Unlocking the Will to Learn:
Identifying a Student's Unique Learning Combination

by Christine A. Johnston
Rowan College of New Jersey

submitted for presentation at
The Twentieth Convening of the British Educational Research Association
September 8, 1994
St. Anne's College, Oxford University

This author gratefully acknowledges the professional assistance of Gary R. Dainton in the development, execution, and reporting of this study; the technical assistance of M.E. Westermaier in the development of the text and graphics; the technical assistance of R. B. Kottkamp in the analysis and reporting of the data; and the editorial assistance of Mardella Lesher in the final editing of this document for presentation at the Annual Meeting of the BERA.

Abstract

How the human mind functions and processes experiences has been a topic which has fascinated philosophers and psychologists for centuries. Many who have explored the complexities of the human mind have suggested that the human essence consists of a tripartite configuration: the cognitive, the affective, and the conative. Yet to date a void exists in both the literature and the practice of educators concerning how to identify an individual's learning process. The two questions this study sought to answer were what conceptual framework provides a tripartite conceptualization of the interactive learning process; and what is the content and format of a reliable and valid instrument which is able quantitatively and qualitatively to capture a learner's cognitive, conative, and affective learning combination? The outcomes of this study include a tripartite conceptualization of the cognitive, conative, and affective interactive learning process and the results of testing the viability of the Learning Combination Inventory to identify a learner's interactive learning process. The factor loadings on the inventory's 64 items suggest that the inventory has the potential for capturing discrete cognitive/conative/affective interactive learning schemas. Preliminary findings on the construct validity of the Learning Combination Inventory suggest that, as an instrument for identifying the tripartite interactive learning process, it merits further study and development.

Introduction and Background to the Study

The composition of the human mind has been a topic which has fascinated man for centuries. References to it can be found in the earliest of Western literature. In the Odyssey, for example, Homer, describes the protagonist, Odysseus, as contemplating his choices and determining "within the division in his mind" what action he will take when confronted with a predicament of epic proportions. Yet for all of the conjecture about the structure of the mind, no single, empirically established theory of how the human mind functions has evolved. Philosophers, psychologists, and educational practitioners have all devoted extensive energy to exploring the interworkings of the mind. Among the intrepid individuals who have offered their explanations are such names as Plato, Kant, Baine, Wundt, James, and May. What differentiates these philosophers and psychologists from others who explored the complexities of the human mind is that these individuals based their explanations on the assumption that the human essence consists of a tripartite configuration: the cognitive, the affective, and the conative.

The Tripartite Theory of the Human Mind: Implications for Learning

In the field of education, the issue of how the human mind functions has focused on the question, "How does a child learn?" As deceivingly simple as this question may first appear, the question begs a highly sophisticated response. For over a half century the work of Piaget, Jung, and Skinner have formed the basis of our learning constructs. However, recently cognitive psychologists have shown a renewed interest in the tripartite theory of the mind. Their writings on brain science, hemisphericity, and motivation (McClean, 1978; O'Keefe & Nadel, 1982; Isaacson, 1982; Sagan, 1977; Elliott, 1986; Snow, 1989; Sockett, 1988), suggest that Jung and Piaget may have failed to explore an important construct of learning, i.e., the conative construct. It is this construct which Bell described as the focused energy resulting once a learner experiences an interconnectedness between cognition and conation (Gholar et al. 1991). It is this third aspect of the mind which warrants further investigation as we seek to understand better the trilogy of the mind and its effects on the learning process (Hilgard, 1980).

The Tripartite Theory of the Human Mind: The Concept of Conation

While each aspect of the tripartite theory of the mind (feelings, thoughts, behavior) bears consideration and study as an important aspect of the learning process, the lesser known construct, conation, requires further clarification. Snow and Jackson (1993) and Cornu (1993) suggested that the volitional factor of conation is a vital aspect of each individual's learning modality. Snow (1992) described conation as "among the most interesting and potentially useful psychological constructs which go beyond the conventional constructs of cognitive aptitude and achievement"(p.2). Suggesting that conation is a part of "all human behavior, especially school learning and achievement," Snow defined conation as the "interest, purposeful striving, persistence, and action control" of the individual (1989).

