

## LEARNING, INSTRUCTION & DESIGN THEORIES

Patricia Allen Carbonell

Capella University, Minneapolis,  
USA.

[havanagirlscientist56@gmail.com](mailto:havanagirlscientist56@gmail.com)

### ABSTRACT

*Theories are often used by instructional designers as design justification (Smith & Ragan, 2005). The following overview of the literature profiles the different key issues among theories of instruction, learning and instructional design. Three examples of how instructional materials may be developed in the workplace are each modeled after one of the three differing theories discussed, and are presented, at the end of this analysis.*

**Keywords:** Learning, Instruction, Design theories

### INTRODUCTION

Spector (2008) states that the reliability of a situation to consistently occur, due to a defined group of rules and principles, are evidence of a theory. The trial nature of a theory, with its hypothesis, still tentative, according to Popper (1957) are all testament to the collaboration of inquisitive critical thinkers, whose quest is to find out if there is any error in their theories. An analysis Reigeluth & Carr-Chellman (1996) of what constitutes a theory is addressed in order to be able to discern the differences amongst instruction, learning and instructional design theories. In relation to instruction and learning Reigeluth & Carr-Chellman (1996) it is challenging to create explanations of a general nature, or to predict theory. A similar progress occurs in the development of the reasoning of a child, argued Piaget (1929). Dewey (1929) theorizes rules of practice are not yielded, even when laws and facts have scientific shape. Their educational practice value is a practice mode, intelligent or accidental, routine as well as not direct; it consists of provision of *intellectual instrumentalities* to be used by the educator. Effective training, states Dewey (1929) involves the balancing of information, observation, imagination,

Driscoll (2005) furthers the descriptive learning theory differentiation by citing prominent behavior psychologist (B.F. Skinner 1938, 1974). Behavior is the root of all psychology states Skinner (1938, 1974) and descriptive learning theories seek to envisage learning behavior as a major distinction (Driscoll, 2005). The differentiation of learning psychology for Skinner (1938, 1974), was the pairing of environmental functions with the desired behavior to be learned. In describing an example of this psychology of learning theory, he explains the Black Box. He also declared that observable events of learning are descriptive. Driscoll (2005) highlights in her learning theory distinctive example of the classic Skinnerian (1938, 1974) black box experiment is a descriptive example of a learning theory. The descriptive example of a learning theory using the black box is useful. When using the black box Skinnerian (1938, 1974) example to describe a learning theory; a pairing of the response (R) is hence learned by an association with the stimulus (S) coming from the environment. The quest by B.F. Skinner' to explain the psychology of learning by seeking the function amid behavior and the environment (Skinner, 1938, 1974) is present in his black box allegory. For Skinner (1938, 1974), the black box represents the learner. In this description of a learning theory example, not much is known about the internal goings on of the learner, albeit the black box, but not knowing what is going on inside the box is not as consequential,

as observing if any learning has occurred. According to Skinner, (1938, 1974), the results and change in the learner behavior is what is paramount, and not as important is the learner's environmental surroundings.

The theoretical and close relationship between Piaget's intellectual development and support for Dewey's (1910) learning kind was made explicit in the literature by Bruner (1966). From Bruner forward, new psychological research evolves and researchers create instructional design frameworks including the most current research (Merill and Twitchell, 1993; Reigeluth, 1983, 1999; van Merriënboer, 1997).

Evolving from behaviorism (Skinner, 1938) to cognitivism (Anderson, 1983) to constructivism (Ford, 1987), learning psychology has witnessed real changes. According to Spector (2008), in association with these changes, researchers and developers thoughts about instruction have also been changed (Driscoll, 2000; Lesgold et al., 1978; Reigeluth, 1983, 1999; Spector and Anderson, 2000).

Dewey (1910) writes in *How We Think* for the need to comprehend the nature of thought in order to design effective ways to train those thoughts. Indicating training regimens proceed from the concrete to the abstract. Dewey (1910) distinguished abstract from concrete thinking.

