

The Challenge and Significance of Constructivism

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**George E. Hein
Professor Emeritus
Lesley University
Cambridge, MA, USA**

INTRODUCTION

I wish to thank the organizers for their kind invitation to attend this conference and share my views with you. I consider it a privilege to join you as you address the important issues of the role that youth/children's museums can play in our societies. The theme of this conference is "Playing to Learn?" Let me start by suggesting a slightly more forceful theme, "Playing to Learn!" I think we are well beyond the need to question Piaget's famous saying "Play is the work of the child." We should assume that the proposition that children learn through their play is accepted and consider how to best organize that play so that it can lead to optimal learning. I'm sure that's what you had in mind in gently suggesting this theme as a question; but let's make it a forceful statement!

Today, I want to explore some of the consequences of proposing that children's museums are learning institutions; that the playful experiences they provide for children lead to learning and contribute to making our societies richer places for children to grow and prosper. I'll briefly state the position I've taken on educational theory and then discuss some of the challenges we face if we embrace, as I believe we should, constructivist educational theories. Finally, I want to say a few words about the significance of constructivism in the current world filled with strife, terror and war.

I believe that constructivism provides the most useful and most powerful educational theory for youth museums. I feel comfortable advocating it to you because the descriptions of current children's museums that we heard yesterday repeatedly emphasized goals for these institutions that are directly in line with a constructivist view. Thus, Fred Wartna stated that fostering "curiosity" was the goal of his museum, Betsy Diamant-Cohen and Sue Woolway both proposed that children "explore," at their institutions, Alison Cox wants to "encourage a personal response to art," and Barbara Meyerson advocates "non-competitive games with multiple outcomes." This emphasis on creative processes, personal meaning and multiple outcomes—all qualities associated with constructivism—suggests that we are in general agreement on how to capitalize on children's learning through play.

EDUCATIONAL THEORIES

I've argued previously¹ that we can classify all educational theories under one of four headings if we examine how they analyze theories of learning and theories of knowledge (epistemologies.) All theories of learning represent positions that range between two extremes. At one end of this continuum are theories that view learning as passive and incremental; they propose that knowledge is added to the learner bit by bit. At the opposite end of this continuum is the proposition that learning is an active process during which the learner constructs knowledge through interaction with the world, through experience. The proposition that learning is active is no longer controversial; it has been generally accepted. It is the culmination of a century of research, dating from Piaget's carefully delineated developmental theories. However, despite general acknowledgement that active engagement is required for learning, the practice of formal education still relies to a remarkable degree on pedagogic strategies that consider learners as passive recipients of knowledge imparted to them by teachers.

The second dimension of any educational theory encompasses two opposing views of what constitutes knowledge, views that traditionally have been labeled *realist* and *idealist* in formal philosophy. A realist position proposes that knowledge is something "out there," independent of learners (or knowers) and that it exists by itself. Platonic ideas are such an entity, they are perfect and we can only strive to understand them. Alternatively, philosophers have argued that knowledge is created by human beings and resides in our minds. It has no existence outside of the humans that create it. The logical conclusion of idealism is that ideas—concepts, generalizations, even "laws" of nature—are never "true" in the sense that realists define truth, but components of our thought. They may be more or less useful, but are never immutable truths.

This epistemological distinction may seem an obscure theoretical argument of interest only to academics, but it represents a crucial distinction when applied to educational theory. What we believe the "it" is that we are teaching makes an important difference in how we act as teachers, and thus, how we conceptualize children's museums.

Epistemological arguments do surface in real world museum situations. In a recent article in the New York Times², the current debate about the use of chronology as a guiding principle for exhibiting visual art was discussed using exactly the epistemological terms I have described above. A defender of the importance of chronology is quoted as saying "chronology is not a tool of art-historical interpretation which can be used at one moment, discarded at another. . . It's an objective reality, built into the fabric of the work." A critic of this position, discussing the way works of art are displayed at the Tate Modern, which has abandoned chronology, is reported to have said, "In the new museum, you can see everything is constructed. . . . In each gallery you can tell that someone made a decision. That is, by selecting one thing, we are also rejecting something. There is no natural order, no objective truth."

