MSc Project Background Report

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# Abstract

The way we define learning and what we believe about the way learning occurs has important implications for situations in which we want to facilitate changes in what people know and/ or do. Learning theories provide instructional designers with verified instructional strategies and techniques for facilitating learning as well as a foundation for intelligent strategy selection. Yet many designers are operating under the constraints of a limited theoretical background. This paper is an attempt to familiarize designers with three relevant positions on learning (behavioral, cognitive, and constructivist) which provide structured foundations for planning and conducting instructional design activities. Each learning perspective is discussed in terms of its specific interpretation of the learning process and the resulting implications for instructional designers and educational practitioners. The information presented here provides the reader with a comparison of these three different viewpoints and illustrates how these differences might be translated into practical applications in instructional situations.

# Chapter 1: Introduction

* 1. Project Objectives
  2. Project Scope
  3. The Challenge
  4. Report Structure

# Chapter 2: Background

This chapter explains the background behind this project. Significant learning theories are introduced which generally specify ideal ways to learn and teach. This is followed by discussion on Virtual Learning Spaces. We then turn to the importance of usability in virtual learning spaces and finally conclude with reviewing related work in this area of research.

BASIC TERMINOLOGIES

LEARNING

Learning has its own wahalas so we shall return to it.

[<http://projects.coe.uga.edu/epltt/index.php?title=Introduction_to_Emerging_Perspectives_on_Learning%2C_Teaching%2C_and_Technology>]

COGNITION

Cognition is about how our brain works or how our mind works (Leonard, Noh, and Orey, 2007). Cognition is the psychological result of perception, learning and reasoning. To put it in simpler terms, it is the act or process of knowing. Additionally, cognition can also refer to the process of knowing. So in my own words, cognition can be a “process” as well as a “product”. Most cognitive theories are more conceptual and therefore it might be more accurate to talk about how the mind works rather than a biological reference to the brain (Leonard, Noh, and Orey, 2007).

INSTRUCTION

THEORY

## 2.1 Learning Theories

A Learning theory attempts to help us understand the complex process of learning by describing how people (and animals) learn. According to Hill (2002), learning theories have two chief values:

* Providing a vocabulary and a conceptual framework for interpreting the examples of learning we observe.
* Suggesting where to look for solutions to practical problems.

Interestingly, the theories do not provide solutions to practical problems. However, it should be noted that they do direct our attention to important variables that are crucial in finding solutions. Before I dive deep into learning theories, I would “attempt” to define the term “Learning”. Being a complex process, it is not easy to define learning, According to author(year), “Learning is such a common experience that we hardly ever reflect on exactly what we mean when we say that something has been learnt” [@REF, Principles of learning on BB pix, 12042011][so many have attempted but cannot, show examples here]. Illeris (2000) defines learning as a process that brings together cognitive, emotional, and environmental influences and experiences for acquiring, enhancing, or making changes in one's knowledge, skills, values, and world views (Illeris, 2000; Ormorod, 1995). This definition attempts to capture the process as well as the product. A noteworthy fact in the definition is that learning is a product of the interplay between the cognitive, the emotional and the environmental. However, the environment can affect both emotion and cognition, positively or otherwise. It therefore becomes a very important factor in learning.

Learning theories are generally categorized under three philosophical frameworks namely:

* Behaviourism
* Cognitivism and
* Constructivism

**BEHAVIORIST THEORIES**

Behaviorism is a learning theory based on the idea that all behaviors are acquired through conditioning which occurs through interaction with the environment. J. B Watson, widely regarded as the father of Behaviorism [@Ref], defined learning as a sequence of stimulus and response actions in observable cause and effect relationships [@Ref]. Thus behaviorism assumes that the learner is essentially passive, responding to environmental stimuli (@Ref, Learning Theories). According to Learning Theories [@Replace], “the learner starts off as a clean slate (i.e. *tabula rasa*) and behavior is shaped through positive reinforcement or negative reinforcement.” Positive indicates the application of a stimulus while negative indicates withholding of a stimulus (@Ref, LT), thus learning is observable by the change in the behavior of the learner in response to the stimuli. There are basically two kinds of conditioning in Behaviorism namely classical conditioning and operant conditioning.

**Classical Conditioning**

This is a behavioral training technique in which a naturally occurring stimulus (**S1**) is associated with a response (**R1**). Then a previously “neutral” stimulus (**Sn**) is associated with the naturally occurring stimulus. Eventually, the previously neutral stimulus after some time, begins to cause the response (**R1**) even in the absence of the naturally occurring stimulus (**S1**). Thus **Sn** and **R1** are referred to as the conditioned stimulus and conditioned response. An example of this is the case of Ivan Pavlov’s dogs (@Ref). [@Expand if necessary page-wise, else delete]

**Operant Conditioning**

In this case, learning or behavioral change occurs through “rewards” and “punishments” for behavior. Through this kind of conditioning, an association is thus made between a behavior and a consequence for that behavior. According to this model, rewards are supposed to increase the likelihood of the behavior recurring while punishments are supposed to reduce the likelihood. Consequently, a punishment is not applicable if it does not result in reduction of the behaviour.