Learners that actively create their own knowledge by making sense out of presented materials are examples of constructivist learning. Activation of several learner cognitive processes during learning, specifically the selection of relevant information, organizing incoming information, and integrating incoming information with existing knowledge is what constructivist learning relies upon (Spector, 2008). The analyzing of an SOI model highlighting three cognitive processes of importance in constructivist learning: S for selecting, O for organizing, and I for integrating (Mayer, 1996) is evaluated.

Different from the early theories of learning that profiled the process by which information is presented and long-term memory encoded; a constructivist learning theory focuses on the way knowledge has been constructed by the working memory of the learner (Spector, 2008). As part of the process (Spector, 2008) of construction, the learner utilizes environmental materials that are incoming, and also previous knowledge stored in long-term memory. A theory of learning used to generate instructional implications is an SOI model (Spector, 2008). According to the SOI model of learning, constructivist learning can occur when a learner engages in three cognitive processes according to the SOI model of learning for constructivist learning to take place. They are as follows: selecting the relevant information, organizing a mental representation of the information in a coherent way, and integrate the new information with prior knowledge (Spector, 2008). The real treasure in the constructivist theory is the notion of value for what is going on inside the learner head, (Spector, 2008) as well as what is being presented to the learner.

A poignant variable in the study of education from Dewey's time (1902) is his classic work dealing with the differentiation between education that is child-centered and education that is curriculum-centered. In the former, child-centered the attention centers on promoting cognitive changes in learners, whereas in education that is centered on curriculum, the attention is on covering the material (Spector, 2008). A reflection of this educational variable to mind the learning process as well as the learning product is in the literature analyzed by Bloom & Broder (1950). The central constructivist value of giving importance to the learning process, as well as giving importance to the learning product is in the traditional constructivist theoretical call to focus on process and product (Spector, 2008).

The student's ability to utilize the learned information, instead of just having a memory of the information is another constructivist theoretical focus on process, and not just product (Reigeluth & Carr-Chellman, 1996). The student's ability to transfer the learning for their own good use, as well as retrieving the learned information, when necessary from learned memory, is another key factor of constructivism (Reigeluth & Carr-Chellman, 1996). In psychology and education's long history, the best to articulate meaningful learning was Gestalt psychologist, (Wertheimer, 1945). Meaningful learning is desired over rote learning; hence senseless memorization is less desirable than a deep understanding (Reigeluth & Carr-Chellman, 1996). The ability to transfer what was learned to novel situations measures constructivist learning that goes beyond just retention and is the deep understanding and its hallmark (Reigeluth & Carr-Chellman, 1996). Lastly, in constructivism there is value in knowing how to learn, think and remember, as well as, knowing what to learn, think and remember (Reigeluth & Carr-Chellman, 1996). Selecting, organizing, and integrating information, as well as techniques for coordinating and monitoring these processes (Pressley, 1990; Weinstein & Mayer, 1985) are the component processes developed by students as an important part of their learning strategies. Students are also required to know basic skills in learning and thinking (Reigeluth & Carr-Chellman, 1996).

Instructional Designers use theory to back up their chosen design (Smith and Ragan, 2005). Promoting constructivist learning, it is possible to design instruction even when the learner is disengaged in an episode of active behavioral learning (Reigeluth & Carr-Chellman, 1996).

In constructivist learning, if a design of a text is done to foster cognitive processes that are appropriate, constructivist learning can occur from simply text reading passively (Reigeluth & Carr-Chellman, 1996). The constructivist revolution offers a new vision of the learner as an active sense-maker and suggests new methods of instruction emphasizing hands-on activity and discussion (Reigeluth & Carr-Chellman, 1996). In light of the fact that book-based instruction continues to play a major role in education (Britton, Woodward, & Binkley, 1993), it is useful to explore ways of promoting constructivist learning from textbooks to accomplish this goal. A new vision of the learner as an active sense-maker suggesting new instructional methods that emphasize discussion, as well as hands on activity is the mantra of the constructivist revolution. Use of headings, italics, boldface, font size, bullets, arrows, icons, underlining, margin notes, repetition, white spaces, and captions included in the text are instructional methods that foster the selection information process. Use of outlines, signaling headings, pointer words, structured illustrations, and coherent text structures are all instructional methods that foster the organizing information process. Use of advance organizers, captioned multiframe illustrations, narrated animation, worked out examples, and elaborative questions, are instructional methods to foster the integrating process of presenting information and prior knowledge (Reigeluth & Carr-Chellman, 1996).

