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“How Do I Know?” The Epistemological Roots of Critical Thinking



Mark K. Felton and Deanna Kuhn

Abstract Museum educators often think about what they want children to take away with them from museum visits. But at least as important is what children bring to these visits. Research in developmental psychology shows that children and adolescents progress through a sequence of ways of understanding knowledge and knowing—understanding that lies at the core of museum experiences. Museum educators should be aware of these different ways of understanding and how they may (or may not) support people’s museum experiences. In this article we describe this sequence of understandings and consider ways in which educators can support progression to its most advanced level—one at which inquiry, analysis, evaluation, and debate are valued and regarded as worth the intellectual effort they require.

Museum educators are concerned with the question: “What do visitors take away from their museum experience?” In developing programs and exhibitions, they work toward the laudable goal that visitors leave the museum with greater knowledge than they arrived with. But there may be an additional question that is just as important to ask, namely, “What do visitors bring to museum visits?” Neither children nor adults enter museums as blank slates. They bring with them a wealth of prior knowledge, assumptions, skills, and dispositions, all varying enormously across individuals and all likely to have a profound impact on what meaning museum visitors make out of their experience.¹ They may respond to what they see by dismissing it, by assimilating it into what they already know, or by adding to, elaborating, and even transforming their existing understanding. Prior knowledge and understanding are thus fundamental to the process of knowledge construction.

But prior knowledge can misguide learners. People often have ill-formed ideas, mistaken assumptions, and incorrect information that interfere with learning. Ideally, their experiences in a museum will challenge their existing knowledge, requiring them to examine their understanding and potentially revise or deepen it.² Toward this end, museum educators must engage visitors in ways that will promote the active evaluation of prior knowledge, prompting them to consider not only what they already know, but also how they know it, which brings us to the heart of critical thinking. By getting visitors to contemplate the question “How do I know?” museum educators are more likely to lead them to examine their understanding, revise their misconceptions, and build new knowledge on a stronger and more elaborate base of prior knowledge.

BELIEFS ABOUT KNOWLEDGE AND KNOWING

Of course, getting museum visitors to critically examine what they know can be challenging. On a recent trip to a natural history museum, we witnessed a visitor roll her eyes at a display on evolution and groan to a friend, “Oh great, even the Museum of Natural History is caving in to the Religious Right. Now they’re calling evolution a *theory*!” Shaking her head dismissively, she passed over the fossil evidence and moved on to another display. To her, evolution had already progressed from theory to established fact—a sophisticated view in one sense, but not in another. The display she dismissed was designed to highlight for visitors the assertions, bodies of evidence, and arguments that constitute evolutionary theory, leaving them with an enriched understanding of the theory and its basis. But the effort did not succeed with this visitor. Because she was already certain that her knowledge was correct, she saw no purpose in asking herself, “How do I know?” As a result, she lost the opportunity to critically examine the breadth and accuracy of her prior knowledge, and she may have also missed the opportunity to build further understanding on a more substantial explanatory base.

Beliefs about the nature of knowledge, also referred to as epistemological understanding, play a fundamental role in critical thinking. The question “How do I know?” can be approached in two ways. First, one can ask, “Where does knowledge of this sort come from?” and second, one can ask, “How can I support what I think I know in this case?” The first question is an epistemological one that addresses the nature, sources, and certainty of knowledge. And the answer to this epistemological question, in turn, determines whether

an individual goes about addressing the second, critically reflective one. For example, if students enter an art museum with the belief that aesthetics are purely arbitrary and subjective, they will not learn to question, refine, or elaborate their judgments about art. Or if students believe that historians have access to a single objective truth about the past, they will not learn to explore alternative interpretations of the historical record. In both cases, assumptions about the nature of knowledge in a given discipline undermine the critical examination of one's beliefs, knowledge, and judgments.

