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Learning Theories and instructional Design

Assignment 3

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Course Coordinator: Dr. Ford

Student ID: 311101157

Trevor Queeley

Instructional designs are entrenched in many supporting theories. This paper will examine three schools of thought: Behaviourism, Cognitivism and Constructivism. This writing will progress from a historical view of some of the main contributors to each collection of ideas. Here, one can observe a link from one theorist's accumulative idea to another in an attempt to exploit weak areas in that theory — understanding where these collections of ideas originated is essential in linking how they have impacted instructional design. Furthermore, a closer look at one theoretical view of behaviourism, cognitivism and constructivism will help in understanding how learning theory has impacted instructional design. While clear cases will demonstrate the link of each approach in instructional design as they are applied in the real world. A more in-depth analysis of instructional design and learning theories will summarise the evaluation of the three theories examined in this paper to emphasise the impact of views on instructional design.

First, let us look at what a theory is. Dorin, Demmin, & Gabel (1990) describe the term theory as a collection of ideas that provides a general description for observations made over time; it tends to explain and predicts behaviours while usually having some doubts. The authors continued to explain that theory sometimes may be widely accepted for a long time and later disproved. In contrast, instructional design can be seen as systematically developing and designing instructional material for effective knowledge processing. Kurt, (2017) quotes Siemens G (2002) describing Instructional design as being the art and science of developing instructional materials that will transform the learner from one state of not being able to accomplish a specific task, then to doing so. This text outlines how learning theory influences instructional design by looking at the basics of theories, models &strategies, the historical development of theories & instructional design and key tenants of Instructional design systems.

Outlined above are the definitions of theories and instructional design systems. The ensuing writing will review the basics of Behaviourism, Cognitivism and Constructivism learning theories. The first theory to be examined is Behaviourism.

Behaviourism – The basics

As a learning theory, behaviourism dates back to the era of Aristotle, who wrote 'On Memory' (Neurosci, 2010); Aristotle focused on relations between events such as lighting and thunder; one cannot exist without the other. Behaviourism theory distillates on the study of overt behaviours that can be observed and measured (Good & Brophy, Educational psychology: A realistic approach, 1990). Simply put, learning happens when a correct response is demonstrated following the presentation of a specific environmental stimulus while the emphasis is on observable and measurable behaviour. Hence, much emphasis is placed on the relationship between environmental variables and behaviour. Important to mention are some contributors to behaviourism.

Firstly, Pavlov was a famous Russian physiologist known for working with dogs. According to the University of Wuerzburg (n.d.) Pavlov used a dog, food and a tone in an experiment to demonstrate by hearing a sound, the dog will associate it with a reward –food. Pavlov Classical Conditioning is what the investigation was termed. Also, John B. Watson expounded on Pavolov's ideas and shifted his original work from animals to humans. For example, Watson instilled fear into a little child by making a loud noise every time he touched a rat; Watson then eliminated the fear by presenting the rat without the loud noise (Beck, Levinson, & Irons, 2009). Then there is Skinner, a leading behaviourist, the proponent of operant conditioning and the inventor of Skinner's box for facilitating experimental, observational behaviours. His primary scientific research includes The behaviour of Organisms in 1938 and

Verbal Behaviour in 1957, not to mention his most popular social and political views, which were shared widely through Walden Two and Beyond Freedom and Dignity.

Cognitivism – The basics

Similarly, cognitive psychology can be traced to the Greek period. It became popular around the 1950s with influential psychologist Jean Piaget. Then, around the 1960s, Miller and Bruner initiated Harvard Centre for Cognitive studies, making some fundamental cognitive theory concepts famous. But first, a definition of Cognitive Theory from Good and Brophy's perspectives.

Cognitive theorists recognise that much learning involves associations established through contiguity and repetitions. They also acknowledge the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. However, even while accepting such behavioristic concepts, cognitive theorists view learning as involving the acquisition of reorganisation of the cognitive configurations through which people process and store information. (Good & Brophy, 1990 pp. 187).