Overview of the literature follows with the discussion of three views of learning and instruction. Learning as response strengthening, learning as knowledge acquisition, and learning as knowledge construction is shown by Mayer (1992) of how three learning views have evolved over the last 100 research years on learning. Response strengthening as learning was developed in the first half of the 20<sup>th</sup> century and was based in artificial laboratory settings on the study of animal learning (Reigeluth & Carr-Chellman, 1996).

The role of instructor's role is the administration of rewards and punishments like a drill-and-practice, and the learner's role is to receive rewards and punishments is the first view. The role of the learner repeatedly cued to give a simple response, followed by immediate feedback, is the environment the instructional designer must try to create in their role (Reigeluth & Carr-Chellman, 1996).

The second view developed in the 1950's, 1960's, and 1970's was based largely on the study of human learning in artificial laboratory settings. Based on knowledge acquisition learning when a learner places new information in their long-term memory, learning has taken place. The learner's role is acquiring information in a passive way. The commodity is information and the role of the instructor is to present lectures and textbook information, and the teacher's job is to present information, such as in textbooks and lectures (Reigeluth & Carr-Chellman, 1996).

The learner is exposed to a lot of information, such as textbooks, lectures, and computer-based multimedia programs because information is the commodity, a direct transmission to learner from instructor knowledge acquisition. The role of the instructional designer is to create an environment where this is fostered (Reigeluth & Carr-Chellman, 1996).

When a learner actively constructs a knowledge representation in working memory; learning has occurred according to the third view known as knowledge construction. Knowledge construction was emerging around the 1980's and 1990's with the learner being the sense-maker, while the instructor becomes a cognitive guide, was based largely on the study of human learning in increasingly realistic settings. The instructor is a cognitive guide who serves to model authentic academic tasks according to the idea of knowledge construction (Reigeluth & Carr-Chellman, 1996).

Creating environments wherein, the learner interacts meaningfully with academic material, is the role of the instructional designer. The learner's process of selecting, organizing, and integrating information is fostered. One kind of learning task may work with a particular group of learners and may not work with other group (Reigeluth & Carr-Chellman, 1996). The learning circumstances sometimes have an effect on .

Instructional theory and learning theory are related according to Reigeluth (1996). The subject areas, although different are thematically related are the different domains of learning are interrelated (Reigeluth & Carr-Chellman, 1996). Instruction is defined (Reigeluth, 1996) as anything to facilitate learning that is done purposefully.

A theory (Smith and Ragan, 2005) consists of organized statement sets permitting the explanation, prediction and control of an event. In the review of the literature, cite Bruner (1966) as the first researcher to refer to a learning statement set as instruction theory. Its prescriptive character differentiates instructional theory. Prescriptive theories are very different from descriptive learning theories. The latter, descriptive theory concerns itself with how learning occurs, without regard to what could encourage the learner. The difference is that with instructional theories, features of the learning environment explained in detail are an intentional way to develop learning (Smith and Ragan, 2005). Instruction theory tries to tie particular instructional scenarios to the learning process and learner outcomes (Gagne and Dick, 1983). The scripts sought by instructional theories are the identification of beneficial instruction conditions that enhance learning transfer, and increase retention. According to Gagné (1965, 1988) a theory class, at a minimum standard, should explain rationally the relationship among teaching procedures and improved human behavior.

The Theory on Conditions of Learning by Gagné (1965, 1988) tries to prescribe supportive learning condition (Smith and Ragan, 2005). Differentiating learning from instructional theory, an explanation of Bloom's (1968) Model of Mastery Learning ensues. The majority of students, as high as 90 and over, are able to attain mastery over what is being taught to them (Smith and Ragan, 2005). The defining characteristic task of this prescriptive instruction theory is to identify the specific means toward the mastery of the subject (Bloom, 1968). Different from a Skinnerian (1938, 1974) descriptive learning theory, Bloom (1968)

prescribes variables inside the learner and the corresponding instruction that are altered to encourage the mastery of learning through a prescriptive instructional theory (Smith and Ragan, 2005).

