Proposed Learning Analysis:
Developing Strategic Thinking in Welfare-to-Work Recipients

Ed333a:
Analyzing Functions and Needs in Learning Environments
July 23, 2001

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I. Learning Problem

Welfare-to-work programs cannot succeed on job placement and basic skills training alone. Multiple studies have shown that in order for welfare recipients to make the transition to a traditional work environment, they must learn “softer” skills that move them toward self-sufficiency. Nationally, 42 percent of welfare recipients are high school dropouts, and in California, that number swells to 50 percent. Translated into real terms, the statistics mean that half of those on welfare not only have inadequate arithmetic and writing skills, but have also missed out on the strategic thinking and problem-solving skills that are taught in advanced high school and college courses.

Federal research on welfare-to-work programs clearly shows that combining job placement assistance with academic and soft-skills training is more effective over a 5-year period than programs that omit the cognitive skills (Bugarin, 1998). Experts say that while jobs are available for those leaving welfare, and employers are often willing to train them, most return to the welfare rolls within a few years (National Center for Policy Analysis, 2001). For many, the reason is a flawed work ethic that results from a lack of strategic planning for the future. Simply put, their conceptual models of how to go about making decisions are incomplete.

The Welfare Reform Network, based in Washington, D.C., recommends teaching critical thinking skills and decision-making skills in order to better prepare welfare-to-work adults for the workplace. Many new training workshops, including corporate programs at companies such as Marriott and UPS and independent seminars such as the North Carolina-based “Workin’ It Out” soft skills training, have incorporated this feature into job training, focusing on recognizing problems, making smart decisions and brainstorming for alternatives.

With the long list of adversities facing welfare recipients in their quest to return to work, planning and critical organizational skills can make the difference between a successful transition and a failed one. Succinctly, the learning problem for adults on welfare is to internalize problem-solving and strategic thinking skills that can be applied in the workplace and in life.
II. Goal of the Study

The goal of our learning study and subsequent proposed design is to create an environment that begins to build a conceptual problem-solving framework for welfare recipients in a motivating, creative learning environment.

We plan to build on research that links chess play to the development of strong critical thinking skills in children. Chess, a game of strategy that requires players to move pieces across a checkerboard in an effort to "capture" the other player's King piece, has been proven to engage young students in a conceptual framework of reasoned decisions. Our hypothesis is that exposing welfare adults to chess would result in similar progress. For young students, an independent study in Pennsylvania showed that those involved in chess classes improved their standardized test results by 17.3 percent, compared with only 4.56 percent for students participating in other activities (Milat, 2001).

Chess, and its near-infinite configuration of play, forces players to think out their next moves and develop a plan of attack or defense. Players must also evaluate different choices before making decisions. And as an advanced player, they learn to recognize patterns and make decisions according to a mental framework they have developed. Likewise, the welfare recipient must consider his or her options for work, understand how to make informed decisions and reason out problems, and begin to recognize patterns that can make their decisions better informed.

III. Theoretical Background

One learning theory that is very concerned with strategic thinking and how it develops is the cognitive theory. In this theory, the acquisition of knowledge is supported by interactive environments that allow learners to construct problem-solving and reasoning skills and by an approach to learning that includes consideration for the sequences of conceptual development. In addition, the cognitive theory proposes that direct interactions with the physical environment facilitate the construction of conceptual understanding by the learner. Additional factors in the learning environment are the learners' present mental models and current operational stage of reasoning. These two pieces of information determine what the learner brings to the educational environment and the level at which conceptual development can start. Therefore, in order to design an instructional environment to enhance strategic thinking, the study of the welfare-to-work situation must gather several vital pieces of information including a well defined design goal, the sequence of development of problem-solving skills and how these have been facilitated in the past, the operational stage of reasoning learners currently maintain, and the mental models learners will bring into the environment.
IV. Needs Assessment

**Research procedures for problem solving** – It will be worthwhile as well to recognize current and historical procedures for teaching and comprehension of problem solving and critical thinking. It is suggested that by the time children begin school, most have built a considerable knowledge store. By adulthood, they may still lack the appropriate representations of this knowledge, but if it is tapped and built on as teachers attempt to teach them advanced and formal problem-solving concepts, it is likely that the learners will acquire a more coherent and thorough understanding of these processes. Yet, we still must understand the vehicles by which these new learning processes are formed.

**How to test** – We will need to examine methods by which researchers and teachers ultimately engage in lessons to foster and encourage advanced problem solving. With this information at hand, it will better enable this study to engage in the correct procedures that will be demonstrated in the chess games.