On the surface, it may seem that a naive understanding of epistemology is acceptable. Does the museum-going public really need to ponder the objective certainty of scientific principles or the validity of art criticism? We would like to argue here that yes, in fact, at some level they do. Critical thinking requires considerable effort, and visitors will only engage in the cognitively complex work of critically evaluating their knowledge if they believe that it is worth the effort. If knowledge is simply a matter of objective fact or subjective opinion, many visitors will choose not to engage in the reasoning required to critically examine their understanding.³ They will be satisfied knowing that something is true without expending the effort necessary to explore why. Whether examining perspectives on art criticism or exploring alternative interpretations of the historical record, museum visitors first must see that knowledge consists of reasoned assertions before they can learn to engage in a critical examination of those assertions. Therefore, museum educators must be ready to address their visitors' epistemological understanding in order to engage them in critical thinking.

EPISTEMOLOGICAL DEVELOPMENT

Over the past decade, the study of epistemological understanding has blossomed, and we now have a broadly convergent picture of a sequence of levels through which individuals develop as they come to understand the nature of knowledge and knowing (see Table 1). Over time, individuals' beliefs about knowledge tend to develop from an extreme objectivist stance to an extreme subjectivist one before settling—ideally—on the balanced view that although knowledge is constructed by human minds it can still be evaluated against a set of standards.⁴ At each of these epistemological levels, the kind of thinking that individuals engage in is shaped by their beliefs about the nature of knowledge.

Table 1: Epistemological Levels

Level	Assertions	Knowledge	Critical Thinking
Realist	Assertions are COPIES of an external reality.	Knowledge comes from an external source and is certain.	Critical thinking is unnecessary.
Absolutist	Assertions are FACTS that are correct or incorrect in their representation of reality.	Knowledge comes from an external source and is certain but not directly accessible, producing false beliefs.	Critical thinking is a vehicle for comparing assertions to reality and determining their truth or falsehood.
Multiplist	Assertions are OPINIONS freely chosen by and accountable only to their owners.	Knowledge is generated by human minds and therefore uncertain.	Critical thinking is irrelevant or useful only for dismantling absolutist assertions.
Evaluativist	Assertions are JUDGMENTS that can be evaluated and compared according to criteria of argument and evidence.	Knowledge is generated by human minds and is uncertain but susceptible to evaluation.	Critical thinking is a vehicle for evaluating the relative merit of assertions based on an identified set of criteria.

Preschool-aged children are strict realists. They believe that knowledge is an exact copy of the world around them, and they accept an assertion without questioning its veracity because they do not distinguish reality from statements people make about reality. As a result, there is no need for critical thinking at this level because everyone is assumed to share the same experience of an objective world. A story about history is taken at face value without any question of its truth. But as children develop, they come to understand that reality is filtered through people's perceptions. They begin to distinguish their own minds and mental states from others' and discover that individuals can hold false beliefs about reality. At this level, children realize that two historians may tell different stories about the same event, but they assume that one historian is simply wrong. This realization represents a milestone in critical thinking as children come to recognize the need to evaluate knowledge and beliefs for their accuracy rather than simply accept them at face value. Nevertheless, at this level children maintain the absolutist belief that all knowledge is based on a verifiable and objective truth. Knowledge consists of facts that are either right or wrong. As a result, critical thinking is limited to identifying and correcting false knowledge and

beliefs. Absolutists continue to accept knowledge from authorities without concerning themselves regarding the basis for this knowledge. As long as the knowledge is conventionally accepted as “true” or “correct” there is little need for understanding why.

The developmental transitions beyond the absolutist level take time and occur at different rates depending on the individual, the environment, and the content area of knowledge. Broadly speaking, by some time during adolescence, individuals begin to discover that all knowledge is, in fact, constructed. In the process, they realize that much of what they once thought was incontrovertible truth may be no more than subjective opinion or preference. This realization ushers in the multiplist view that since all knowledge is constructed by humans, it must be entirely subjective. It follows that no point of view is any more valid than another. The multiplist holds that everyone is equally right or, for the cynic, equally wrong, and any one claim is as valid as another. Evaluating the strength of one historical account over another is unnecessary because both accounts are purely subjective. Critical thinking at this level is used only to dismiss absolutist claims and to reject critical evaluation of claims as unjustified.