If the two continua describing theories of learning and theories of knowledge are depicted perpendicular to each other, they define four quadrants that illustrate four different educational theories, as illustrated in Figure 1. I have labeled these quadrants to represent educational theories. Thus, a belief that knowledge is external and that students (or museum visitors) learn sequentially by adding knowledge to the mind bit by bit leads to a traditional lecture and text approach to education. The knowledge is contained in the text and is provided to the students through a systematic presentation of the material suitably broken down into small segments. Conversely, the lower right hand corner represents constructivism, an educational theory requiring that the teacher embrace both the idea that learning is an active process and that learners construct knowledge.

When applied to museums, we can represent these ideas as four different kinds of museums, (or individual galleries or exhibitions), that I have labeled Systematic, Discovery, Stimulus-Response and Constructivist as illustrated in Figure 2 and described in detail previously.³

In museums, It's easy to find examples of exhibitions or exhibit components that illustrate all four of these quadrants. Didactic panels that describe what is to be learned and exhibitions that provide information in a prescribed order, guiding the visitor through them by the physical layout of the exhibition are likely to be Didactic-Expository. Those that allow visitors to interact with materials (for example, by rolling balls down ramps, exploring skeletons of different species or gazing at a recreation of a historic or natural scene) in the hope that they will learn a general principle, represent the Discovery mode. An exhibition that trains the visitor to learn a dance step or drive a model car is likely to be based on Stimulus-Response (behaviorist) principles. An exhibition that allows exploration with materials for its own sake and values any interpretation the visitor makes of the activity is Constructivist.

CHALLENGES OF CONSTRUCTIVIST PEDAGOGY

Constructivism is appealing to museum educators and exhibit developers for a variety of reasons. It encourages interactive exhibit development, it legitimizes play as a form of learning and it is compatible with the progressive tradition of object learning exemplified in museums for decades.⁴ But it also represents challenges that need to be appreciated and overcome before constructivist exhibitions can be fully accepted and used to best advantage. I'll discuss five consequences of accepting a constructivist view of the educational world. Individually, they are not unique to constructivism, but the application of each is necessary if we wish to implement constructivist pedagogy in museums.

Embrace personal (and social) meaning making.

It 's self-evident that we all "make meaning," that we construct personal views of the world.⁵ My interpretation of a novel is different from yours; my opinion of

Uncle Freddie may not be as positive as yours, etc. But accepting other people's personal meaning making as integral to pedagogic practice is challenging. It requires acknowledging the validity of whatever meaning a learner derives from an experience. The learner's interpretation cannot be rejected, as typified by the traditional portrait of the strict teacher who consistently tells students they are "wrong,"⁶ nor can personal meaning making be viewed as a temporary outcome of experience, to be tolerated and overcome while we lead the student to correct ideas. Constructivism requires that we build exhibitions that celebrate and encourage personal meaning making. The London Museum of Science's Launch Pad is an example of a constructivist children's gallery. There is no specific science content that children are expected to "learn" as they play, but there are certainly many general ideas they can develop, test and enlarge upon as they manipulate the various materials and machinery available.

In practice, applying constructivist pedagogy often means that exhibitions focus on processes more than on content.⁷ At the Boston Museum of Science, Larry Bell, Vice President for Exhibitions, has developed an overall exhibition plan that focuses on science processes, such as observation, experimentation, classification, etc., as the basic organizing principle for all permanent exhibitions. Using these categories, exhibit staff is creating constructivist galleries whose aim is to engage visitors. For example, in the gallery devoted to experimentation, visitors are encouraged to actively explore experimental settings;⁸ goals similar to the ones described yesterday in your youth museums. To the extent this occurs, the gallery is considered a success. The focus on process rather than content is parallel to Kate Steiner's description of "looking for skills" in developing exhibition components.

Acknowledge the difficulty of personal change.

