

THE LIBRARIAN'S GUIDE TO LEARNING THEORY

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PRACTICAL APPLICATIONS IN LIBRARY SETTINGS
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ANN MEDAILLE

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INTRODUCTION

FROM MAKERSPACES TO BOOK CLUBS, FROM MEDIA FACILITIES TO GROUP study spaces, from special events to book displays, libraries support learning in numerous ways. This book is intended to help librarians better understand how people learn so that they can improve support for learning on their campuses and in their communities.

This book reviews theories related to learning. But what is learning? Learning is not something that occurs only in classrooms or through *instruction*, which consists of a sequence of events designed to support learning.¹ Instead, people are learning constantly in a variety of settings. While learning is not synonymous with instruction, learning theories can and should inform the design of instruction. Throughout this book, the links between learning theories and instructional methods are explained in order to make these connections clear.

Learning has been defined in various ways. Many definitions of learning focus on the acquisition of knowledge and skills, but all definitions emphasize that learning results in change. Thus, *learning* can be defined more broadly as any change that occurs in skills, knowledge, attitudes, or values that is not due to the normal processes of biological growth. Furthermore, changes resulting from learning are somewhat lasting and are gained through experiences such as thinking, doing activities, or observing others.²

Theories provide a set of principles for explaining phenomena. While anyone can develop a theory based on their own guesses or intuitions, most theories that are widely accepted are based on an accumulation of evidence. Learning theories

provide frameworks for organizing and understanding research findings related to learning, and they serve as the basis on which further research questions are developed for exploration. For the sake of conciseness, the vast quantities of research that support the development of learning theories have not been presented in this book; instead, the focus is on the major principles comprising the theories themselves.

Because learning encompasses a wide range of experiences, many different theories have been proposed to explain how people learn. The ideas behind the learning theories described in this book have come from the fields of psychology, education, philosophy, and anthropology, among others. Most of them were developed in the twentieth century, although they were influenced by centuries of ideas that came before. While behavioral learning theory dominated in the first half of the twentieth century, other theories rose to prominence in the century's second half, including constructivist theory, social cognitive theory, sociocultural theory, information processing theory, and self-regulation theory.³

No one theory is able to explain all learning. Different learning theories may be better or worse at explaining different kinds of learning for different individuals. Thus, theories can comfortably coexist, helping to explain diverse learning experiences or situations. While these theories are distinct, they also share many similarities. For example, many theories characterize learning as an active, complex process involving the interplay of thoughts, emotions, motivations, and social, environmental, and other factors. Thus, the theories described in this book are able to comfortably coexist with each other. In addition, the explanations provided here are intended to show how different concepts and theories relate to each other to form a more comprehensive picture of learning as a whole.

Many books on learning theory, typically written for students of education, are organized according to major theory, sometimes presented chronologically. This book, however, is organized into fourteen topics that are relevant to the work of librarians, with information about the relevant theories presented in each chapter as appropriate. This book can be read from cover to cover, or readers can jump around to the topics that interest them. Each chapter also contains parenthetical cross-references to indicate when related information is covered in a different chapter.

Several theories are applicable to multiple topics and are therefore addressed in multiple chapters. For instance, information processing theory is relevant to both focusing attention (chapter 3) and the ingestion of content through multimedia

(chapter 4). Constructivist theory (chapter 1) is pertinent for learning through the process of collaboration (chapter 2), context (chapter 9), dialogue (chapter 10), inquiry (chapter 11), and imagination (chapter 12), so it reappears in several places.

The content in each chapter applies to a variety of library types and levels. While learning theories are the same no matter what level of learner is being engaged, they will, of course, be applied differently depending upon the circumstances. For example, the theories described in chapter 3, “Attention,” are important for both younger and older learners, both of whom must direct their attention in order to be able to learn.

Each chapter follows a consistent format and includes the following sections:

- *Theoretical Overview*: This section begins each chapter and summarizes the most relevant aspects of theories and related instructional methods regarding each topic.
- *Implications for Libraries*: Because it can often be difficult to understand how to implement theoretical content, the practical guidance offered in this section shows how librarians can apply these theories to library spaces, services, resources, and technologies.
- *Teaching Librarian’s Corner*: This section provides suggestions for how to apply theories to a range of instructional contexts, such as information literacy instruction and the teaching of maker or media skills.
- *Further Reading*: Recommended readings are included in this section.
- *Questions to Consider*: Reflection questions regarding the application of theory to library settings are provided in this section.