Only some individuals move beyond this blanket relativism. Those that do make the transition come to understand that although all knowledge is constructed, one can still evaluate claims based on the evidence and arguments that do or do not support them. Critical thinking within this evaluativist paradigm involves developing and applying criteria to evaluate claims. To reach this level, individuals must not only appreciate that a historical account is constructed, but also develop the skills to examine and critique its quality. We would like to see all individuals reach this evaluativist level, using explanation, argument, and evidence to respond to the question “How do I know?” It is not until they reach this highest level that learners develop the skills they need to complete the transition from passive recipient to active participant in disciplinary knowledge construction.

In addition to a descriptive picture of epistemological levels, we also have gained some insight into the developmental process. Children typically progress from absolutist to multiplist levels without explicit instruction, although the progression is likely to take time and occur only gradually. Progression beyond the multiplist level, in contrast, is much more fragile and dependent on educational experience. In addition, researchers have found that subject matter makes a difference. People move from absolutist to multiplist levels across different knowledge domains in a distinct order, first

abandoning absolutism in the areas of aesthetics and personal taste and only later in the realms of values and of social and finally physical sciences.⁵ But in the next transition, from the multiplist to the evaluativist levels, this order is reversed. Individuals are most likely to acknowledge the value of evidence and argument in the realm of physical science first, followed by social science, and only later, if at all, in values and aesthetics. In short, the kind of knowledge being contemplated makes a difference in people's epistemological thinking.

Thus, museum educators working in science contexts are likely to encounter visitors who cling to the absolutist view that all science knowledge is objective and certain. Art museum educators are more likely to encounter the multiplist view that all aesthetic knowledge is subjective and no one viewpoint is more valid than another. In history museums, visitors tend toward the belief that historical knowledge is a succession of objective facts about "what happened." In each of these cases, the individual's prevailing assumptions must be disrupted if he or she is to make progress toward the kinds of critical thinking supported by an evaluativist epistemology. Yet it is the transition from multiplism to evaluativism that remains overall the most challenging. Unlike the earlier levels, which emerge spontaneously (at least in some subject areas) without instructional support, the evaluativist level is reached by only some individuals and must be carefully nurtured in both formal and informal learning contexts.⁶

FOSTERING DEVELOPMENT THROUGH ARGUMENTATION

Although the mechanisms responsible for epistemological development are not yet fully understood, research into the effects of discourse on reasoning suggests that engagement in argumentation may play an important role. In their review of the literature on epistemological development, Patricia King and Karen Kitchener recommend giving students the opportunity to discuss ill-structured problems and argue controversial issues while assisting them in examining their assumptions about knowledge and its acquisition.⁷ In our own research, we have found that guiding adolescents as they engage in argumentative discourse with a peer and then reflect on these dialogues has a positive effect on their ability to consider their knowledge and beliefs within a framework of alternatives.⁸

With sufficient instructional support, argumentation holds at least three potential benefits for epistemological development. First, and most

dramatic, it demonstrates vividly that reasonable people disagree about important matters, making it near impossible to cling to the simple absolutist view of knowledge as certain and uncontroversial. Second, argument helps students appreciate the need for reasoned opinions. When asked to take a stand and defend it against alternatives in discourse, students learn to distinguish between having an opinion and supporting that opinion. They begin to appreciate that knowledge must be built on a foundation of evidence and argument if it is to hold up against alternative claims. But students need assistance in this developmental process. In particular, we have found, they need help in understanding that an opponent's claim is as relevant to the argument as one's own and warrants at least as much attention.⁹ Getting students to engage in and reflect on their own argumentation primes them to ask those epistemological questions "How do you know?" and, more broadly, "Where does knowledge of this sort come from?" Teachers need to be ready to help them construct answers.

A third benefit to argument is that it offers external support for the process of critical thinking. Argumentative discourse externalizes individual thinking.¹⁰ When two people disagree, they challenge assumptions, ask for evidence, propose counter-arguments, and advance alternatives. In short, they probe each other's knowledge with the kinds of evaluativist questions that they often fail to ask themselves when thinking alone. But again, teachers must support this development. Most adolescents, and many adults, fail to produce these kinds of questions when they argue.¹¹ But when given guidance in reflecting on the dialectical nature of argument, students discover and adopt these questions over time.¹² Routine exposure to these probing questions in dialogue, in turn, increases the likelihood that students will begin to spontaneously ask themselves, "How do I support my knowledge in this case?" Seen in this light, argumentation is a context for students to form evaluativist knowledge goals and hone the process of critical thinking.