A second challenge of constructivism is its requirement that we recognize the lack of a necessary connection between what is taught or presented to a learner and what is learned. Of course, this is true for all educational situations. But when learning is defined as personal construction of meaning, rather than as the transmission of knowledge, then our attention is more clearly focused on the complex process by which humans change their minds. Personal meaning making, like all significant learning, consists of replacing concepts already in our minds—however naïve or vague they may be—with new ones.⁹ This process, called *accommodation* by Piaget, to distinguish it from *assimilation*, the simpler process of adding new items to existing schema without conceptual change, is never a necessary consequence of teaching. It may or may not happen, depending on any one of a number of factors. The classic model of education suggests that learners accept a new idea because of its logical consistency with other "correct" concepts already known or because it's intellectual elegance has powerful appeal. But, we also accept ideas because they "feel right," are presented to us by a person or institution we trust, or because doing so gives us some reward or wins us social approval.

Any of these factors may be sufficient, and none is necessarily compelling. And, since the process of conceptual change always involves some loss (relinquishing the old concepts that have had some value to us,) we need to give up something in order to learn the new. A few individual bits of information that are inconsistent with my view are not likely to change my position. As anyone who has ever engaged in an argument or tried to convince another of a point of view knows, any one of a number of influences may be sufficient to alter a position, but no amount of new knowledge or experience is ever necessary to do so.

Eliminate “misconceptions” language

The meanings that learners develop are frequently not congruent with canonical interpretations. For example, It has been demonstrated repeatedly that even successful completion of university level physics courses does not assure that individuals will have accepted modern scientific concepts of motion, force or energy. Therefore, such personal meanings are often described as “misconceptions.”

I believe that another challenge of constructivism is to avoid such language. If we are going to accept personal meaning making, we need to rid ourselves of the traditional habit of thinking that our students (and visitors) are “wrong” when they describe a natural phenomenon, a historical period or an interpretation of a social condition in terms that do not match standard, academic knowledge. Instead, we need to concentrate on trying to understand why they come to their conclusions and how these relate to their previous and experience. A response by a six year old that the sun travels around the earth may be a highly sophisticated and thoughtful answer if the child has been told previously by a beloved and trusted adult that the moon travels around the earth and the child has then generalized from this explanation and applied it to her observations of the sun’s apparent similar motion in the sky.

To treat this conclusion as a misconception is both to miss the wonder of the child’s reasoning and the opportunity to build on her powerful reasoning. Using alternative terminology—calling concepts “personal,” for example—frees the teacher to explore the best pedagogic strategy to apply to this common situation. For exhibit development, this approach means creating components that allow and encourage multiple ways of interaction, all of which are acknowledged as appropriate. This approach of acknowledging learners’ conceptions matches what Margarita de Lancastra yesterday described as “positive education.”

Emphasize naturalistic research and evaluation

If enhancing visitors’ personal and social meaning making becomes the goal of museum education and exhibit development, then the success or failure of any exhibition or program can only be determined by examining how visitors interpreted the experience. And any such study must allow us to catalogue and

analyze visitor experience on its own terms; not only the extent visitors have mastered traditional subject matter.

As a consequence, evaluation of constructivist exhibitions requires that we adopt the strategies of an anthropologist or other field worker—someone who sets out to find the unknown, and not the strategies of the experimental psychologist—someone who sets out to test a preconceived hypothesis.¹⁰ In the social science research literature, this distinction is generally described as the difference between “qualitative,” “naturalistic” or “holistic” research methods as opposed to “experimental design” research. There are ongoing debates between advocates of these two research strategies. What is important for adopting a constructivist agenda is recognizing that measuring (a term itself associated with experimental design approaches) the extent to which visitors or learners have mastered standard subject content may be irrelevant to understanding the interesting and rich ways in which visitors have made meaning from exhibitions.

Develop criteria for judging educational quality.

Finally, to implement constructivist exhibitions we need to acknowledge that we do not have adequate criteria for interpreting visitors’ meaning making to guide us in exhibition and program development. If we give up the criterion that “success” is measured by the extent that visitors master standard subject matter (as suggested above), then what do we substitute in its place? We need criteria to decide whether museum environments are more or less successful.

