Cognitive Mapping Utilized With An Online Training Program: Developing A Conceptual Framework For Learning and Performance Outcomes in An Online Learning Program

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Cognitive Mapping has been used in many different venues and as a tool in several areas, such as, planning health research (Stadler, et al, 2013), and engineering (Dixon & Lammi, 2014) are two examples in which very complex relationships can be reduced to key elements that can be easily manipulated to make certain that all relationships can be seen and measured. The purpose of this article is to demonstrate its use in an online training program "***iLookOut for Child Abuse Prevention Program***" for early care and education providers (aka, early childhood educators, childcare workers, early childhood professionals) by demonstrating how the cognitive map will a blueprint for what a trainee needs to learn, and what the curriculum needs to cover via child abuse prevention learning modules.

Cognitive Mapping was first introduced in 1948 by Edward Tolman, an educational psychologist, (Tolman, 1948). Originally, it was used to explain how rats learned the locations of rewards in a maze and as such generated a practical model for mapping the environment.

The advantage of Tolman's work is a move away from a simple S-R relationship and the demonstrated "latent learning" with rats in maze learning where non-reinforced rats still learned about the maze by exploring the maze. By including a cognitive component, we begin to see the move toward a social cognitive framework by including cognition as an important aspect of learning. By bringing in cognition, we are able to further explore learner characteristics that help improve learning (e.g., self-regulated learning components of goal-directedness, motivation, goal feedback, etc.). An important component of learning is outcome expectations (Schunk & Zimmerman, 2006), which is rooted in Tolman's concept of field expectancies. According to this notion of expectancies, a learner is able to anticipate contiguous relations between stimulus and response. For example, lightning is followed by thunder. Field expectancies helped people form cognitive maps, which are internal representations of these expectancies along with the selection of actions needed to help learners attain their goals.

The notion of latent learning is important because learners may not demonstrate adequate learning and performance outcomes during the process of learning. Yet the learning activity is important for acquisition of knowledge that learners may use at a later time. This could be at the summative assessment period or, more relevant for our participants, at the time that they are in classrooms and working with infants and toddlers. According to a Social Cognitive framework, learners will act in a manner that is believed to be successful and will orient toward viable observational or learning models that will provide the important skills or tools to ensure success. Thus, cognitive maps help with this process. This is where the cognitive maps developed for iLookOut can help so that by understanding how we guide our learners through a more efficient development of this map, rather than relying on

individual differences in map formation, we can ensure that learners can develop the necessary and more efficient means to respond to abuse and neglect scenarios in the classroom (i.e., displaying latent learning).

By definition "cognitive maps" are literally just mental or conceptual models, "thinking maps" that like other forms of cartography maps territory. But here it is cognitive "territory" rather than geographic terrain that is being characterized. Sometimes, cognitive maps provide a linear progression of a concept, or the relationships between various factors. But they also can serve a developmental purpose, helping people (be they researchers, policy makers, teachers, or learners) develop a deeper understanding of how different elements are (or should be) related to one another.

There are many applications of cognitive maps, here are some examples that have been used in the past: 1) Perceptual, such as - a. Inquiring, investigating, gathering data or information; b. Noticing, attending to, becoming aware of; c. Differentiating, distinguishing, discriminating. 2) Cognitive, such as - a. Organizing data, sorting, chunking, finding patterns and relationships; b. Interpreting data, understanding it, making sense of it, what it means; c. Analyzing data, reasoning about it; d. Troubleshooting, diagnosing; e. Drawing conclusions; f. Framing, reframing; g. Illuminating, insights, clarity; h. Estimating probability, confidence levels, degrees of certainty. 3) Evaluative, such as - a. Evaluating, assessing, judging anything; b. Evaluating performance, effectiveness, success (relative to a Purpose); c. Predicting likelihood and degree of future success; d. Assigning importance, urgency, priority; e. Providing feedback, including monitoring and measuring progress. 4) Volitional, such as - a. Identifying desires; b. Defining or clarifying purposes; c. Planning. 5) Behavioral, such as - a. Acting, behaving, performing (relative to a Purpose); b. Implementing a plan (performance relative to a Purpose); c. Communicating; d. Learning knowledge; e. Building or improving skills; f. Developing.