While librarians are constantly assisting learners, many may not be familiar with some of the theories that underlie educational and instructional practices or may not understand how these theories relate to their own work. Understanding learning theories may not only help librarians better plan for instruction, but it may also help them design services and spaces, provide rationales for funding requests, promote their contributions, and better assess what works. Hopefully, this book can help librarians achieve some of these goals.

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1

CONSTRUCTING KNOWLEDGE

THEORETICAL OVERVIEW

Are learners empty vessels, waiting to be filled with knowledge, preferably imparted by a wise teacher? Or are they more active participants in generating meaning and understanding? These questions are addressed by the theory of *constructivism*, which describes the ways that learners actively construct their own understandings when encountering new information.¹ Libraries have become essential in providing the resources, technologies, and tools that help learners to construct knowledge.

Constructivism is often opposed to another major learning theory that became prominent in the first half of the twentieth century: behaviorism. To understand the idea of constructing knowledge, it can be helpful to know more about the ways that constructivism differs from behaviorism, as well as the work of Jean Piaget and Lev Semyonovich Vygotsky, two theorists who had an enormous impact on the development of the idea of knowledge construction.

Constructivism vs. Behaviorism

Unlike constructivism, the theory of *behaviorism* describes how behaviors are learned in response to environmental cues. Behaviorism emphasizes the effects of external motivation and repeated practice in the learning of discrete skills and behaviors that can be observed and measured.² Behaviorists conceive of learning in terms of repeated responses to stimuli. These responses are learned through positive and negative reinforcement, which can be used to train learners to repeat

or avoid certain behaviors. This repeated reinforcement supports the development of certain neural pathways in the brain. Behaviorism describes the mechanisms whereby behaviors are repeated over time until they are performed better and faster through continued reinforcement. For example, when teaching a dog to sit, an owner associates the sitting behavior with a particular cue (such as a hand signal or the word “sit”) and teaches the dog to repeat that behavior through rewards (such as treats or praise). Over time, the dog performs the sitting behavior faster and more consistently.

The process of manipulating the environment to reinforce certain behaviors is called *conditioning*. Ivan Pavlov (1849–1936), a Russian physiologist, and B. F. Skinner (1904–1990), an American psychologist, were two of the first scientists to describe this process, which involves associating behaviors with particular environmental cues (e.g., a dog salivating whenever it hears the sound of a bell) and using punishments and rewards to reinforce and shape certain behaviors. While the experiments of the early behaviorists were initially performed with animals, the principles of behaviorism are widely applied in learning situations of all kinds whenever rewards or punishments (even those as simple as verbal praise or disapproval) provide reinforcement for or serve as inhibitors of certain behaviors.

In contrast to behaviorism, constructivism conceives of learning not as repeated behaviors in response to stimuli but as the mental construction of knowledge and skills that occurs within individuals when they encounter new information in their environment and reconcile it with their existing understanding. Constructivism, however, can be understood as a philosophical theory in addition to being a learning theory. As a philosophical theory, constructivism addresses *epistemology*—that is, the nature of knowledge and how people come to know about their world. From this perspective, constructivist theorists assert that people actively construct knowledge on the basis of their individual experiences and beliefs, many of which are culturally determined.³ Thus, knowledge is thought to be inherently subjective and personal, and objective truth is either not possible or not knowable.

As a learning theory, constructivism describes how the process of knowing occurs within each person. Constructivist learning theorists maintain that knowledge is not necessarily a thing that individuals acquire but is instead constructed within the mind of each individual learner. In other words, knowledge is not simply imparted to another, but rather, learners construct their own understandings of the world by connecting new information with what they already know. Learning thus begins with each person’s unique experiences and interests. Because any two people have different values and understandings, they may learn different knowledge

and skills even when presented with the very same instruction. Knowledge, then, does not consist of objective truths about “real life” but of individual constructions that occur in relation to environmental stimuli.

Finally, constructivist learning theory is not so much a single theory as it is a theoretical family that provides the guiding principles upon which many other theories are based, including collaborative learning (described in chapter 2, “Collaboration”), situated learning (described in chapter 9, “Context”), inquiry-based learning (described in chapter 11, “Inquiry”), and many others.

Constructivist Learning Theory

While the theory behind constructivism was fully developed in recent times, its origins can be found in the work of several thinkers and philosophers, even those from thousands of years ago. In the time of ancient Greece, for example, Plato described how Socrates used questioning to help learners discover their own answers and arrive at their own understandings of complex ideas.