Just as I indicated above that constructivist exhibitions are more likely to emphasize process than content, I believe that criteria for judging the success of museum environments will be based on evidence of skill development, rather than in determining advances in traditional knowledge. To return to the opening comments and ways all of you described your goals for your museums, we need to define the success of learning through play as increased willingness to explore, investigate, question and challenge. And in order to accomplish this, we need better descriptions of these terms. This sort of description is not easily available. It has been ignored by much of the research that attempts to demonstrate the value of museum environments by their ability to teach children “correct” concepts valued by school systems and tested by traditional examinations.

SIGNIFICANCE OF CONSTRUCTIVISM

Constructivist pedagogy is appropriate for museum education because it capitalizes on the way in which museums interact with visitors. It is also politically important; it advocates a style of education that is necessary for supporting critical thinking and for developing a society that values diversity and respect for others. As we grapple with the serious issues raised by terrorism and appropriate responses to it, as we recognize that fanatical adherence to

sectarian views can be destructive to society as a whole, we need to acknowledge the role that different educational theories may play in shaping our civil society. While constructivism challenges us to shake off traditional beliefs about education, it also guides us toward an approach that offers opportunities to be both constantly critical of all ideas and tolerant of other views than our own. These attributes of constructivism are significant for developing educational policy appropriate for democratic societies.

Emphasis on questions and inquiry; not on answers

In the previous section I indicated that constructivist exhibitions are more likely to stress processes and “ways of knowing” than content (recognizing that processes can only be illustrated within the context of specific content.) A consequence of such an approach is that exhibitions and programs will stress questions and interesting ways of examining those questions rather than providing answers.

The current formal education literature is full of references to inquiry as a tool for education. Critics of this educational practice argue that schools instead should go “back to basics,” meaning that didactic approaches with much repetitive drill on “facts” should dominate. There are obvious practical reasons why this traditional educational method is not particularly useful for museums. One of the challenges facing museum educators today is teachers’ insistence, based on pressures facing schools, that museum visits match the curriculum content they are required to teach. In its extreme form, this pressure urges museum educators to assure that school visits to museums will help improve student scores on standardized tests. Not only is this an impossible demand,¹¹ but it is part of a movement to reduce education to the mastery of a strict content, rather than seeing it as a mode of human development.

Museums are ideal institutions to foster inquiry and challenge beliefs. The current political news reminds us constantly of the consequences of education that indoctrinates rather than supporting questioning. Extremists typically have given up critical thinking and opted for an exclusive worldview that is not only presented as “the truth” but also allows for no challenge or possibility of alternative interpretations. Constant inquiry and questioning is the best alternative to such education.

Denial of absolute truth

Constructivism, with its dual emphasis on both active constructions by the learner and the proposition that the result of this mental activity is “constructed” truth, forcefully denies the possibility of absolute truth. The quest for such truth, for certainty, has been recognized as a most dangerous and destructive human effort. John Dewey in *The Quest for Certainty* argued that the long tradition of Western philosophy of seeking absolute truth has been not only fruitless but also has caused humans to downgrade practical knowledge and the arts. He

contends that the effort to find security in a search for Truth leads to uncritical acceptance of dubious propositions about the world. Isaiah Berlin has put it more forcefully, arguing that

. . . It is a terrible arrogance to believe that you alone are right; have a magical eye which sees the truth: & that others cannot be right if they disagree.¹²

Constructivism saves us from the arrogance of believing that we alone—our profession, our academic discipline, our experts—are correct and that all other views are necessarily incorrect. Rather, it challenges us constantly to question our beliefs and to test them against experience.

Limitations of assessing learning

Another attribute of constructivism is that it requires us to examine critically assessment practices. In recent years, school authorities in both the United States and Britain have dramatically expanded reliance on testing to determine the quality of educational performance in general and the achievement of individual students in particular. These tests are based on an analysis of subject content, not on the meanings that individuals develop in the course of their education. They invariably rule out the possibility of understanding fully what students actually know and how they interpret the world.

