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ABSTRACT

This paper discusses the development of a learning approach based on the unique needs of adult learners who are required to learn and use new information technologies. It establishes how the "Inquisitivism" learning approach has evolved from a synthesis of key cognitive learning theories into one cohesive approach and how the implementation of Inquisitivism in the development of learning environments, curriculum, and courses can meet the needs of today's adult learner. The first section explains why there is a need for a new approach to adult learning. Contemporary cognitive learning theories upon which this new approach is based are identified in the next section, including constructivism, discovery learning, activity theory (active learning), functional context, and minimalism. The third section describes the learning approach of Inquisitivism. The following key concepts of Inquisitivism are summarized: (1) fear removal; (2) stimulation of inquisitiveness; (3) using the system to learn the system; (4) getting started fast; (5) discovery learning; (6) modules can be completed in any order; (7) supporting error recognition and recovery; (8) forum for discussions and exploiting prior knowledge; (9) real world assignments; and (10) developing optimal training designs. (Contains 23 references.) (AEF)

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# Inquisitivism or "The HHHMMM??? What Does This Button Do?" Approach to Learning

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**Abstract:** Inquisitivism or "The HHHMMM??? What Does This Button Do?" approach to learning is a synthesis of cognitive theories that provide a novel approach to technology related adult learning. It gives learners the freedom and opportunity to control, construct and take responsibility for their learning experience rather than force learners into following a strict and often confusing set of procedures or instructions. Learners using this approach quickly gain confidence and overcome the debilitating fear that often accompanies technology-related learning.

What I mean to discuss in this paper is the need for a new approach to adult learning. That is to say, I wish to discuss the development of a learning approach based on the unique needs of adult learners who are required to learn and use new information technologies. More specifically, I will establish how a learning approach I have labeled Inquisitivism has evolved from a synthesis of key cognitive learning theories into one cohesive approach and how its implementation in the development of learning environments, curriculum and courses, can meet the needs of today's adult learner.

To successfully fulfill the task that I have I laid out I will: 1) Explain why there is a need for a new approach to adult learning, 2) Identify contemporary cognitive learning theories that this new approach will be based upon. 3) Finally, establish the learning approach of Inquisitivism. A practical application of the Inquisitivism in Web-Based Instruction (WBI) will be the basis of discussion of a subsequent paper.

## The Need

A central theme of many papers presented at recent educational conferences and published in educational journals is that many of our instructional systems are failing or are in need of repair. In addition, many articles call for a complete change in the way we design and deliver educational material. *Objectivism vs. Constructivism: Do we need a new paradigm?* (Jonassen, 1991), *Web-based distance learning and teaching: Revolutionary invention or reaction to necessity* (Rominiszowki, 1997), and *The Learning Revolution* (Dryden & Vos, 1994) are only three of the many articles or books that call for a significant change in learning models. Some argue that there is a common basis for many of the current problems in education discussed in these and similar books. There are claims that the deficiencies in the outcomes of learning are strongly influenced by underlying biases and assumptions in the design of instruction (Rand J. et al., 1991). The systems approach to instructional design which has no substantive theory content, no user domain content and is arguably the primary factor contributing to the poor outcomes of instruction, is still the predominant instructional design assumption used throughout most of education (Carroll, 1990; Dryden & Vos, 1994; Jonassen, 1997; vad der Meij & Carroll 1995).

Another theme revealed in recent work calling for change deals with the limitations of instructionism. This dominant method used in most instructional settings is based on the notion that students are passive receptacles for information that the instructor (teacher or instructional media) relays (Jonassen, 1996). Carroll (1990) titled his polemic against the systematic approach to learning and instructionism, the *Nurnberg Funnel*. The legendary Funnel of Nurnberg was said to make people wise very quickly by simply pouring knowledge into them. In the *Nurnberg Funnel*, Carroll presents the results of ten years of empirical research that shows that newer methods of instruction based on Constructivism and other cognitive theories perform much better than the commonly used systems approach to instruction. This literature points out that there is a need for a substantial change in the way instruction is developed and delivered.