The definition above seems to build on the behaviourist theory and may have some gaps. Therefore, cognitivism has some basic principles that they are founded on. According to (University of Wuerzburg, n.d.) they are:

- Learning is an alteration of knowledge state
- Knowledge achievement is described as a mental activity that involves internal coding and structuring by the learner
- The learner is viewed as a dynamic participant in the learning process

- Emphasis is on the construction blocks of knowledge, for example, identifying prerequisite relationships of content.
- Emphasis on structuring, organising and sequencing information to facilitate optimal processing
- It is viewed as an active process that occurs within learning and can be influenced by the learner.
- The product of learning depends on the presenter and on what the learner does to process the information.

Most importantly, these principles are built on theories of cognitivism can be described as

Component display theory, which incorporates two dimensions, content and performance, as well as Dual Coding theory, which identifies three types of processing: representational, referential and associative processing. In addition, a significant theory is schema theory which is purported by Bartlett (1932), as recollection takes the form of schema, which provides a psychological framework for remembering and understanding information, as well as, Mental Models that use representations of reality that people use to understand specific phenomena. In brief, these theories aim to transfer knowledge most efficiently and effectively with a focus on instruction to create learning from stored information in memory in an organised and meaningful way.

Constructivism - The basics

Pioneered by Bartlett (1932), constructivists believe that learners construct their reality based on mental structures, prior experiences and beliefs used to interpret objects and events (Jonassen, 1991). The University of Wuerzburg (n.d.) confirms constructivist ideals support the position that learners build a personal understanding of the world based on experiences and interactions. At the same time, knowledge is embedded in the context in which it is used.

Furthermore, constructivism believes that the individual imposes meaning rather than existing in the world independently.

There is a basic understanding of three major schools of thought, ensuring that at least one theory proponent from each is closer.

Behaviourism and instructional design

As mentioned above, many different theorists have different approaches to the collective behaviourism. However, this section will focus on Skinner's Operant Conditioning. Operant conditioning describes one type of learning connection in which there is an eventuality between the response and the exhibition of a stimulus. Purported by Burrhus Fredric Skinner, when he trained rats and pigeons to press a lever to gain a reward in the form of food. B.F. Skinner is renowned for pioneering learning and behaviour research (Shrestha, 2017). Skinner proposed that human behaviour can be observed as voluntary responses by an organism when placed in a particular environment. On this premise, he coined the term Operant Conditioning Learning. The experiment consisted of a rat placed in what he called Skinner box where he set the rat inside the box; then the rat slowly became familiar with the environment and discovered a lever. After being placed in the box several times, it was apparent the rat was conditioned to press the lever to receive a reward. Here, pressing the lever is the operant reaction, and the food released inside the box is the reward (Shrestha, 2017).

Similarly, students at the Anguilla WISE campus have demonstrated similar behaviour in responding to merits rewards. Here, the most repeated behaviour is being helpful around the school. Interestingly, though they can receive merit rewards for many other activities, being helpful seems to be the most popular. Primarily because their first merit was due to them helping out a teacher.

Important to realise that Skinner's operant conditioning can be seen in this example and is still valuable for instructional designs. Critical parts of operant conditioning learning are recognising the operant behaviour and the consequences of that particular environment. Furthermore, the translation of this theory is ubiquitous in most modern lessons, where learners receive rewards for demonstrating specific learnings or behaviours.

Cognitivism and instructional design

Here, the focus is on schema theory. Bartlett is credited with pioneering the concept of schema. He deduced the idea from studies of memory in which subjects recalled accounts of stories that were not there (Bartlett, 1932). For example, Bartlett suggests that knowledge is represented in memory in general structures termed schemas. Schemas are prototyping or generic characterisations of objects, events, and situations (Armbruster, 1986). Simply, schemata stress the importance of general knowledge that helps formulate mental representation. Practically, teachers are tasked to help learners develop new schemas and establish connections between them, resulting in memory. To do so, background information and prior knowledge are vitally important.

Most teachings have suggested there are schemas for almost every aspect of life; schema helps to quickly process large content of information. An example of the schema is seen in restaurants. Zakrajesk (2019) suggests mentioning you are going to a fast-food restaurant for dinner, you should return with a burger; however, if one returns with a T-bone steak, it becomes confusing as to not fit the schema for fast food. Therefore, Zakrajsek continues, teachers attempt to activate relevant schema to make new information easy to process for learners. For this reason, they may say, 'this new information is kind of like...' (Zakrajesk, 2019). Similarly, real-life experience of schema theory in practice was seen as students were introduced to

measurement conversion. The new concept had to be linked to converting USD to ECD to establish a schema.