Of course, it's important that educators assess the results of education. But tests that only ask students to mastery of formal content (and often at a very low level of comprehension), simply miss much of what is learned.

A constructivist view of education considers learning to be a constantly expanding body of meanings created by the learner. These will increasingly encompass a portion of the "content" knowledge of any subject, but they will always be personal. This process is illustrated in the diagram on Figure 3. For beginning naïve learners the personal meaning making may well have little in common with the accepted content knowledge of any discipline. As learners advance, their personal meaning making begins to overlap with the content field and to be influenced by it. But even for experts, there is a range of personal knowledge that is not totally congruent with the accepted content and the two domains, the personal and the accepted content, influence each other.

Unless we develop methods of probing the personal realm of knowledge, as indicated earlier in the brief discussion on research methods, our tests will simply fail to discover what meanings individuals make.

Valuing Diversity

Constructivism has the further advantage of forcing us to value and honor diversity. Our previous knowledge and experience influence our entire meaning making. Recognition of the importance of learners' backgrounds is crucial to

understanding their response to our educational efforts. This awareness requires that we appreciate and accept their cultural, social and family ways of interpreting the world. As teachers, we may be eager to impart particular ideas, to emphasize particular modes of thought or behavior and to encourage meaning making that encompass more of the accepted content of any discipline. But adherence to constructivist pedagogy will require that we start by acknowledging the legitimacy of cultural perspectives other than our own.

Education for social change

Finally, constructivism is compatible with the progressive challenge that education is not only a means of training students to take roles in existing social structure, but a way of transforming society; to bring about social change. As Julian Weissglass stated recently,

Traditionalists structure schools to prepare students for filling roles in society--not for transforming it. They do not see that traditional approaches may contribute to maintaining the inequity and injustice that exist in our society. Progressives see society as needing improvement and the schools as serving the function of helping students become thinking citizens who can contribute to creating a more just society. John Dewey, the leading progressive educator of the century, wrote that "education is the fundamental method of social progress and reform."¹³

By shifting the focus of education from the content to be learned to the process by which people make meaning, we are forced to reexamine the ways in which we sort and classify students, the value we place on individual, independent thought and the opportunities we provide for each learner to achieve his or her full potential. Constructivist theory, as Dewey recognized a century ago, is the appropriate approach for a democratic education.

Youth museums can perform a significant service in illustrating the power of this approach. You have already spoken of your institutions as places where children can be nurtured at the same that time that they play to learn; where the goal is, as Katherine Lippens said yesterday, to create "balanced, open adults;" where inquiry, exploration and the construction of meaning are valued, encouraged and critically appraised. These activities can be crucial in helping children develop into thoughtful adults.