Instructional theorists sometimes use different terms for the same constructs, thereby making consensus of terms a challenge. A theory of instruction represents a complete underlying set of values representative of the philosophy. Alignment of values is helpful. Explicit values about instruction should be presented for every instructional theory. Designer values are secondary to the primary values of the instruction, teachers, learners, employers and communities, alignment of stakeholder values are important. Major instructional value kinds are identified by Reigeluth and Carr-Chellman (1996) are subsequently presented and follow. Values about learning goals must be in alignment by the stakeholders. Philosophically valued, statements about learning outcomes differ to conducting a needs analysis to empirically identify goals as stated in Reigeluth & Carr-Chellman (1996). Values about priorities serve to judge the instruction's success, address the instruction's effectiveness, efficiency, and appeal. Values about priorities also serve as criteria to judge how well the instructional methods and guidelines? Statements about which instructional methods are valued from a philosophical point of view are different to selecting methods empirically-based on research results (Reigeluth & Carr-Chellman, 1996).

Power is such an important issue and values about power to make decisions about goals, priorities, and methods that it may be seen as a category under the other three instructional value kinds, but power is deserving of a its own. A learner centered instruction paradigm is an integral part of learner empowerment according to Reigeluth (1999) and is mainly appropriate in differing scenarios, making what is known as empowerment, a method variable that spans goals, priorities, and methods. Reigeluth's framework remains a valid guide, amidst the challenge of descriptive and prescriptive distinctions (Reigeluth & Carr-Chellman, 1996).

The naive and objective view that overlooks the reality of descriptive research as well overlooks the reality involved in prescriptive research. A theoretical framework of these different models and associated research are found in Reigeluth (1983). Reigeluth (1983) argues that a basic difference between psychological research on learning and instructional design is that the former is primarily descriptive whereby learners under those conditions achieved particular outcomes; and the primarily prescriptive achievement of the latter, with an outcome of the primarily prescriptive theory is achieved by implementing that instructional strategy. The application of the instructional design can be for the entire course, program or lesson level (Reigeluth & Carr-Chellman, 1996).

A theory offering explicit guidance on how to better help people learn and develop is an instructional design theory according to Reigeluth (1996). Providing instruction should contain clear information about descriptions and examples of the goals, knowledge needed, and the expected performances are examples, according to (Reigeluth, 1996) of needed knowledge. Thoughtful practice is an opportunity for learners to engage actively and reflectively on what is they need to learn, whether it be adding numbers, word problem solving, or essay writing. Helping them to proceed more effectively (Reigeluth, 1996) information feedback is given by clear, thorough counsel to learners about their performance. Perkins (1992) cites strong intrinsic or extrinsic motivation through rewarded activities that occur because they are very interesting and engaging in themselves or because they feed into other achievements that concern the learner.

Major characteristics that are common to all theories of instructional design are discussed as follows. Not like most familiar kinds of theories, instructional design is oriented by design.

Its attention is on means to attain learning and development goals instead of being description oriented and paying attention on any given events results. A theory is more directly useful for educators if it is design oriented, because it serves as a guide to achieve their goals. Theory of instructional design identifies ways to support, methods of instruction, to facilitate learning (Reigeluth & Carr-Chellman, 1996) as well as in what situation it should or should not be used. Providing more guidance to educators, all instructional design theories have methods of instruction that may be broken down into more detailed component methods. Leinhardt's (1989) research is the basis for Perkins' (1992) description of the components for clear information. Beginning with the students goals being identified, followed by goal monitoring, then proceed to giving abundant examples of treated concepts, to demonstration and linkage of the new to the old concepts according to Perkins (1992). A fuzzy image early in the process of design may be aided by an instructional design theory to help develop a stakeholder vision. When the time comes to reach consensus, so that there will be no major disappointments, misunderstandings, or resistance when it comes time for implementation, ends and means, shared values there was an opportunity for stakeholders to have a shared vision (Reigeluth & Carr-Chellman, 1996).