Constructivism and instructional design

With constructivism, the situated cognition theory will emphasise this section. Lave (1991) defines it as "situated"...does not imply that something is concrete and particular, or that it is not generalisable, or not imaginary. Instead, it means that a given social practice is multiplied and interconnected with other aspects of ongoing social processes in activity systems at many levels of particularity and generality" (pp 67). Therefore, situation cognition should not be seen as allowing for concrete learning in localised situations. Instead, situated cognition emphasises the network of activity systems where authentic practice occurs (Lave, 1991). Literature suggests a strong social and cultural influence exists in the theory situated cognition practice. Human learning is contextual because knowledge and physical action are combined to reinforce that knowledge. Situated cognition theory defies traditional approaches to pedagogy; this shifts the way educators provide instruction in a classroom and expect students to acquire knowledge and skills in that environment and expect them to apply it elsewhere.

Wise Geek (n.d.) simplifies an example of how situated cognition works. The author uses learning fractions as a typical experience of abstract learning, where learners go through problem sets and simple measures, like a pie chart, to understand fractions. Unfortunately, learners may not be able to transfer the knowledge to real-life to solve problems involving fractions, like determining the correct dosage of medicine for their sibling or how to adjust a recipe for two to more. On the other hand, if students learn about fractions while performing real-world activities, like baking, they can internalise the knowledge and learn how to use it (Wise Geek, n.d.). Furthermore, understanding of situated cognition can be seen when people are reluctant to see a

doctor who has only received classroom training; this reluctance illustrates the understanding of situated cognition theory. From experience in the classroom, this theory is relatable to a few situations where concepts were introduced to the students. Yet, they seemed not to gravitate to the content being taught. However, once the content is compared to a familiar topic or action, they can relate when they seem to remember and links the new content to that prior knowledge.

Learning theories and instructional design practice

After looking at these theories and their applications in instruction, the variance between the selected learning theories as it relates to the practice of instructional design is apparent. Is any one theory easily applied in practice than the other? For example, some may argue that cognitive theory can be seen in most designs, thus the most dominant. In contrast, others may suggest instructional strategies advocate and are utilised by behaviourist which is also used by cognitivist, but for different reasons. For example, behaviourists assess learners to determine a start point for instructions, while cognitivist look at the learner to assess their predisposition to learn (Ertmer & Newby, 1993).

On a final analysis of the literature, when an instructional designer designs from a behaviourist or cognitive view, the designer assesses the situation and sets goals. Objectives are used to set individual tasks. Further, assessments determine whether the objectives' criteria have been met. Here, the designer determines what the learner should know and attempts to transfer the knowledge to the learner. Objectively this approach seems to be a closed system, even though it may allow for some splitting and remediation, the learner is still limited to the designer's world, much like Skinner's box.

Upon reviewing the constructivist methodology to designing, a summary of the approach deems the designer to produce a much more facilitative than prescriptive product. Chiefly, the

content is not prearranged per se. Still, the learner and the assessment are much more subjective because, unlike the behaviourist approach, it does not rely on specific quantitative criteria but on a self-evaluation and process-based approach. Generally, the standard pen and paper test of mastery learning is not used in the constructive design. Instead, evaluation is done on the quality of notes and final products. Very much seen in the curriculum used at WISE Anguilla, - an Albena Lake Hodge Comprehensive School division. Nonetheless, teachings have indicated that there is no one 'best' theoretical approach to delivering instruction. Instead, a combination of strategies can be used in the instructional design process.

In sum, exploring how learning theory can influence instructional design was an exciting journey. Understanding the basics of the theories examined, set the foundation for this paper's development. Behaviourism is the first place an enormous emphasis on the relationship between environmental variables and behaviour. Pavlov proved this theory with his experiment using a dog, food and a tone to demonstrate that by hearing a sound, the dog will associate it with a reward, which was food. Cognitivism draws some of its thoughts from behaviourism theories. Where they recognise that much learning involves associations established through contiguity and repetitions, they believe in reinforcement of knowledge gained where that knowledge is reorganised to make sense in real-world applications. While constructivism believes learners construct their reality based on prior experience, mental constructs and beliefs are used to form the foundation for learning.