Figure 1

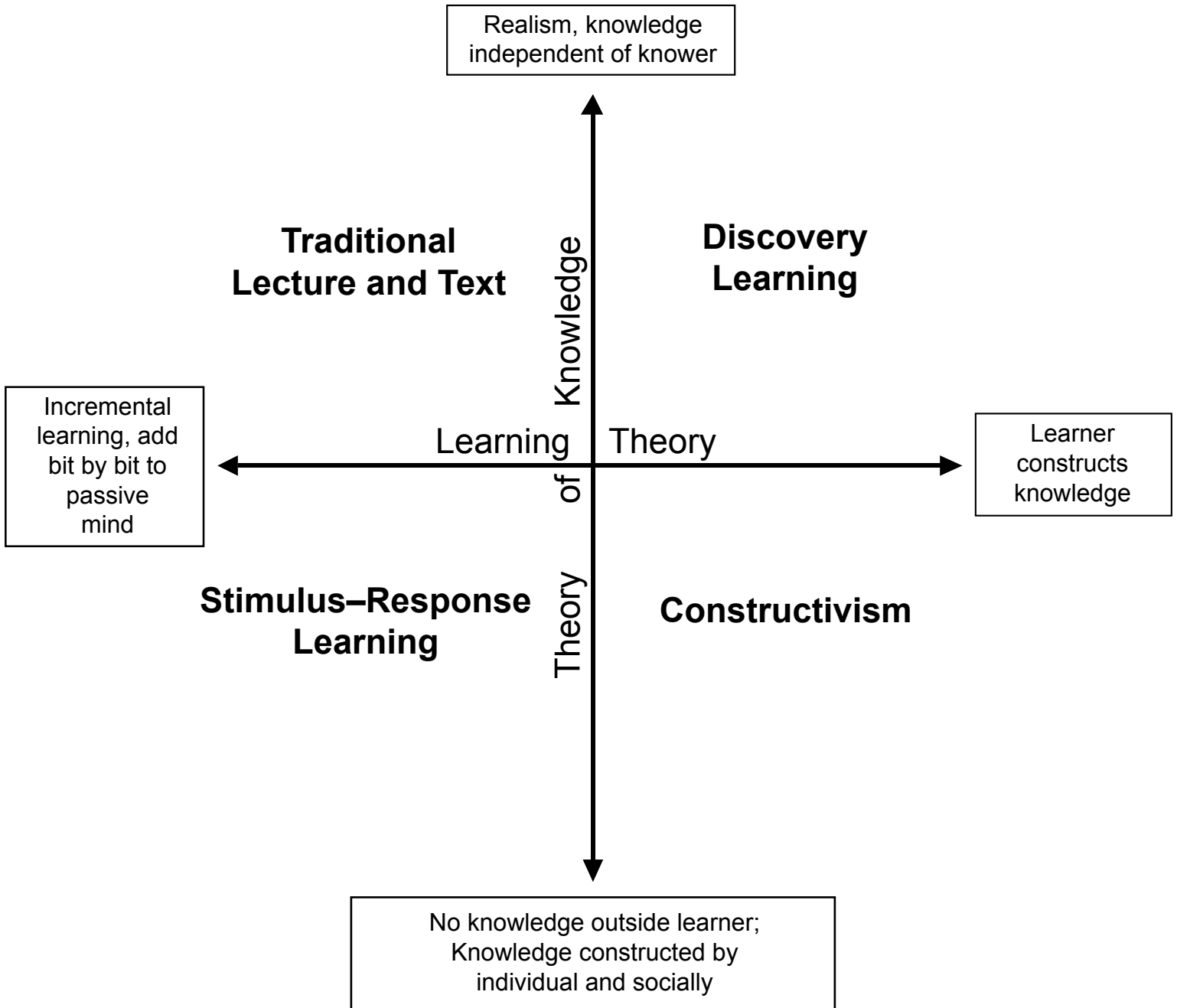


Figure 2

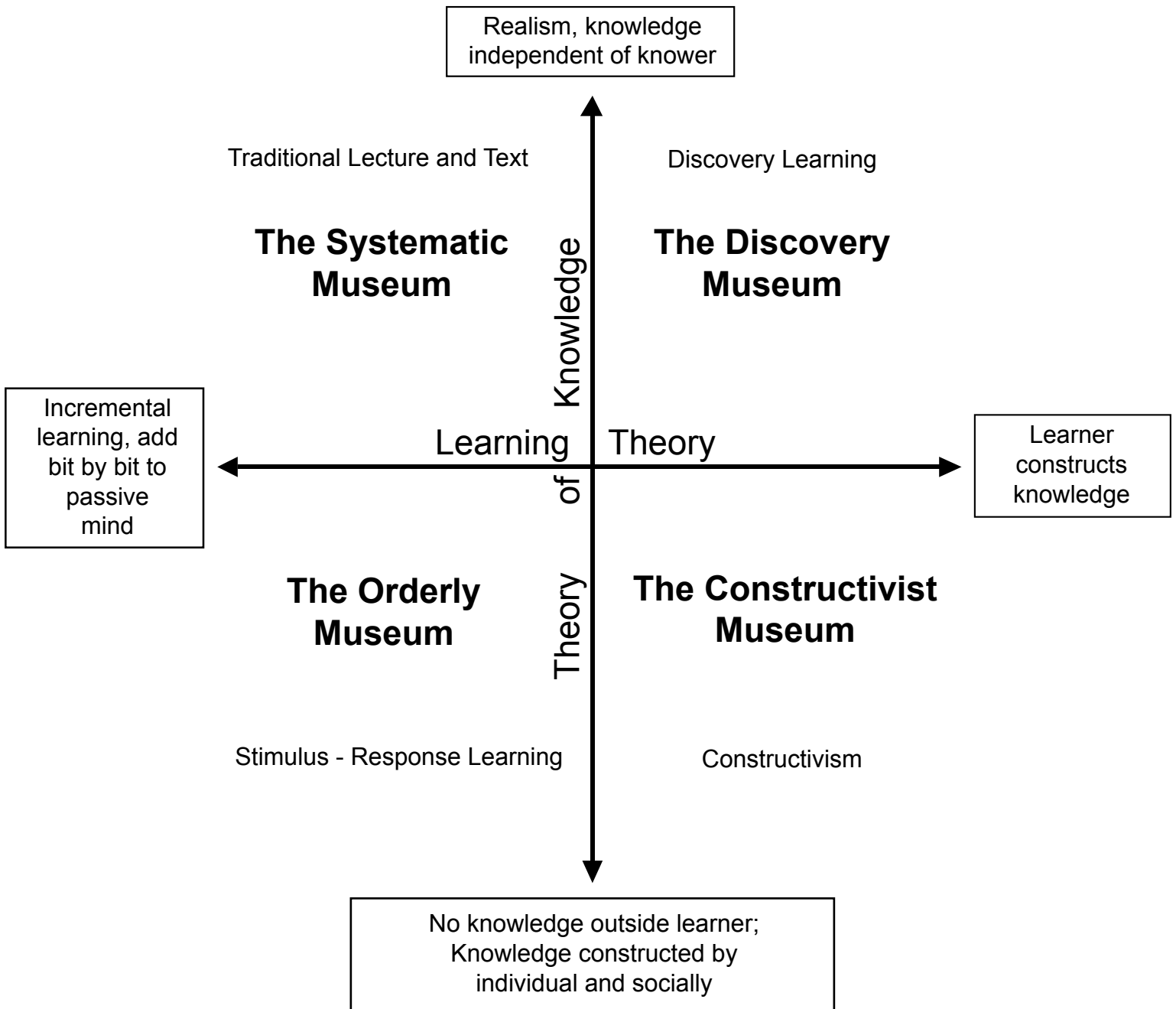