Lacking in instruction is the creative visioning of an ideal (Reigeluth & Carr-Chellman, 1996). Advocated by Diamond (1980), this visioning activity of an ideal kind enjoys practical benefits, often exciting the team responsible for the design. An instructional design theory should allow for a natural progression after Burkman's (1987) user-oriented ID notion and going beyond relevant potential user perceptions by having the users play a major role in designing their own instruction (Reigeluth & Carr-Chellman, 1996).

Practitioners must understand the six major kinds of instructional design theory, and be able to integrate all of them (Reigeluth & Carr-Chellman, 1996). According to Reigeluth (2009) instructional design theory is a collection of design theories that affect aspects of instruction. These aspects include instructional-event design theory (DT), or instructional-program design theory (DT), or instructional-product design theory (DT), which according to Reigeluth (2009) basically show what the instruction should be like. The next aspect is what Reigeluth (2009) called instructional-analysis design theory (DT), which highlights the information gathering process for making decisions about instruction. Another aspect is followed that addresses what the instruction plan creation process should be like, Reigeluth (2009) refers to this aspect as instructional planning design theory (DT). The next aspect described by Reigeluth (2009) called instructional-building design theory (DT), deals with what the process of instructional resources creation should be like. Reigeluth (2009) defines the following aspect, which he calls instructional-implementation design theory (DT) entails what is the implementation preparation process like. Lastly, Reigeluth (2009) introduces what he calls instructional-evaluation design theory (DT), which deals with summation and formative instruction evaluation.

The single instructional-event theory is noted by Reigeluth (2009) as the single one that provides guidance about the instruction's nature itself. The rest of the other five design theories serve as guides to what is commonly known as the instructional systems design or development process (ISD) (Reigeluth & Carr-Chellman, 1996).

Interrelationships (Reigeluth & Carr-Chellman, 1996) exist between the six kinds of instructional-design theory. The most obvious interrelation among the six instructional-design theories is that they have input-output relations with one another. Reigeluth (2009) however reflects that in other kinds of theories, there is a bigger integrative role between analysis and evaluation.

Analysis, Reigeluth (2009) recommends, should be integrated with each of the five other instructional-design theory kinds to provide application information. Inclusion of scope and sequence decisions, for an instructional event being planned, also include decisions about instructional approach, instructional tactics, media selection, media utilization for the instructional event plan (Reigeluth & Carr-Chellman, 1996). Each of these kinds of decisions requires a different kind of analysis at a different point in time during the planning process. Reigeluth (2009) posits an instructional-analysis theory may become integrated with instructional-planning theory. Reigeluth (2009) considers that instructional-analysis theory must be integrated with instructional-building theory during the process of instructional-building, because different kinds of information are need for the different kinds of decisions that need to be made. Identically, the exact application of the above according to Reigeluth (2009) can be made in reference to the instructional-implementation theory.

Each major instructional-planning process decision has a parallel evaluation conducted, ensuring the integration of the instructional-planning theory with the instructional evaluation theory states Reigeluth (2009). It must also be able to integrate with every one of the other four instructional theory kinds Reigeluth (2009) as well states.

Theories are used by instructional designers to validate their instructional designs (Smith & Ragan, 2005). The literature differentiates design theory as being different from descriptive theory. Different from descriptive theory, design theory is goal oriented and normative according to Reigeluth & Carr-Chellman (2009). Social sciences' probabilistic nature of having the cause not always result in the effect, Reigeluth and Carr-Chellman (2009) discuss, tend to create more descriptive theories, because of the innate nature of their cause and effect relationships. The term theory in instruction goes back historically to at least to Bruner (1966) and Gagne (1985) having been utilized to characteristically describe the instrumental base of knowledge in many fields. According to Reigeluth and Carr-Chellman (2009) now the literature discussion returns to the differentiation between theories, and focuses the following back to what is not considered instructional-design theory.