A closer look at the selected theories in the practice of instructional design saw Skinner's demonstrating operant conditioning to change the behaviour of pigeons. Similarly, this is seen in the Albena Lake Hodge Comprehensive School's WISE division, as students repeatedly assist teachers with different tasks to receive merit rewards. In contrast, cognitivism in the instructional

design saw the use of schema to assist in processing information. Here, it is expected that if one is dining at a fast-food restaurant, one should have a burger; however, if one is seen with a T-bone steak, it becomes puzzling because it does not fit into the schema theory. Finally, in situation cognition theory, a learner builds on cultural and real-world experience to help him relate to or learn new content. The example used to depict this theory is the use of currency conversion in a topic of measurement conversion.

The final analysis contains borrowed tenets from each instructional theory school of thought. Therefore, they all have their place in instructional design. With this in mind, the designer should be cognizant that the instructional design should be able to apply depending on the situation. Important to note, that there is no isolated approach and a combination of theories in a design may exceptionally be the common practice to achieve maximum results.

References

Armbruster, B. B. (1986). Schema Theory and the Design of Content-Area Textbooks. *Educational Psychologist*, 2(4), 253-267. Retrieved November 2019

Bartlett, C. F. (1932). *Remembering: An experience and social study*. Cambridge: Cambridge University Press.

Beck, H. P., Levinson, S., & Irons, G. (2009, October). Finding Little Albert. *American Psychologist*, 64(7), 605-614. DOI:10.1037/a0017234

Dorin, H., Demmin, P. E., & Gabel, D. (1990). *Chemistry: the study of matter*. New Jersey: Prentice Hall, Inc.

Ertmer, P. A., & Newby, T. J. (1993). Behaviourism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 6(4), 50-70.

George Mason University. (n.d.). *Learning Theories and Instructional Strategies Matrix*. Retrieved October 2019, from Instructional Technology Program: <http://www.nyoraps.vic.edu.au/learningtheoriesmatrix.htm>

Good, T. L., & Brophy, J. E. (1990). *Educational psychology: A realistic approach*. New York: Longman.

Good, T. L., & Brophy, J. E. (1990). *Educational psychology: A realistic approach* (Vol. 4th). NY, New York: White Plains. Retrieved 2019

Jonassen, H. D. (1991). Objectivism versus constructivism: do we need a new philosophical paradigm? *Educational Technology Research and Development*, 3(39), 5-14. Retrieved 2019

Kurt, S. (2017, July 1). *Definitions of Instructional Design*. Retrieved from Educational Technology: <https://educationaltechnology.net/definitions-instructional-design/>

Lave, J. (1991). Situated learning in communities of practice. In J. M. Resnick, & &. S. Levine, *Perspectives on socially shared cognition* (pp. 63-82). Washington DC, USA: American Psychological Association. Retrieved November 2019, from lagim.blogs.brynmawr.edu/files/2015/03/Situating-learning-in-CoPs.pdf

Neurosci, A. (2010, April 17). On memory and reminiscence Aristotle (ca. 350 b.c.). *Annals of Neurosciences*, 2, 87-91. DOI:10.5214/ans.0972-7531.1017208

Pappas, C. (2014, January 30). Instructional Design Models and Theories: Schema Theory. *eLearning Industry*. Retrieved November 22, 2019, from <https://elearningindustry.com/schema-theory>

Shrestha, P. (2017, November 17). Skinner's theory on Operant Conditioning. *Psychestudy*. Retrieved November 20, 2019, from <https://www.psychestudy.com/behavioral/learning-memory/operant-conditioning/skinner>.

University of Wuerzburg. (n.d.). *Bisentrum Department of Genetics and Neurobiology*. Retrieved November 11, 2019, from <http://www.biozentrum.uni-wuerzburg.de/genetics/behavior/learning/classical.html>

Wise Geek. (n.d.). *What is Situated Cognition?* Retrieved November 23, 2019, from WiseGeek: <https://www.wisegeek.com/what-is-situated-cognition.htm>

Zakrajsek, T. (2019, October 25). Cognitive Load: A Fundamental Key to Student Learning. *The Scholarly Teacher*. Retrieved November 22, 2019, from <https://www.scholarlyteacher.com/post/cognitive-load-a-fundamental-key-to-student-learning>