**Level of expertise and understanding of operational staging** – It is essential to decide what type of expertise these learners possess. It will greatly determine at what level we must begin the learning process and inform us of current practices in problem solving. Adults have special needs and requirements as learners; they tend to be autonomous and self-directed, goal-oriented and have accumulated a foundation of life experiences and knowledge that will be applied to the learning experience. The study must recognize that people’s inherent plan-ahead abilities gradually develop from childhood and are a major foundation for life choices as we imagine and interpret a course of action. It will also be relevant to investigate the level of operational staging with which our learners come into this proposed study. What type of reasoning do they understand and what types of thought processes do they engage in?

**How to test** – A pretest in critical thinking and problem skills based on standardized high school examinations will lead us to understand where these learners reside on the spectrum. We understand that there will be inherent problem solving abilities (ie: what time to go to bed, where to find food) but the level of expertise in problem solving will be crucial in understanding how our study will be conducted.

**Analyze mental models** – The essence of our strategy will be to get learners to code and recode their models of basic critical thinking. Existing problem solving abilities (ie: what to do when one rises in the morning or what one decides to eat for lunch) are inherent but we will involve modeling in the chess game to advance deliberate problem solving skills. With expert guidance, students in the chess study will to generate concepts of central control, pawn structure, maneuverability, king safety and development of the pieces, the student will have to internalize such concepts to initiate reasoned judgments of their position on the board. When they progressively recode the material in the problem domain, they will formulate bigger "chunks" of understanding. Experts likely have the same memory capacity as novices, but experts have more sophisticated "chunks" of chess information.
How to test – Since our study must focus on expert modeling of problems and their solutions, guidance of procedures and concepts, and metacognition, we will have to develop a foundational understanding of the existing models that welfare-to-work groups already have. This means we will investigate how they currently use problem-solving and critical thinking in daily life. Conducted through interviews, the research will obtain specific and common qualities of the learner’s exposure to problem solving on a day-to-day basis. What type of decisions do our learners have to make during the day - decisions about how to raise a family, business decisions in the workplace? How deep are their decision-making tactics and how often do they use critical thinking throughout a day? Such questions will give us a basic, yet foundational concept of the learner’s current mental modeling requirements.

Sequences of conceptual development in problem solving - We will need to understand how individuals build their sense of conceptual development as they progress from childhood to adulthood. As children, we have an intrinsic set of problem-solving skills that are inherent in our development. However, in reaching adulthood, additional tasks have been added to our mental structure and we must understand the sequence of problem solving development throughout life.

How to test – Research and investigation into existing literature studies will help us understand how individuals develop their problem-solving skills. A generalized idea of studies in conceptual development of problem solving will form a foundation for understanding how our study should be executed.

Level of urgency – Realize the amount of time it takes to learn complex concepts (such as a critical thinking component as the foundation of chess) is an important consideration in the welfare-to-work study. It has been estimated that world-class chess masters require from 50,000 to 100,000 hours of practice to reach their level of expertise. They rely on a knowledge base containing some 50,000 – 1,000,000 patterns to guide their moves. The time to learn involves the development of pattern recognition skills that support identification of meaningful patterns. Furthermore, these skills foster information and knowledge of their implications for future outcomes. This complex cognitive activity of information integration requires time and will be difficult to expect our study group to obtain desired results immediately. (National Academy Press, 1999)

How to test – we need to understand the level at which these individuals are in the environment. Will the allocation of time for this study be adequate enough to deliver the intended results? Our best judgment could be based on a simple understanding of the immediate needs of our learners. If their external needs do not require immediate transfer of this knowledge, then we can build a study to accommodate a higher level of learning experiences. An interview with the group of learners would suffice to understand this component.
Goal-orientation – Adults are generally goal-oriented and can appreciate an educational program that is organized and has clearly defined elements.

How to test – If we can understand the purported interest of our learners, we will have a sense of goal orientation.

V. Results to Design

The results of the study will inform the design of the learning activity, this will allow us to estimate the levels of modeling, coaching, and scaffolding that will be required throughout the study. For example, through a detailed cognitive analysis of expert problem-solving skills, the goal for instruction will be clearly defined. The “tacit knowledge (including goals, strategies, and assumptions) [will be] made explicit for teaching” (Gott, 1988-89). As designers, we will have a clear idea of the hierarchy of procedures and knowledge that learners need to construct through active learning. The hierarchy will determine the order of knowledge presentation and the best method to present the knowledge.

Gathering information about the learners’ initial level of development of critical-thinking skills and intuitive understanding of problem solving will provide insight into the most appropriate approach to learning. Assuming the level of expertise in problem solving is low, the learners will most likely need to be introduced to a procedural-based approach to critical thinking. Once the learners start to build cognitive structures or mental models of the lower-level abilities, a more conceptual approach to critical thinking can be introduced. Providing that the learners have some initial understanding of critical-thinking skills, the design can be planned to build on this notion. Measuring the learners’ operational reasoning level will also determine where instruction can start and the possible limitations or hurdles with which instruction will need to cope.