Of these various applications of cognitive mapping, this article will focus on the development of a cognitive map for the iLookOut program for the following purposes: coordinating learning knowledge, implementing a plan, predicting likelihood and degree of future success, providing feedback, monitoring and measuring progress, evaluating and assessing achievement, organizing data, and finding patterns. As such, this article will provide the details of how the process was developed and applied to an online training program to help prevent child abuse: ***iLookOut for Child Abuse Prevention Training Program***.

So more specifically, the cognitive map helps to organize the development of the iLookOut curriculum and will focus on the following elements as delineated in the above topical list:

-Discriminate —i.e., to distinguish different concepts learning points

-Finding patterns and relationships —i.e., to demonstrate associations between various components

-Measuring progress —i.e., to map learners' actual progress through different stages of learning (particularly with regard to the pinging, which is sequential)

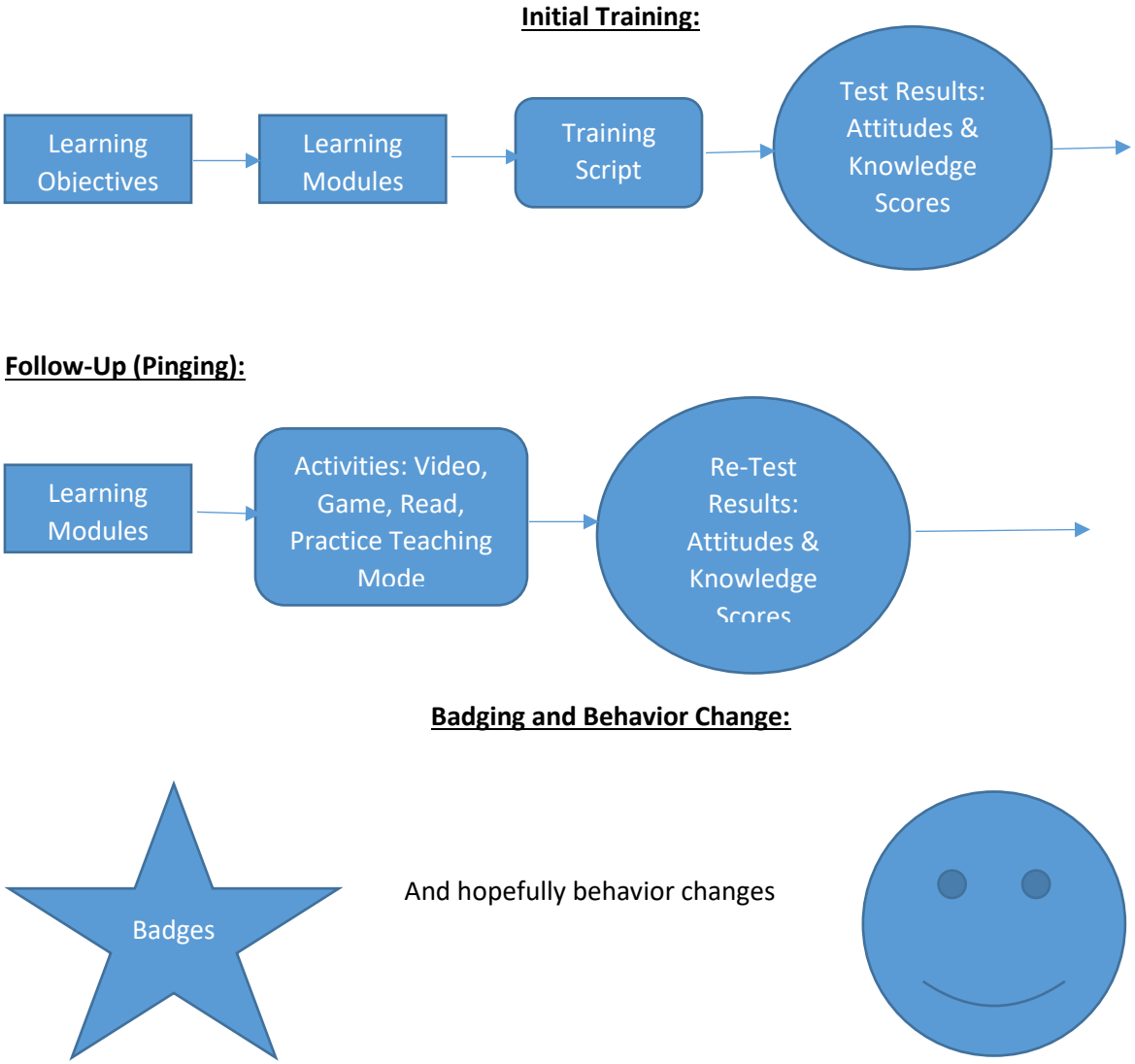
-Clarifying purposes —i.e., to clarify the purposes of various components of the learning program, pinging activities, etc.