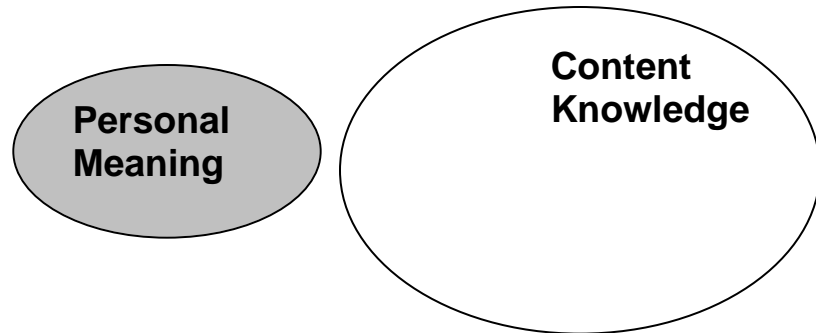
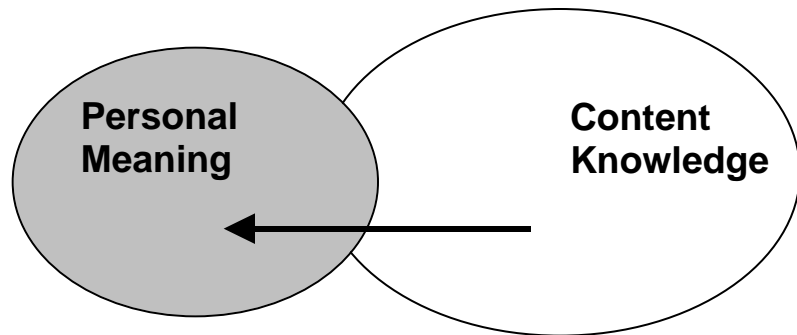