In addition, the urgency of the learning will also determine the approach for teaching problem solving. The need for fast application of skills will require that instruction start with procedural knowledge. This will allow the “how-to” knowledge to be applied while the “why” knowledge is increased. The question then becomes how best to present this knowledge so the learners construct their own understanding of critical thinking. Research into past designs will help reveal the most effective instruction methods developed to date for problem solving. Incorporating the expected results of our study and the literature review, we have determined that the problem of fostering critical-thinking skills in welfare-to-work recipients is best approached from a cognitive theory perspective.
VI. Proposed Design

The cognitive approach to learning focuses on building strategies for thought and constructing a conceptual understanding of the domain knowledge. In order to facilitate both of these in the welfare-to-work recipients, our design incorporates expert modeling, guidance through the hierarchy of procedures and concepts, and metacognition. The introduction of chess programs in educational settings has proven to be a powerful method for facilitating problem-solving skills and developing strategic thinking. This evidence suggests that welfare-to-work recipients could benefit from learning to play chess. Building on the learners’ initial understanding of how strategy is used to win games, critical thinking skills will be introduced through the game of chess. The learner, by playing chess, will then construct critical-thinking “knowledge by direct interaction will elements of the physical environment” (Greeno et al, 1996).

Chess is a wonderfully simple and well-structured problem-solving tool. However, even with clear rules and clearly desired outcomes, it is a difficult concept to master, and much more challenging is the understanding of how its objectives will help learners attain their goals. These learners may primarily associate the chess study as having no apparent meaning or logic. In the beginning of the study, it might be difficult for them to learn with proper understanding and they may need to take time to explore underlying concepts and generate connections to other information they already possess. Moreover, is there a motivation to reach the intended goal?

The instructional process will start with students learning the basics of chess. Students will learn the procedures for playing the game (the pieces and the allowed movements of each piece). Through active learning, students will begin to practice the steps of chess strategizing. As beginners, the emphasis will most likely be on the number of pieces each player has. Experts will tutor students as they play, asking for explanations of moves and pointing out possible alternatives. When learners exhibit chunking of greater numbers of possible moves, the experts can begin to model more advanced chess strategies. They also can provide corrective feedback during play. The focus of the game will take on a more conceptual approach to the game including “the ideas of central control, pawn structure, space, maneuverability, king safety, initiative and development of pieces” (Milat, 1997-2000).

Learners will also be encouraged to utilize computer chess-tutoring programs. These programs will allow the learner to view expert reasoning through computer simulation. The computer will offer options for the next move as well as the ability to predict opponent’s moves. The learner will be able to analyze his or her reasoning by comparing it to the computer’s suggestions. This metacognition will, in turn, help students develop better critical thinking skills.
Chess is a meaningful learning experience for the welfare-to-work recipient. It allows active learning of problem-solving skills through interaction with the physical environment. Supported by expert tutors, human or computer, the learner proceeds through the hierarchy of procedures and concepts and constructs his or her mental models based on expert reasoning.

“Chess develops logical thinking. Chess requires some understanding of logical strategy…. Chess develops the capability to predict and foresee consequences of actions…. Chess develops the scientific way of thinking…. You explore new ideas, try to predict their outcomes and interpret surprising revelations” (Ferguson, 1997).

VI. Conceptual Framework

We plan to base our study on the cognitive perspective on learning, incorporating procedure-based training that creates a hierarchical structure for problem solving. As our learners become more proficient in the game, they will begin to develop “successive approximations of increasingly mature performance” (Gott, 1988-89) that display improvement in skills and understanding. As Gott suggests, in the learning process the players will observe the rules and structure, encode it in a conceptual framework and begin to emulate high-level players. They will also begin to understand the significance of each individual decision (or move) to the whole picture.

At low skill levels, the more behaviorist-style conditioned reinforcement (losing a piece, losing the game) slowly improves decision-making and understanding consequences. The game also provides opportunities for “recovery,” making up for mistakes made early. And the game’s feedback is not immediate, so players can learn how to work backward through their decisions, figuring out how to revise their play the next time. Their learning will be strengthened by the interaction with material systems, the game pieces that exemplify the consequences of the decisions learners make (Greeno et al, 1996). In addition, our design intends to build social interactions, in which the learners learn from each other, model good moves (better content) and discard bad ones.

We also believe that learning is most potent when the conditioned procedures are reinforced with a more abstract framework that links interdependent decisions. This is primarily created through a mental model of the game, one that examines constraints on decisions and defines a player’s level of control over the outcome. The goal of the game is clear now, the procedures evident; finally, the synthesis of the learning takes place. This method is particularly effective for transfer of knowledge to new situations, which is the primary goal of our prospective design. We anticipate that, similar to both inner-city children and accelerated young learners that have all shown dramatic success in re-using the skills from chess, welfare recipients will see the game in the larger context of their own lives. They may begin to think seriously about the consequences of their decisions and consider fully the alternatives before them.
References