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## **Cognitive Learning Theories**

It can be argued that cognitive theory is a reaction against behaviorism. By going beyond the information given and focusing on the mental processes that are involved in knowing and learning, cognitive theories offer a much larger view of human capability and potential (Bruner, 1973). In general, cognitive theories place an emphasis on higher order thinking and look at the processes that are involved in all aspects of knowing and learning. Constructivism is perhaps the most well known cognitive theory and represents much of the current emphasis of the cognitive movement (Di Vesta, 1987). In addition to constructivism, the following theories discussed will form the basis of the Inquisitive approach.

### **Constructivism**

Constructivists posit that learning is an active process in which individuals construct knowledge based on their interactions with the world. Learners rely on their cognitive structures, their needs, beliefs and prior knowledge to transform new information into new knowledge. It could be argued that Constructivism is a theory of knowing as opposed to a theory of learning.

Bruner (1966) states that a theory of instruction should address four major aspects: (1) predisposition towards learning, (2) the ways in which a body of knowledge can be structured so that it can be most readily grasped by the learner, (3) the most effective sequences in which to present material, and (4) the nature and pacing of rewards and punishments. Instruction should be concerned with the experiences and contexts that make the student willing and able to learn, structured so that it can be easily grasped and designed to go beyond the information given (Kearsley, 1997).

Social constructivism focuses on socially co-constructed knowledge that is based upon a groups interaction with the world. Vygotsky's social learning theory is often used as an example of social constructivism.

The theory of andragogy is specifically for adult learning. Knowles (1975, 1984) posits that adults are self-directed and expect to take responsibility for decisions. Therefore, adults can be expected to take responsibility for their own learning. Instruction for adults needs to focus more on the process and less on the content being taught. The designer of adult learning must keep in mind that: adults need a valid reason to learn something, they learn experientially, they often approach learning as problem-solving, and they learn best when the subject they learn can be immediately applied. In addition, instructors should act as facilitators and allow learners to discover things for themselves, but still provide guidance and help when mistakes are made.

### **Discovery Learning**

Discovery learning refers to obtaining knowledge for oneself (Bruner, 1961). This does not mean that students are allowed to do as they wish. Rather, students are directed by the instructor to either solve a problem or gather information and develop a hypothesis. Meaningful learning is promoted by discovery because the learner uses inductive reasoning to formulate general rules, concepts and principles. Discovery learning is especially useful and beneficial in the training and instruction of teachers. The discovery learning process requires a learner to focus more on the process than the content. This emphasis on process allows prospective teachers to better understand the dynamics of learning helping them to become more effective instructors.

### **Activity Theory (Active Learning)**

Activity Theory is based on the notion that human learning is mediated through practical activity and activity is mediated by cultural signs: language, tools, media, and conventions. As the products of learning change, activity changes along with the consciousness of the participants in a continuous, evolving cycle of learning. Activity is fundamental to learning. Proponents of activity theory would argue that it precedes knowledge and there is no understanding apart from it.

### **Functional Context**

Making learning relevant to the experience of the learner is the key to the functional context approach. New information is related to existing knowledge (information in long term memory) and transformed into new

knowledge. This transformation is facilitated by cognitive processing skills including language, problem-solving, and learning strategies. Instruction that utilizes this approach strives to use the same materials in the training that will be used in the "real world".

The functional context approach was developed specifically for adult technical and literacy training (reading/writing/mathematics) in military programs, but it has implications for learning of basic skills in general (Sticht, 1976) and reading in particular (Sticht, 1975). Functional context theory shares a similar emphasis with Situated Learning theory which also stresses the importance of context during learning (Kearsley, 1997).

## Minimalism

Minimalism should be referred to as a descriptive approach to designing effective instruction. "One of the key ideas in the minimalist approach is to present the smallest possible obstacles to learners' efforts, to accommodate, even exploit, the learning strategies that cause problems for learners using systematic instructional materials." (Carroll, 1990) The minimalist goal is to get out of the way of the learner and let them get more out of their training (learning) experience by providing a less overt training structure.