Figure 3

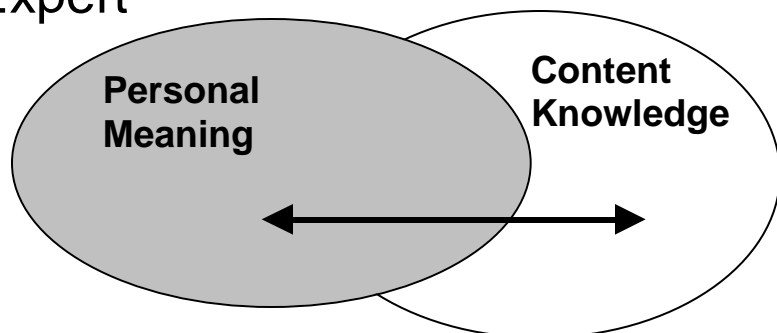
Naïve Learner



More Advanced Learner



Expert



¹ Hein, G. E. (1998) Learning in the Museum, London: Routledge.

² Brady, S. "Snubbing Chronology as a Guiding Force in Art: Curators and Critics, Changing the Rules, Slap the Hands of Time." New York Times, September 2, 2000.

³ Hein, G. E. and M. Alexander, *Museums: Places of Learning*, Washington, DC: American Association of Museums, 1998.

⁴ Hein, G. E. "Informal Science Supporting Education Reform: Theory and Practice/Beliefs and Actions," Keynote address, NIESEN conference, Sept. 24, 2001.

⁵ I'm speaking of meaning making as "personal," although I recognize, acknowledging the work of Vigotsky and his many followers, that our interpretation of the world is mitigated by our social context and the language we use. It's more correct to say "personal and social" or "personal, within the social context of our culture." The simpler formulation is sufficient for the points I'm making in this talk.

⁶ Dickens' schoolmaster Mr. Choakumchild is the classic model for this, although most of us have vivid memories of such teachers from our own education.

⁷ I recognize that these two aspects of cannot be separated, processes—ways of knowing—are not independent of the subject matter that is known. But it is possible to emphasize one or the other in exhibitions, as it is in formal education.

⁸ See, E. Bailey, K. Bronnenkant, J. Kelley and G. E. Hein, "Visitor behavior at a Constructivist Exhibition: Evaluating *Investigate!* at Boston's Museum of Science," in Dufresne-Tassé, C. editor, Évaluation et éducation muséal: nouvelles tendances, Montreal: ICOM/CECA, 1998, pp. 149-168.

⁹ This discussion is about conceptual change, not about learning isolated bits of information that fit into already existing schema. To realize that every state in the US has a state capital requires some conceptual change. To learn the name of one more state capital when you already have the concept does not require the same mental reorganization. (See Bradford, et al. (editors) (1999) How People Learn: Brain, Mind, Experience, and School, Washington, DC: National Academy Press.)

¹⁰ Hein, G. E. "The Maze and the Web: Implications of Constructivist Theory for Visitor Studies," Keynote address, Visitor Studies Association annual meeting, Birmingham, AL., August, 1997.

¹¹ Hein, G. E. "High Stakes Tests Don't Belong in Science Museums: We Can Do Better Than That!" panel presentation, "Can Informal Science and Mathematics Learning Coexist with High-Stakes Testing?" Association of Science-Technology Center annual Meeting, Phoenix, AZ, October 10, 2001.

¹² Berlin, I. (2001) "Notes on Prejudice," New York Review of Books, 65[16] p. 8. This subject is covered in more detail in his essay, "Two Concepts of Liberty."

¹³ Weissglass, J. (1999), Education Week, April 21