Learning theory is different because it is a descriptive theory, for it describes the learning process states Reigeluth and Carr-Chellman (2009) rather than design theory that is aimed at facilitating generative outcomes. Design theory creates something, while descriptive theory describes what already exists. To illustrate this, Reigeluth and Carr-Chellman (2009) discuss schema and information-processing theory. What is believed to occur inside the learner's head, if identified as methods, help that process and once identified would become theories of instructional-event design. The easy ability of an instructional-event theory to lead to learning theory development as an explanation of the theory of the instructional-event state Reigeluth and Carr-Chellman (2009) can also lead to a learning theory creating the development of an instructional-event theory in the learning theory application.

A certain method of instruction in an instructional-event theory works so well because learning theory has provided and understanding of it, and justifies its application. Instructional Designers use theories to validate their choices in design (Smith and Ragan, 2005) and their rationalizations for utilizing their preferred theories. Instructional theories are valuable in many contexts according to the literature (Reigeluth and Carr-Chellman, 2009) with their main function being to improve learning in schools from levels P-12.

The current industrial age educational paradigm according to Reigeluth et al, (2009) challenges the reality of students' different learning rates. The education industrial factory mandates all students learn at the same time, the same thing state Reigeluth and Carr-Chellman (2009). Occurring in the aforementioned paradigm, are slower learners mandated to master content at a velocity that creates learning deficits. These learning deficits according

to Reigeluth and Carr-Chellman (2009) accumulate making learning in the future more difficult. In this industrial age paradigm of education, the faster learners wait, by force and become demotivated according Reigeluth and Carr-Chellman (2009) thereby losing their opportunity to acquire more learning. An alternative (Reigeluth et al, 2009) is to specify a level as the standard, and allow variable times needed for the students to attain the level of the standard, and allow all students to proceed forward after their standard is achieved (Reigeluth, 1994).

The literature has attempted to summarize and synthesize published present day findings about learning-centered instruction paradigm states Riegeluth and Carr-Chellman (2009). In order to identify research-based, learner-centered, psychological principles (American Psychological Association Presidential Task Force on Psychology in Education, 1993) the American Psychological Association undertook an extensive project and reported its findings in a report state Reigeluth and Carr-Chellman, (2009).

Describing specific features and characteristics of learner-centered teachers and schools McCombs and colleagues (Lambert & McCombs, 1998; McCombs & Whisler, 1997) identify 12 such principles and presented the supported research as evidenced by Reigeluth and Carr-Chellman (2009). Riegeluth and Carr-Chellman (2009) relate that by assisting students with the responsibility for their own directed learning puts them in a better position of being a lifelong learner. In describing the focus shift to learning from teaching, ways are included to create custom learning, depending on differences in the students and motivate them to put more effort into learning, according to Reigeluth and Carr-Chellman (2009). The main role of the learner-centered paradigm is technology (American Psychological Association Presidential Task Force on Psychology in Education, 1993; Lambert & McCombs, 1998; McCombs & Whisler, 1997) to deliver methods like the significant advancement proven of students' higher abilities to achieve as cited by Reigeluth and Carr-Chellman (2009).

Work was undertaken by the National Research Council to synthesize present knowledge about the learning process of people (Bransford et al, 2000). This two year study resulted in a comprehensive synthesis of research findings that suggest there are new approaches to instruction that allow for the possibility for many individuals to approach important subject matter with deep understanding (Bransford et al, 2000) due to comprehensive synthesis of new instruction approaches findings by the National Research Council work (Reigeluth & Carr-Chellman, 1996).

Many instructional designers who are involved in training design have developed additional competencies in a more inclusive specialty that Smith and Ragan (2005) call performance technology. These individuals are prepared to develop interventions that address contributors to poor employee performance. Performance Technology in the future will encompass a major role in instructional design theory. Instructional Design Practitioners, performance technologists, rely on instructional as just one more job aid towards the ultimate goal of skilling the institution's individual performance technology enhanced from the old to the new paradigm. A stark contrast from the more linear prescriptive instruction theories, performance technologists utilize other job aids. Other job aids performance technologists rely on are incentives for performance as well as psychological or counseling services. Drawing from this difference concerning performance incentives, are the descriptive learning theories that attempt to describe learning and do nothing to encourage it (Smith and Ragan, 2005). Insightful for future changes to the discussion of instructional design thinking, Hannum and Hansen (1989) as cited by Smith and Ragan (2005) identify five ID model changes as paths wider than traditional behavior psychology, general systems theory, communication and audiovisual theoretical roots. According to Smith and Ragan (2005), their original roots were