Unlike many of the other learning theories and approaches minimalism has been developed from the empirical process. Carroll's research at the IBM Watson Research Center in the 1980's revealed that traditional systematic instructional materials were very ineffective and often hindered the learning of new technologies by trapping the learner in error loops within the instructional material. Learners often experienced more problems working through the support and learning material than they did by simply attempting to learn the new system through discovery exploration (Carroll, 1990).

In the first of many experiments Carroll and his associates reduced 94 pages of the systematic training manual of the IBM DisplayWrite to 25 cards. The cards did not include any step by step procedures, but provided general information for completing a task. The cards were intentionally created incomplete so that learners would focus on the task at hand and fill in the missing details which ultimately facilitated the construction of their own understanding. The learners were encouraged to work directly on the DisplayWrite system and use the cards for direction or guidance.

Out of a group of twelve participants, six used the guided exploration (GE) cards and the other six were given the traditional systems-style manual (SM). Both groups were expected to complete their respective training by working through either the drill or practice of the systems-style manual or the twenty five GE cards. Both groups were evaluated by being required to complete a real task of transcribing a one-page letter into the word processor and printing it out. The participants were asked to think out loud and their thoughts were recorded by research associates. In addition, the session were video taped so that all the data could be collated and taxonomized to develop a qualitative picture of how GE learning was contrasted by SM learning.

The guided exploration cards allowed for much faster initial learning and more successful performance in the achievement task. The learning time for the GE participants was less than half of what it was for their SM counterparts; 3 hours and 55 minutes vs. 8 hours and 5 minutes (Carroll, 1990). Similarly, GE participants spent half the time on the achievement task as did their SM counterparts and the GE group achieved much greater success than the SM group. The GE group spent more time working on the actual system trying out more operations than the SM group who spent most of their time reading about the system. Not only did the GE group work effectively with the operations they need to complete their task, they experimented with many more aspects of the system.

The GE group had much more success because they worked with the system itself and took responsibility for their own learning. They demonstrated much more initiative and used errors as learning experiences. In contrast, the SM group often became trapped in error loops created by the systems-style manual. The problems the SM group experienced with the instructional material hindered, or in some cases, prevented the learner from working with the system they were attempting to learn.

Additional experiments were conducted over a 10-year period that demonstrated the minimalist approach to be much more effective than the traditional system approach in virtually all aspects of technical training involving adults. It is from this body of research that Carroll has developed the rubric of minimalist instruction. The nine concepts listed below make up the primary principles of Carroll (1990) minimalist approach:

1. **Training on real tasks.** This is one of the key differences from the systems approach. All training must take place on the actual system that is being learned.
2. **Getting started fast.** Adult learners often have other interest than learning a new system. The learning they undertake is normally done to complement their existing work. The "welcome to the system" prefaces and other non-essential layers in an introduction are simply a waste of the learners' time.
3. **Reasoning and Improvising.** There is no single correct training method or procedure. Allowing for self



directed reasoning and improvising throughout the learning experience requires that there is a substantial reduction in the verbiage and volume of learning materials.

4. **Reading in any order.** Materials designed to be read in any order cannot be read in the wrong order. This will eliminate the common problems that arise from material read out of sequence.
5. **Coordinating System and Training.** The most effective way to coordinate the system and training is to conduct the training on the actual system being learned.
6. **Supporting Error Recognition and Recovery.** Much of what learner does is "error". Since there is such a pervasiveness of errors in most learning, it is unrealistic to imagine that errors can be ignored. Error recognition and recovery strategies need to be implemented to enable learners to learn from their mistakes instead of being trapped by them.
7. **Exploiting Prior Knowledge.** Most adult learners of technology are experts in other areas or domains. Understanding the learners' prior knowledge and motivation and finding ways to exploit it is one of the keys to effective adult training.
8. **Using the Situation.** The learning situation itself can provide many details. In many traditional cultures, "teaching" never occurs. Children are not shown how to perform skills or rituals or understand myths, but are shown in context how to participate (Brunner, 1996a: 151)
9. **Developing Optimal Training Designs.** Instructional models are not deductive or prescriptive theories; they are descriptive processes. There is no "deductive theory of minimalist instruction" that given a set of minimalist principles, will allow us to crank out a minimalist training manual (Carroll, 1990: 91). In contrast the design process should involve the actual learner through empirical analysis so that adjustment can be made to suit the learners needs. "Develop the best pedagogy that you can. See how well you can do. Then analyze the nature of what you did that worked." (Brunner, 1960)