The thinker who has had perhaps the most important influence on modern notions of constructivist learning theory is Swiss psychologist Jean Piaget (1896–1980), who wrote hundreds of books and articles on child development and other topics, including philosophy, biology, and zoology. Piaget described four different stages that children pass through as they acquire knowledge and develop the ability to think at higher levels:

1. *Sensorimotor*, when young children use movement to respond to the world through their senses
2. *Preoperational*, when children begin to think symbolically (e.g., use language) and to create mental constructs and patterns to make sense of information received from their environment
3. *Concrete operational*, when children begin to use logical thinking about concrete events and to revise their previously formed mental constructs about the world
4. *Formal operational*, when adolescents or young adults begin to think abstractly, use deductive reasoning, apply abstract thinking to different situations, and continue to revise their previous mental constructs

Piaget’s work on child development was instrumental in helping to explain how people process information that shapes their understanding.⁴ Piaget argued that learners do not passively ingest information; rather, they actively structure and categorize information when adapting to environmental stimuli through the

development of schemas. A *schema* is an individual's mental system for structuring and organizing information associated with concepts, ideas, or experiences. The process of learning occurs because people create their own mental structures or templates that help them process information that they receive from the world around them.⁵ For example, public services librarians have schemas for navigating research and technology consultations that include a sequence of steps, expectations for interactions, common questions to ask, technologies to use, and so on. Schemas provide a framework for learning to occur because they enable new information to be more readily incorporated into existing understandings. Over time, a learner's schemas become more sophisticated through repeated exposure to new information. People with different types of intelligence, such as music, math, or visual intelligence (see chapter 14, "Individual Differences"), build different mental structures to shape their understandings of the world and then use those existing structures to create new structures.⁶

One of the central concepts of Piaget's theory revolves around the role that cognitive conflict plays in learning. *Cognitive conflict* occurs when learners encounter new information from their environment that conflicts with their current understandings. This old and new information presents an uncomfortable contradiction in the minds of learners, who long to resolve this conflict and achieve a harmonious mental state. Piaget referred to this harmonious mental state between a learner's internal cognitive structures and external information as *equilibration*.⁷ To achieve equilibration when encountering new information, learners draw upon their existing knowledge, their prior experiences, and their cognitive skills in order to make sense of the new information and incorporate it into their thought processes.

Piaget described two processes through which learners make sense of new information received from their environment. With *assimilation*, learners incorporate new information from their environment into their existing schemas. Their existing mental structures are enhanced by this new information. With *accommodation*, learners change their existing schemas in order to make sense of the new information that they encounter in their environment. Learners must use accommodation to achieve a kind of mental balance when, for instance, things do not work as expected or when two different but valid arguments are presented to explain the same phenomenon or event. This process of reconciling conflicting information results in a mental reordering or reorganizing that leads to learning and cognitive growth.⁸ Thus, assimilation and accommodation describe the ways that learners construct their own knowledge, as they process information from the environment in accordance with their own unique mental structures.

Piaget's theory of development suggests that learners are not "blank slates"; rather, learning is an active process on the part of the learner. In practice, this means that educators cannot simply deliver knowledge to learners but instead must help to facilitate learning by engaging learners in an active process that allows for the experience of cognitive conflict. Through the experience of cognitive conflict, learners transform concepts, construct their own understandings, and represent their learning in unique ways. Constructivist theory supports a role for educators that moves away from lectures, memorization, repetition, set curricula, the use of textbooks, "right" answers, and standardized tests. Instead, librarians and other educators should create learning situations that enable learners to experience the cognitive conflict that forces them to think through problems and contradictions in order to develop new understandings. They should attempt to facilitate and organize *active learning situations* that allow learners to become mentally engaged with the content, enabling them to take control of their own learning and to construct knowledge for themselves.

However, while learners may encounter new information that challenges their existing mental structures, this does not mean that they will necessarily change their thinking. Learners can simply ignore or reject the new information and persist in their current understandings. For librarians and other educators, this means that they should attempt to become aware of learners' stages of development and create learning situations that are appropriate. If educators present content that is beyond learners' abilities to process it, then learners will not be able to assimilate or accommodate it in a way that leads to growth.

Furthermore, a constructivist approach to instruction is not useful in all cases and for all content. Constructivist approaches that provide minimal guidance may fail novice learners who do not possess a sufficient collection of information and learning strategies to help them solve problems. For many types of learning situations, it is necessary to provide close instructional guidance, rather than unguided exploration and discovery.⁹ To illustrate, it would be difficult for learners to arrive at their own understandings of certain math and science concepts, such as the rules for algebra or the theory of evolution.