[@Diagram Here, Too Many Words huh?]



Behaviorism has been applied in the fields of psychology and medicine but here we are more interested in its application in learning improvement. Educational approaches such as applied behavior analysis; curriculum based measurement; and direct instruction have emerged from this model [@Ref Kim T & Axelrod, 2005, See Refs Note]. We discuss this further in later sections.

Many scientists have worked on behaviorism enriching it with new concepts and experiments. For example, Edward C. Tolman, Clark L. Hull or Burrhus F. Skinner who produced theories about reinforcement, language and problem resolution.

The original theory of behaviorism is now more commonly referred to as “classical behaviorism”. New lines of thought have been extracted from classical behaviorism thus giving rise to Neo-Behaviorism (second Generation) and Social-Behaviorism (Third Generation) (@Ref from PLE Group p. 21, Deaudelin & Lefebvre, 2005). Of these two, Social Behaviorism focuses more on learning. It considers learning as a relatively stable behavior modification arising from experience.

**BEHAVIORISM IN LEARNING**

In Behaviorism approaches learning is centred on the teacher. The teacher is given the role of transferring his knowledge to the learner which is confirmed done by observing a relative permanent change in the behavior of the learner. This approached is marked by reinforced and programmed learning [@REF Learning Theories PDF]. Interestingly, all computer-assisted instruction is solidly planted on the foundation laid by behaviorist researchers (Abrahamson, 1999). According to Standridge (2002), “Behaviorist techniques have long been employed in education to promote behavior that is desirable and discourage that which is not”. Among the methods derived from behaviorist theory for practical classroom application according to Standridge, are

* Contracts

Contracts involve the educator and learner agreeing on particular terms or set of activities that improves or eliminates a behavior. The educator works closely with the learner to ensure that the terms of the behavioral contract are being fulfilled as agreed.

* Consequences

A consequence is the immediate result of a behavior. It follows immediately and according to Standridge, “may be positive or negative, expected or unexpected, immediate or long-term, extrinsic or intrinsic, material or symbolic (e.g. a failing grade), emotional/interpersonal or even unconscious”.

* Reinforcement

Reinforcement refers to whatever increases the strength of a response [@REF LT, Melvin Marx]. It is the process of increasing the probability of a behavior by the delivery of a “stimulus” (e.g. a Chocolate Bar) immediately after a behavior (or “response”) is performed. Reinforcement may be **Negative** to reduce the probability of the response or **Positive** to increase it.

* Extinction

Extinction according to Strandridge, decreases the probability of a response by contingent withdrawal of a previously reinforced stimulus.

* Behavior Modification

Behaviour modification is a method of eliciting better classroom performance from reluctant students (Strandridge, 2002). According to Strandridge, it has six basic components including specification of outcomes; development of a positive, nurturing environment; identification and use of appropriate reinforcers, reinforcement of behaviour patterns until success is achieved; reduction in the frequency of rewards and finally evaluation and assessment of the effectiveness of the approach based on the teacher’s expectations and the learner’s results. This set of patterns can be applied where any modification in behavior is needed from the classroom to skill acquisition centers to reformation homes.

The table below shows example(s) of the practical application of each method.

|  |  |
| --- | --- |
| **METHOD** | **EXAMPLE** |
| Contracts | A student is failing in class, the teacher devises a contract providing that the student will always be punctual, sit in front, and stay back for extra help. This contract will minimize distractions and help the student perform as expected if fulfilled by both parties. |
| Consequences | Praising students’ ability, Selecting students for special projects, etc |
| Reinforcement | Submitting all coursework on time gives you 5% for each |
| Extinction | A teacher gives extra marks for students who answer questions in class; other students consider this unfair; the teacher then decides to withdraw the extra marks incentive. |

Table x.x [@TODO, Label Table]

Below is a summary of some features of a behaviorist learning model:

* Learning is done in small, concrete, progressively sequenced tasks
* Learning is marked by repetition in order to increase retention and speed of learning.
* Consistent use of reinforcements during the teaching-learning process. For instance, with verbal acts such as congratulatory remarks and non verbal acts such as medallions.
* Habits and other undesirable responses can be broken by removing the positive reinforcements connected with them (use of punishment).