A secondary key to the minimalist approach is the need to discover and support the learners sense-making efforts. This discovery is a dynamic approach that will not only involve the instructional designer, but also the learner. There is no minimalist checklist that a designer can use to create effective instruction. Carroll (1990) states that taking checklists seriously is perhaps the most typical and debilitating design fallacy.

The minimalist approach to learning offers one of the best theoretical foundations from which adult instruction can be designed. Like many other approaches, minimalism is a synthesis of many other theories that propagate the educational psychology landscaped. Despite offering many sound concepts for instructional design, the minimalist approach lacks a number of key components that are required for today's adult learner.

## Inquisitivism

While Constructivism and many other cognitive theories and approaches examined in this investigation do stress that learner must be motivated, or at least have a predisposition towards learning, most do nothing more than state a variation of this fact. Experience in the past five years of instructing a variety of technology related courses face2face or online, has revealed that you can have an adult learner who is motivated to learn or, at minimum, predisposed to learning, and yet these same people have difficulty with the simplest of tasks and procedures. They want to learn; they paid their fee for their course, have shown up for the class or accessed the information online, yet they seem to be paralyzed. Why?

Fear! Fear of wrecking the computer; fear of breaking the system; fear of loosing their data and a whole host of related or even unrelated fears. Helping adult learners overcome their fear of technology is one of the first steps in creating a successful learning environment. Convincing an adult learner that there is nothing to be afraid of can be achieved through either explaining or demonstrating that the system cannot be broken or wrecked. In addition, it is just as important to demonstrate that mistakes will happen, the system will eventually crash, but it can be restarted. Finally, implemented effective backup procedures at the system level can help reduce or eliminate the fear of loosing data. Letting the learner know that working with technology can, and will, at times be frustrating will help reduce the amount of paralysis that can occur when things go wrong.

Dispelling the learners' fear is only one part of the challenge in adult education. The second and often more difficult related challenge is stimulating the natural curiosity or inquisitiveness that decades of traditional formal education have so successfully squelched. There have been numerous studies conducted over the many years that clearly demonstrate the first six to ten years of a child's life (the actual period depends on the study) are the most critical period of development.

A young child is a natural scientist. This can be easily demonstrated by giving an infant a piece of paper or a toddler a stick. The toddler's natural inquisitiveness will motivate him to see what kind of an instrument the stick will make by shaking it or hitting it against another object. Next the child could check out engineering, mechanical

or tensile strength of the stick by seeing if they can break it. The economic value of the stick is assessed by offering the stick to another person. By placing the stick in their mouth the child is determining the chemical composition of the item. New parents find out very quickly that anything within reach become objects of investigation. This natural inquisitiveness is what adults need to adopt in order to not only succeed at learning new technologies, but also enjoy the experience.

For the past five years I have been using this example of the child as an investigative scientist to motivate adults to become inquisitive. In addition to the child scientist example, I also ask my new class of adult learners to think of their children; nieces, nephews, or family friends, when it comes to learning computer games. Within minutes of handing a computer program or game to a child they have it installed, clicked on every menu item and button on screen, and are well on their way to racking up a score that most adults could never dream to achieve. Children excel at the computer and other technologies because they follow the "HHHMMM???" approach to learning. Adults can have almost the same level of success with technological learning if they allow themselves to be inquisitive.