established in behavior psychology, general systems theory, and audiovisual and communications theory. The first path, according to Hannum and Hancen (1989) is front-end analysis (Smith and Ragan, 2005). Although instruction theory's first linear and prescriptive path is very similar to front-end analysis, the flexibility in approach of instructional design to source this path first, or not cannot be present in the strictly linear and prescriptive approaches of the theory of instruction. Hannum and Hancen's (1989) second path focus is on the field of psychology, as well as, on the cognitive sciences that may affect the creation of both delivery and design (Smith and Ragan, 2005). Hannum and Hancen's (1989) third path posits market research techniques to be the forces that influence implementation (Smith and Ragan, 2005). Instructional design theory (Hannum and Hancen, 1989) evaluation may be affected because of sociology and anthropology (Smith and Ragan, 2005). The stated affect of cross disciplines having an effect on the implementation of an instructional design differs greatly from the position of a more descriptive learning theory. The fifth path presented by Hannum and Hancen (1989) highlights training programs is created from the design of the job. Prescriptive instruction theory would not conform to this changeable premise as the driving force of an instructional design. The challenge of instructional design will constantly in the postulation about the real nature of knowledge, how it is attained, as well as learning value systems (Smith and Ragan, 2005).

This growing body of knowledge, the authors (Reigeluth et al, 2009) name the science of learning, highlight the important aspect of customizing the instruction to match the pre-existing knowledge of every one of the individual learners. This according to Reigeluth and Carr-Chellman (2009) assists learners with their individual learning control over their deep understanding development of sub-matter. Offered are both design theory and descriptive theory in relation to the learner centered learning environment design. Technology is a central player in the design theory guiding the creation of such learning environments states Reigeluth and Carr-Chellman (2009).

Evaluating how instructional designers in my college workplace can utilize these three types of theories when designing instructional materials are presented next. The workplace designer can create instructional materials using a learning theory by creating an environmental where the learner can create their own materials by constructing knowledge from previous long term memory and the presentation of the information. The learner becomes the sense maker of the environment, and the instructor the cognitive guide.

Workplace Designer can create instructional materials using an instructional theory by creating online modules that are sequential and cumulative. The student cannot go to the next module until they have met the course standard. Students performing at their own pace, advance once they are able to perform at the standard.

Workplace designers can create instructional materials using an instructional design theory. The use of a computer system helps the design team, including all the stakeholders to create flexible, computer-based intelligent tutoring systems. Student will be creating and/or modifying their own instruction while they are learning. This instruction concept is adaptive, except that the learners are not having conversations to ask the computer system how to utilize instructional methods, and the computer responds by giving advice or decisions. As Winn (1989) stated more concentration on the mechanisms by means of which decisions are made (Winn, 1987) will provide the role of instructional designer less instructional decision making. It follows that the only viable way to integrate student's decisions about instructional strategies that meshes with cognitive theory is to do so during instruction using a system that is in constant dialogue with the student. A system capable of continuously updating

information about the student's progress, attitude and expectations is warranted (Reigeluth and Carr-Chellman, 1996).

A matter of concern for centuries has always been the practice of education, and formally organized instructional theories were not available until the middle of the 20<sup>th</sup> century. The interrelationships among all the kinds of theories related to instruction are powerful and systemic (Reigeluth & Carr-Chellman, 1996). In many cases, it is helpful for a theory to be a hybrid of several of these kinds of theories; such hybrids have been common from the early pioneers in instructional theory, Dewey, Skinner, Gagne, and Ausubel to recent theorists, (Bransford, Brown, & Cocking, 2000); (McCombs & Whisler, 1997).

Using the literature, differentiation among learning theory, instructional theories, and instructional design theory, were discussed. Examples of how instructional designers in the workplace can use learning, instruction, and instructional design theories to create instructional materials followed the literature discussion.

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