**COGNITIVIST THEORIES**

Cognitivism as a learning theory looks beyond behaviour to explain brain based learning. In other words cognitivism attempts to improve learning by considering how the human memory works. Cognitivism shares a similarity with behaviourism on the basis that both view knowledge as “given” and “absolute” [@REF Learning Theories]. However, cognitivism is based on the basic assumption that human beings are logical beings and thus make choices that are most sensible to them. Pure cognitive theory largely rejects behaviorism on the basis that behaviorism reduces complex human behavior to simple cause and effect (Fritscher, 2011)[@Ref, Lisa Fritscher, <http://phobias.about.com/od/glossary/g/cognitivethedef.htm>]. In 1929, Bode, a Gestalt psychologist challenged behaviourism, criticising it for being over dependent on overt behaviour to explain learning. [@Expand more on Cognitivism]

Many of the information processing models of teaching and learning are based on the cognitive view of learning [@Ref, Learning Theories PDF]. However, current trends in past decades have been towards merging the two into a comprehensive “cognitive-behavioral theory” [@Ref Fritscher].

**COGNITIVISM IN LEARNING**

Cognitivisim approaches learning from a learner-centred perspective. From this perspective, learners need to develop deeper understandings, not just produce the right behaviors (Wortham, 2003). Since these deeper understandings cannot be imposed on learners, they must construct their own mental models with sufficient guide from the teacher. Cognitivism views learning as a change in the learner’s understanding, hence the focus is on elaboration, thus the teacher plays the role of a coach or a facilitator. As a facilitator, he has to provide clues and teach mnemonic strategies [@REF Fortin Rosseau in PLE BG p24], to introduce context. As a coach, he has to constantly evaluate the learner’s knowledge to keep the learner as active as possible. Tardif (1992) lists some basic principles that characterize the cognitive learning approach as follows:

* Learning is an active and constructive
* Prior knowledge a crucial factor in learning and believes that knowledge is essentially cumulative.
* Learning permits a link between the new pieces of information and the information already in memory.
* Learning is basically the acquisition of a repertoire of knowledge, cognitive & metacognitive strategies.
* Learning leads to declarative, procedural and conditional knowledge. Examples of declarative knowledge include knowledge of multiplication tables; knowledge of the role of a verb in a sentence; definition of terms; etc.

Robert Mills Gagné, an American educational psychologist best known for his "Conditions of Learning" identified five major types of learning namely:

* Verbal Information
* Intellectual Skills
* Cognitive Strategies
* Motor Skills and
* Attitudes.

Gagne published an article in 1962 in which he discussed 3 Principles of Learning [@REF, see if you can grab Military Training and the Principles of Learning article and ref it]:

1. Provide instruction on the set of component tasks that build toward the final task.
2. Ensure that each task is mastered.
3. Sequence the tasks to ensure the optimal transfer to the final task.

One of Gagné's major contributions to the theory of instruction was the model "Nine Events of Instruction" (@REF, @Brush).

* Gain attention
* Inform learner of objectives
* Stimulate recall of prior learning
* Present stimulus material
* Provide learner guidance
* Elicit performance
* Provide feedback
* Assess performance
* Enhance retention transfer

**CONSTRUCTIVIST, SOCIAL, AND SITUATIONAL THEORIES [@TODO Rename to just constructivism?]**

Constructivism as a learning theory views knowledge as a “constructed” entity [@Ref Learning Theories, PDF]. This totally contradicts the view that knowledge is absolute and given. According to the constructivism paradigm, human learning is an active attempt to construct knowledge based on previous knowledge and the present context. Therefore, every person will construct their own unique set of knowledge. In other words, no two people will start with exactly the same knowledge base, and no two people will construct exactly the same knowledge structures from given experiences or information. Knowledge is seen as a constructed entity and by reflecting on our experiences, we construct our own understanding of the world we live in [@REF Learning Theories, PDF].

**CONSTRUCTIVISM IN LEARNING**

Constructivism approaches learning from a learner-centred perspective also. However, learning to the constructivist is “discovery and construction of meaning” and knowledge cannot be poured in, from one person to another. Also, it holds that knowledge does not become part of the learner after memorisation of external objective information but is continuously built as the learner interacts with the outside world thus producing his own interpretations about it. Many pedagogical approaches have grown from constructivism. According to DeVries et al. (2002), in most pedagogies based on constructivism, “the teacher's role is not only to observe and assess but to also engage with the students while they are completing activities, wondering aloud and posing questions to the students for promotion of reasoning”. This promotes learning by experimentation and exploration, not by being told what will happen. According to Richardson (2003), the constructivist pedagogy involve the following characteristics:

* Student-centredness, evident in attention to the individual and respect for students' backgrounds
* Facilitation of group dialogue that explores an element of the domain with the purpose of leading to the creation and shared understanding of a topic
* Planned or unplanned introduction of formal domain knowledge into the conversation through direct instruction, reference to text, exploration of a web site, or some other means
* Provision of opportunities for students to determine, challenge, change or add to existing beliefs and understandings through engagement in tasks structured for this purpose
* Development of students' metawareness of their own understandings and learning processes

**Social constructivism**

???