Inquisitivism is a proposed learning theory that is based on a variation of the Constructivist learning theory of Minimalism. Since "inquisitive" is defined by Websters as: 1) given to inquiry or research; eager for knowledge; curious. 2. unduly curious; prying; the label of "Inquisitivism" has been used to describe this approach. Much like Minimalism, Inquisitivism is a synthesis of other learning theories and approaches so many of the key concepts will be adapted from other theories. The key concepts of Inquisitivism include:

1. **Fear removal.** Dealing with the paralyzing fear that many adult learners experience must precede the stimulation of one natural inquisitiveness. Demonstrating that the computer or other piece of technology is not easily broken, providing explanations, examples and solutions for common errors and problems and the application of data backup will help quell the adult learners fear.
2. **Stimulation of inquisitiveness.** With the fear abated, encouraging adult learners to become like children and enjoy the pleasure of inquisitiveness can be easily facilitated. Encourage the use of the "HHHMMM???" approach.
3. **Using the system to learn the system.** This is one of the key differences from the systems approach. All training must take place on the actual system that is being learned.
4. **Getting started fast.** Adult learners often have other interests than learning a new system. The learning they undertake is normally done to complement their existing work. The "welcome to the system" prefaces and other non-essential layers in an introduction are often a waste of the learners' time.
5. **Discovery Learning.** There is no single correct method or procedure. Allowing for self directed reasoning and improvising through the learning experience will require the adult learner take full responsibility for his/her learning.
6. **Modules can be completed in any order.** Materials must be designed to be read or completed in any order. This will eliminate the common problems that arise from material read or completed out of sequence.
7. **Supporting Error Recognition and Recovery.** Much of what learner does is "error". Since there is such a pervasiveness of errors in most learning it is unrealistic to imagine that errors can be ignored. Error recognition and recovery strategies need to be implemented to enable learners to learn from their mistakes instead of being trapped by them. Use of Frequently asked Question lists (FAQ's), Help Forums and other help strategies must be implemented to deal the errors and problems that arise.
8. **Forum for Discussions and Exploiting Prior Knowledge.** Much adult education dealing with technology is conducted through alternative delivery. Distance education, WBI and other alternative delivery methods can isolate students. Providing a conferencing system for the replacement of F2F interaction is a crucial component of any alternative delivery program. Most adult learners of technology are experts in other areas or domains. Understanding the learner's prior knowledge and motivation and finding ways to exploit it is one of the keys to effective adult training. In addition, adult learners can share their expertise or assist each other and should be encouraged to use conferencing system to facilitate social interaction.
9. **Real World Assignments.** "Make-work" (purposeless) projects are simply useless. All assignments must have a real world application. Adult learners are often undertaking training to be able to work in their own area of expertise more effectively. If possible, the assignments should be tied directly to the learner's personal or professional interests while at the same time challenging the learner to expand their current knowledge base..
10. **Developing Optimal Training Designs.** Feedback facilities like online surveys or email should be used to allow learners to immediately provide feedback on any aspect of a program. Problems with instructions, assignments, wording or other problems should be immediately addressed and corrected. Instructional

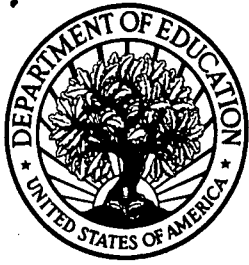
models are not deductive or prescriptive theories, they are descriptive processes. The design process should involve the actual learner through empirical analysis so that adjustment can be made to suit the learners needs. "Develop the best pedagogy that you can. See how well you can do. Then analyze the nature of what you did that worked." (Bruner, 1960)

Like the minimalist approach, Inquisitivism is a huge departure from the familiar step by step procedures of the systems approach. Carroll's (1990) research has demonstrated the reason the systems approach is so ineffective is not that people are not capable of following step by step instructions, they just choose not to. Inquisitivism gives students the freedom and opportunity to control and construct their learning experience.

Perhaps it is the familiarity of step by step procedures that motivates people to choose this ineffective method of instruction. Even though guided discovery that has been implemented in the inquisitive approach as well as other learning theories and approaches has been shown to be a more effective way to learn, many students still seek the comfort and solace of traditional systems based tutorials and manuals. We truly are creatures of habit. Like the minimalist approach, inquisitivism has been showed to be successful. The successes and failures of this fresh approach to learning will be the basis of a subsequent discussion.

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