Finally, librarians and other educators may need to intervene if they see that learners are going down the wrong path. During library instruction, for example, librarians should provide guidance if they observe that learners are making questionable judgments about the credibility and reliability of online sources, even if learners have constructed those ideas on their own. Thus, it is often necessary for librarians and other educators to integrate more guided, non-constructivist

teaching strategies with constructivist approaches, depending on the content and skills being taught.

Assimilation and Accommodation during a Research Consultation

A librarian is helping a student who is researching the issue of gun control laws in the United States. The student is familiar with recent episodes of violence and understands that gun control legislation differs geographically because of the balance of power that exists between the federal and state governments. In the course of her research, the student learns new information about the Second Amendment of the U.S. Constitution, which allows citizens to possess firearms, as well as the history of some views of guns in different states. She *assimilates* this new information into her current understanding of gun control legislation at the state and federal levels. In addition, the student also learns about the efforts of special interest groups to influence gun control legislation. In doing so, she learns that these organizations play a significant role in the passage of legislation through lobbying, media campaigns, and voter mobilization— notions which challenge her current understanding of the ways that laws are passed and information is produced and shared. She *accommodates* this new information by changing her mental structures about both the workings of government and the production of information.

Social Constructivism

While constructivist learning theory describes how learners derive their own understandings, different perspectives on constructivism explain this notion in distinct ways. Are learners constructing new knowledge? Are they reconstructing existing knowledge? Or are they doing some combination thereof?

In addition to having different points of view regarding what is meant by knowledge construction, scholars of constructivist learning theory differ as to whether they believe that the source of learning exists within the learner, within the social environment, or through some interaction between the two. *Social constructivism*, a version of constructivist theory, maintains that knowledge is constructed through social interaction.¹⁰

The ideas behind this view of the role of the social in constructing meaning have been heavily influenced by the work of the Russian psychologist Lev Vygotsky¹¹ (further described in chapter 2, “Collaboration”; and chapter 13, “Guidance”). Vygotsky explained how knowledge is transmitted through cultural products such as language and mathematical symbols, which have been developed through social interaction. He described how the social environment influences thinking, as people internalize speech to help them regulate their own thought processes

in response to information received from the environment. Moreover, dialogue with others leads to cognitive development and the creation of shared meanings. Thus, language not only represents previously constructed meanings but is used to construct meanings too.

According to social constructivist thought, social context is important for learning in different ways. People learn through communication with others that occurs in social settings, and social interaction shapes the manner in which learning occurs. Discussion with others provides a means through which knowledge is shared and learners shape and develop their own ideas. When they are not learning through person-to-person communication, they often learn through information contained in products created by others, such as written information and visual media. Furthermore, knowledge itself is created by human beings who participate in meaning-making activities within cultural contexts. From this perspective, knowledge is a product of shared social activities, and learning occurs as a result of participation in cultural practices. Knowledge structures evolve over time through social interaction and are shared through cultural dissemination.¹²

Those who espouse constructivist theory differ as to how they construe the prominence of social interaction in learning. “Cognitive constructivists” assert that knowledge construction is a process that occurs solely within individuals, while “social constructivists” contend that knowledge construction occurs through interaction between the individual and the social. For cognitive constructivists, learning occurs through the individual process of reorganizing thought in response to cognitive conflict. For social constructivists, learning is a process that occurs through participation in cultural practices.¹³

While these two views may seem like they are at odds with each other, both approaches provide valuable insights into how learning occurs and how instructional situations can be designed to enhance learning. Both approaches to constructivist theory suggest that learners must be actively engaged in the process. Thus, librarians and other educators should strive to create instructional situations that allow learners to execute tasks and interact with content in such a way that they can discover knowledge for themselves.

IMPLICATIONS FOR LIBRARIES

While the process of constructing knowledge is an internal one, it is often external activity that provides the source of the cognitive conflict that serves as an impetus for learning, and thus, constructivist learning frequently involves learning

activities. In addition, constructivist learning often involves social interaction, in which learners can come together and share their ideas with each other. A constructivist approach to instruction encourages learners to generate their own questions, dig deep for their own answers, and demonstrate their own learning. Finally, constructivism also supports an interdisciplinary approach to learning content that focuses on big ideas that are broadly applicable, conceptual understandings that make connections across boundaries, and open-ended problems that require the use of different approaches when generating solutions. Libraries can provide spaces, resources, and opportunities that support these types of engagement.