If behaviourism treats the organism as a black box, cognitive theory recognises the importance of the mind in making sense of the material with which it is presented. Nevertheless, it still presupposes that the role of the learner is primarily to assimilate whatever the teacher presents. Constructivism — particularly in its "social" forms — suggests that the learner is much more actively involved in a joint enterprise with the teacher of creating ("constructing") new meanings (Atherton, 2011).

**COMPARISM OF LEARNING THEORIES**

These learning theories while based on different assumptions and focusing on different perspectives of explaining learning bear some form of relationship to one another. Learning styles and behaviours may be viewed as existing on a continuum bounded by these theories as show in figure xx [@REF Figure?] below. Notice from the figure that the continuum is not explicitly bounded by any of the theories. This is because ongoing researches in learning theories are still uncovering new ways of explaining learning among different categories of learners (such as children, adult, distance learners, etc). While it may be said that most educational models in use today combine concepts majorly from cognitivism and constructivism, that does not mean that the behaviourist theories are not still applicable. For example according to Perraudeau (1996)[@Ref from PLE Group, p. 28], “to develop high intellectual level abilities such as analysis or problem resolution, the teacher will tend to privilege constructivist and cognitivist approaches, whereas for information memorization, a behaviorist approach can be better”.

-------Behaviorism ---------Cognitivism---------Constructivism-------

Figure x.x [@TODO, label figure] [Call it the Spectrum of Learning Theories]

The table below gives a general comparism of the various learning theories discussed so far. For each learning theory, we highlight how knowledge is viewed, what is described as learning, key concepts and focus.



[@TODO: Draw this table in Fireworks Later]

LEARNER CENTRED THEORIES

ANDRAGOGY

RELATIONSHIP BETWEEN LEARNING THEORIES AND LEARNING SPACES

What is the relationship?

Theories of learning have been applied most often in educational institutions. The relationship between cognitive science and education has benefited both scientists and practitioners. Scientists have used educational settings to develop and test their theories, and practitioners have used new knowledge about learning to design more effective education.

LEARNING SPACES ARE BASICALLY DESIGNED TO PROMOTE LEARNING

Usability Testing for E-Learning (see @REFS notepad)

2.2 Virtual Spaces

2.3 Whatever

2.n Related Work

TECHNOLOGY AND LEARNING?

"Even if we have the finest technology, it remains ineffective if the teachers did not tame and integrated into teaching. We must therefore pay particular attention to different modes of training and support to the use of ICT. We must in this matter, have an approach that respects the rhythms of schools and individuals, as opposed to measures ‘wall to wall’ "(Jacques Tardif)

[http://principlesoflearning.blogspot.com](http://principlesoflearning.blogspot.com/)

From Donald Tapscott's perspective, Papert's desired reality is happening now, as a paradigm shift to more interactive learning due to the exploitation of the digital media is taking place in our learning institutions.

Tapscott cites eight shifts in learning today:

• From linear to hypermedia.

• From instruction to construction and discovery.

• From teacher-centered to learner-centered education.

• From absorbing material to learning how to navigate and how to learn.

• From school to lifelong learning.

• From one-size-fits-all to customized learning.

• From learning as torture as learning as fun.

• From the teacher as transmitter to the teacher as facilitator.

# Chapter 3: Research Methods

3.1 Project Description & Delivery Strategy

3.1.1 Project Description

3.1.2 Expected Deliverables

Put this in a tabular format

Sn, Deliverable, Recipient, Due Date, Delivery Method, Remarks

3.1.3 Assumptions, Dependencies, and Constraints

3.1.3 Project Plan

3.1.4 Evaluation Plan

3.2 Project Tools

3.2.1 Development Tools

3.2.2 Communication & Collaboration Tools

Prepare communication plan tables as done in the Plan Template p.8

3.2.3 Evaluation Tools

3.2.4 Reporting Tools

3.3 Project Management Tools

3.3.1 Project Management Plan

Include description for intermediate project goals or milestones

3.3.2 Agile Project Management

3.3.3 Risk Management & Issue Resolution Plan [Contingency Plan]

# Chapter 4: Summary

# List of References

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**SCRAPS:**

**Background report - Structure**

The structure should be decided with your supervisor but typically will be something like:

* Abstract (summary of report)
* Introduction (outlines scope of investigation)
* Background (survey of relevant literature, related approaches, sets wider context)
* Research methods (what the project involves, project plan, evaluation plan)
* List of references (using accepted format)

Scrap ends