IMPLICATIONS FOR MUSEUM EDUCATORS

What, then, can museum educators best do to promote critical discourse, critical thinking, and the epistemological understanding that is their foundation? Following Scott Paris, we suggest museum educators take the long view on fostering change.¹³ Museum educators cannot expect to induce an abrupt epistemological awakening during a one- or two-hour visit, but they can expect to stimulate lasting long-term effects. With consistent exposure

to their standards of arguments and evidence, visitors can come to appreciate the different ways in which knowledge is constructed in the various disciplines. They can discover how scholars cull evidence and propose and refine theories in order to build knowledge. And they can learn to question and elaborate the foundations of their own understanding. Museum educators can engage young children by modeling questions that invite observation, inquiry, and dialogue. For example, we recently visited an art exhibit for young children that posed the question, "How were the Impressionists influenced by Japanese woodblock art?" Children were given the opportunity to explore the collection, make observations, and develop responses, rather than having the answers presented to them. Next to a few of the paintings, adults could find text that suggested questions and observations they might use to assist and guide young visitors. While young children often lack the content knowledge needed to engage in substantive argument on such topics, this exhibit demonstrated that with adequate support they can, nonetheless, take part in reasoned dialogue about claims, counterclaims, and evidence.

But as we saw in the earlier example of the visitor to the natural history museum, simply exposing visitors to evidence is unlikely to be enough. Ideally, older children and adolescents will have their epistemological assumptions challenged directly by exhibits that provoke conversation about how we know what we know. With this focus in mind, museum educators can craft exhibits that explicitly address questions about where knowledge comes from and how it is advanced, thereby getting epistemological assumptions out into the open. In addition, visitors need to see how knowledge is constructed within a framework of alternatives and the central role of argument and evidence in this process. Highlighting past or present scholarly debates invites visitors to examine rival hypotheses and to better understand knowledge as evolving rather than fixed and cumulative. For example, a history exhibit might walk visitors through the notion of historical perspective by presenting artifacts and documents that bring two contrasting perspectives to life. A science museum might propose rival hypotheses about a given phenomenon and then allow visitors to evaluate the strength of each. Or an art museum might introduce visitors to the heated debate over the "value" of impressionist art that raged at the turn of the last century, and then invite them to discuss these same issues as they view an installation on postmodern art.

Museums offer the unique advantage of providing direct access to his-

torical, scientific, and artistic evidence—the raw material for knowledge construction—in a way that secondary print or Internet resources do not. But visitors need guidance to know what to look for, what it means, and how to evaluate and relate multiple knowledge sources. With such assistance, they are more likely to use the material on display to build an evidentiary base for their knowledge and to critically examine both their assumptions and their understanding.

Finally, and perhaps most importantly, visitors need to actively engage in discourse about their knowledge. Conversation is a powerful tool for museum learning, and dialogue has all the potential cognitive benefits we noted earlier.¹⁴ When discussion centers on alternative theories or inconsistent evidence, the occasion is ripe for participants to learn about theory–evidence coordination in ways that extend beyond the particular topic at hand. Armed with prompting questions and notes on what to highlight, parents and teachers can play an important role in making museums a context for conversation and critical reflection. Museum educators might also consider ways in which dialogues can take place offsite in the classrooms of students preparing for a visit or in the chat rooms of virtual exhibits made available on the Internet.

Museums do well by pulling back the veil of certainty and inviting the public to learn about how knowledge is constructed. By provoking discussion about the origins and nature of the knowledge on display, museums do more than offer the chance to view objects in glass cases. They provide a window into the questions and answers that drive critical thinking and informed debate. And with careful crafting, these experiences can foster a visitor's developing identity as someone capable of and disposed to take part in such debate.

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