-Building or improving skills —i.e., to create a framework for how learners will progress through various activities so as to develop their skills

METHODOLOGY

This section will provide an overview of and detail about the methodology used in creating the cognitive map and the schematic formatting in moving from learning modules to actual activities utilized online. Figure 1 provides an overview cognitive map in summary format to demonstrate how all the key elements to the ***iLookOut Training*** program fits together into a unified whole.

Figure 1 - Cognitive Map in Summary format.



The above cognitive map depicts moving from the initial learning objectives and all the subsequent steps for developing the learning modules, training script, and activities. It also shows how these various components are assessed via attitude and knowledge assessments. The following figures will provide the details of the sequencing presented in the above cognitive map giving the reader a blueprint to follow in developing the actual activities used in the learning program and follow-up reinforcement.

Figures 2 and 3 provide the details of the mapping that occurred from learning modules and objectives to the actual activity plans for pinging.

Figure 2 - Template/Chart of Learning Modules, Objectives

Figure 2 clearly shows the relationship between the various learning modules, objectives and the assessment process used in the training program. This figure helps the curriculum planner to make certain that all the learning objectives of the program are within the script and learning modules and will be accessed via knowledge or attitudinal tests.

Learning Objectives (LO) of iLookOut	Script Intervention & Learning Modules (LM)	Learning Module Type	Knowledge Test (KT) Conceptual Areas	Attitudinal Items
Orientation to iLookOut	(LM-0) "Learning Module Orientation"	Optional Slide		
	(LM-2) "Key Questions"	Slide with VO		
	(LM-3) "State Specific Requirements"	Slide with VO		
	(LM-4) "iLookOut Course Worksheet"	Slide with Insturctions and Resource File Handout #1: iLookOut Course Worksheet		

Based upon the learning that occurs in the above figure, follow-up learning via a Pinging delivery model in which very short and targeted activities are used to reinforce any learning that may be lacking based upon the scores from the knowledge and attitudinal assessments. These are presented in figure 3 below.

Figure 3 - Activity Plans Chart for Pinging

Figure 3 demonstrates how the learning modules can be sequenced into online learning activities that help to support these modules and objectives. This figure lists the topic for each week along with the module taken from Figure 2 along with the activity name and actual location within the learning platform and the primary teaching mode.

TOPIC	WEEK	MISSION/MODULE NAME (CODE)	MISSION/MODULE NAME (FRONT END)	ACTIVITY NAME	mLevel LOCATION	PRIMARY TEACHING MODE
If You Don't Who Will	Learning Program	LP1	"If You Don't, Who Will"	If You Don't Who Will	PathFinder	Video
				Certificate of Completion	External Link	
(1)Types of Child Abuse		Y1M1a	Director Message: Types of Abue	What to Expect: Month 1	PathFinder	Game
	1	Y1M1	Module1	iLookOut Pinging Program	Pathfinder	Game
				Welcome Video	Go Animate Video	
				Types of Abuse	Pathfinder	
	2	Y1M2	Module 2	Video: Types of Abuse	Go Animate Video	Video
				Video Check-in: Types of Abuse	Block Party	
	3	Y1M3	Module 3	Child Abuse Reading	External Link	Reading
				Check In: Types of Child Abuse	Checkpoint	
	4	Y1M4	Module 4	In Practice: Types of Abuse	custom Task	In-Practice
				Check In: In Practice	External Link (RedCap)	
				Congratulations!	Custom Task	

CONCLUSION/IMPLICATIONS

This article briefly describes the utilization of cognitive mapping as an organizational and conceptual model to clearly delineate the relationships between Learning Objectives, Learning Modules, and Pinging Activities in an online delivery system of training on child abuse prevention called ***iLookOut for Child Abuse***. A cognitive map is more broadly based and flexible than utilizing more linear modeling, such as developing an outline.

Sharing this process is to demonstrate to other researchers who may be interested in doing assessments or evaluations of professional development, training or technical assistance interventions a process that can be used empirically to determine how the various components within an online program are related. Based on the process, it will provide potential paths to assessing the best combination of activities in an individualized learning paradigm for each learner.

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