Librarians can use some of the following strategies to support constructivist approaches to learning:

- Work with educators to purchase materials that can supplement or replace traditional textbooks and allow learners to connect with material in different ways.
- Promote the use of physical and digital primary sources as a means for learners to engage with original material, generate their own questions, and develop their own perspectives.
- Provide various types of group spaces that allow learners to engage in dialogue and discussion.
- Provide physical and online forums in which people from different disciplines can come together to exchange ideas.
- Host speakers who present challenging ideas from a variety of perspectives and include time for attendees to respond with ideas of their own.
- Lend tools and technologies that allow learners to make or design things, such as cameras, electronics, robotics equipment, anatomical models, building toys, sewing supplies, and bird-watching kits.
- Lead citizen science (www.citizenscience.gov) or nature education programs and projects that allow for hands-on learning. Partner with community organizations to bring hands-on learning experiences into the library or bring library patrons into the community.
- Provide physical and digital forums that present the products of learning, such as displays where learners can show their designs or models, spaces where learners can give public presentations, or web pages where learners can share their writing or artwork.

TEACHING LIBRARIAN'S CORNER

During instructional situations, librarians can integrate constructivist learning theory by attempting to grasp learners' current understandings and interests, and then adjust their instruction accordingly. Librarians should help learners to engage with issues and problems that challenge their understandings, connect to big ideas, pursue issues of interest to them, generate their own questions, and seek their own answers. Librarians can work with other educators to create learning situations that allow learners to discover resources, collect and analyze their own data for research projects, and present the results of their inquiries. They can introduce opportunities that allow learners to touch, manipulate, design, and make objects. Finally, they can partner with community groups to bring learning into real-world settings that provide learners with opportunities to generate their own questions.

Librarians can use some of the following strategies to incorporate constructivist theory into instruction:

- Activate learners' prior knowledge of a topic by asking them to review or reflect upon what they already know about it.
- Ask learners to share their understanding of concepts before providing "official" definitions or lists (e.g., ask learners to define the term "research" or generate their own criteria for evaluating information sources).
- Encourage learners to pursue their own interests or choose their own topics for exploration.
- Teach learners to use reference works as a way to gain background information about new topics to help them construct schemas that can aid in processing information from more advanced and in-depth sources.
- Provide opportunities for learners to use primary sources and data to generate their own ideas and interpretations about the factors surrounding current and historical events.
- Ask learners to investigate various perspectives on complex problems and contemporary issues. For example, learners can summarize and respond to ideas from sources that present conflicting ideas.
- Ask open-ended questions designed to challenge beliefs and current understandings. Encourage learners to engage in dialogue that enables them to share their perspectives, justify their ideas to others, and challenge each other's opinions.

- Let learners make errors (e.g., when searching for information or when designing an object in a library makerspace), give helpful hints to get them on the right track, and encourage them to learn from their mistakes.
- Encourage learners to reflect upon what they have learned either in writing or orally (e.g., reflect upon their information search processes or reflect upon which parts of an assignment were the most challenging). Use learners' reflections to gauge their thinking, address big ideas and concepts, and provide guidance when concepts are poorly or partially understood.
- Encourage learners to share what they know through the creation of products or presentations that allow them to explain what they are thinking. Provide learners with some choice about how they want to represent their own learning (e.g., create a poster, construct a book, make an object, design a plan or program, etc.).

Using Primary Sources for Constructivist Learning

Using primary sources provides an excellent opportunity for employing a constructivist approach to learning. Primary sources can give learners room to analyze events themselves, evaluate decisions, draw comparisons, experiment with ideas, and come to their own conclusions. For instance, if learners are studying early twentieth-century American vaudeville performances, they can use primary-source video, audio, images, and reviews from that time period. When used in combination with secondary sources, primary sources can help learners to explore and arrive at their own interpretations about the reasons for vaudeville's popularity, its reflections of society and culture, its depictions of race and gender, the reasons for its eventual decline, and its influence on contemporary performance styles. Learners could even use their new understandings of this performance genre to construct their own entertainments in a similar style.

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QUESTIONS TO CONSIDER



1. What is cognitive conflict? What are some strategies that librarians can use to ensure that learners experience cognitive conflict during library instruction or events?
2. Describe a variety of activities or events that you could hold in a library of your choosing that promote a constructivist approach to learning.
3. For what kinds of library instruction situations would a constructivist approach to instruction be appropriate? For what kinds of situations would it be inappropriate?

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