, refine a line of query, or plunge down a new path that the original question did not, or could not, anticipate. The information-gathering stage becomes a self-motivated process that is owned by the engaged learner.

Examples: Gwladys Spencer's (amazing actual list of AV material, which includes fossils, maps, microscopes, TV, drama, field trips) shows us that a richer conception of technology is possible, one in which technology is embodied, social, personal, material, and multiple; using web-based searching & remote MRI, hands-on learning in Chickscope; Paris street signs

Create

Create picks up the "controlled or directed transformation" part of Dewey's definition. This term insists that inquiry means active, engaged hands-on learning. Inquiry thus implies active creation of meaning, which includes new forms of collaborating and new roles for collaborators. As information begins to coalesce, the learner makes connections. The ability at this stage to synthesize meaning is the creative spark that forms new knowledge. The learner now undertakes the creative task of shaping significant new thoughts, ideas, and theories extending his/her prior experience.

Discuss

Discuss highlights an implicit part of Dewey's definition, which is developed in great detail in his other writing, especially the later work. Although inquiry has a personal aspect it is also part of our participation in social arrangements and community. The discuss aspect in the inquiry cycle involves listening to others and articulating our own understandings. Through discussion (or dialogue), construction of knowledge becomes a social enterprise.

Learners share their ideas and ask others about their own experiences. Shared knowledge is a community-building process, and the meaning of their investigation begins to take on greater relevance in the context of the learner's society. Learners compare notes, share experiences, and discuss conclusions, through multiple media, including now online social networks.

Community inquiry is inquiry of, by, for communities. How can we go from individual to community inquiry? Dewey argues that inquiry is situated in circumstances defined by a unique history of prior experiences and present social and physical conditions. As Gale points out, this implies an ineffability of experience; there are fundamental limits to how much the defining, problematic situation can even be understood, much less entered into by another. How then is community inquiry possible? We need to be open to the fusing of horizons (Gadamer, 1975, p. 273):

> *The projecting of the historical horizon, then, is only a phase in the process of understanding, and does not become solidified into the self-alienation of a past consciousness, but is overtaken by our own present horizon of understanding. In the process of understanding there takes place a real fusing of horizons, which means that as the historical horizon is projected, it is simultaneously removed.*

Addams (1912) defines *affectionate interpretation* as recognizing (1) I could be wrong (funds of ignorance), and (2) there is a noble impulse in others. Noddings on ethics of caring. The need to work through, to act as if. How experience can lead to a faith in humans. The circle of knowledge. Civic housekeeping. Human & spontaneous inquiry; John Donne: "every man is a part of mankind"

Reflect

Reflect tells us that only the inquirer can recognize the indeterminate situation and further, say whether it has been transformed into a unified whole. Reflection (later articulated in the work of Schön, 1983, and others) means expressing experience, and thereby being able to move from new concepts into action. Reflection may also mean recognizing further indeterminacies, leading to continuing inquiry. Reflection is taking the time to look back at initial questions, the research path, and the conclusions made. The learner steps back, takes inventory, makes observations, and new decisions. Has a solution been found? Do new questions come into light? What might those questions be? And so it begins again; thus the circle of inquiry.

Summarizing, the *inquiry cycle* suggests important aspects of inquiry:

- *Reflect* on experiences; understand oneself as well as the world around
- *Ask* meaningful questions; formulate one's own goals
- *Investigate* through multiple sources and media
- *Create*, actively transform the world
- *Discuss* with others; collaborate

Notes:

1. The cycle is meant to be suggestive, e.g., try to include opportunities for *Discuss* and *Reflect*, but not as a rigid formula. So users might want to start at places other than *Ask*, leave out steps in the cycle, or include things one place where I might put it another.

2. Similarly, users may conceive the steps/aspects in different terms: *Investigate* as *Explore* or *Create* as *Do*.

3. As you think about it you realize that each element is itself the whole, e.g., good *Discuss* always involves *Reflect, Investigate, Create*, and *Ask*.

4. We think of *Ask* as the guiding question, but it doesn't have to be literally a question, could be a title or multiple questions.
5. Inquiry units link to one another in a network, because good inquiry typically leads to further questions.

We can now use the cycle to compare inquiry-based learning to conventional pedagogy. There is a "process" kind of inquiry in which people learn the same things, but in a more active, hands-on, collaborative, explorative way, and then a "substantive" kind of inquiry, in which the goals or content of learning change as well. The table below compares process inquiry with conventional pedagogy:

	Conventional Pedagogy	Process Inquiry
Ask	Content delivery, skills development; implicit question	A priori questions leading to content mastery
Investigate	Pre-set methods and materials	Authentic materials; multiple sources & media
Create	Response modes defined by specific assignments, tests	Active, hands-on learning
Discuss	Teacher-driven	Collaboration, learning through talk & writing
Reflect	External evaluation	Making sense of the process at the end

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