Beckmann & Kuhl (1985) referred to volitional style as "action orientation, a relatively stable disposition to effectively execute action tendencies." Because action schema are a "disposition for action [which] do not appear to be altered by present stimuli" (Powers, 1989, p.24) these "natural procedures for action appear to form a bridge between the cognitive and affective aspects of the learning process" (Caine & Caine, 1991, p. 101).

The Tripartite Theory of the Human Mind: An Integrated Conceptualization

This researcher takes the conative constructs of volition a step further. She suggests that while the areas of multiple intelligences, learning styles, and brain science inform us about an individual's construct of learning, they fail to address the learner's volition, thereby ignoring the individual's "will to learn." What this writer contends is missing from the literature is a depiction of the interaction which occurs during the learning process among a learner's cognitive, conative, and affective qualities. What this researcher seeks to conceptualize is a dynamic model of the learning process which goes beyond a linear, columnar, or orbital representation of the motivation-to-learn process.

Using the metaphor of a combination lock to describe an individual's unique learning system, this writer conceptualizes cognition, conation, and affectation as interlocking tumblers which, when aligned, unlock an individual's understanding of his/her learning combination. She suggests that the intricate interaction of cognition/conation (processing), conation/affectation (performing), and affectation/cognition (developing) act as the numerals of the "lock's" combination. Each individual's learning combination, thus, is comprised of cognitive/conative interaction, conative/affective interaction, and affective/cognitive interaction (See Figure 1).

This integrated conceptualization of the learning process challenges the conventional linear model of learning positing instead that the learner, when confronted with a learning task, will use all three mental resources (cognition, conation, and affectation) to begin the integrated process of learning. For example, the learner may initiate the learning process by reviewing his/her bank of prior-learning for clues on how to make sense of the current task.[1]As a part of the cognitive processing, the learner uses internal communication[2] to determine what level of abstraction is required for the task. Throughout the cognitive processing, the learner seeks to identify what aptitude or intelligence is needed to "crack" the learning task (Spearman, 1927). While identifying and initiating cognitive processing, the learner simulateously instigates the performance of the task using cognitive awareness to begin the "doing" of the learning task in an informed and focused manner (See Figure 2, "I Know" Interaction).

The "doing" process reflects the learner's conative performing trait. Conative performance here is defined as "the enduring disposition to strive" (Brophy, 1987, p.40). As a construct, conative performance consists of an individual's action tendencies (Atkinson & Birch, 1970) (See Figure 2, "I Act" Interaction). This writer terms the congruent interaction of the cognitive and conative process, learning schemas, and suggests that it is they which form an individual's personalized sense of directed energy (See Figure 2, "I Act" Interaction). These schemas include a highly correlated set of subconstructs consisting of an individual's natural talent to perform (skill), an individual's typical rate of response (tempo), and an individual's desire to work alone or in groups (degree of autonomy). As a result of the interaction of an individual's cognitive and conative tumblers, the learner engages in the task using directed energy to complete the focused learning goal established as part of the initial processing of the learning task.

The learner's sense of engaged effort (Lundholm, 1934) then leads to another turn of the lock's dial which produces the learner's affective development (See Figure 2, "I Feel" Interaction). Here the interaction begins with the learner's perception of his/her status as a learner. The learner's sense of status then triggers a complimentary level of self-esteem, producing an attitude of efficacy commensurate with the degree of success which the learner has experienced. As the learner affectively experiences the successful completion of the task, s/he forms an outlook of confidence and a willingness to persist in engaging in similar tasks in the future. This reflective effort causes the learner to bring the successful experience and expanded level of cognitive processing and conative performance to bear on the next learning task.

Central to this researcher's conceptualization of an interactive learning process is the patterned manner in which the learner approaches any given learning task. The literature of temperment and development (Gordon & Thomas, 1967; Chess, Thomas, & Cameron, 1976; Thomas & Chess, 1977; Seegars, 1977; Bodienov, 1986), psychological types (Jung, 1923), style (Merrill & Reid, 1977) and volition (Assagioli, 1973; Kuhl, 1983; Kolbe, 1990), provide a number of broad-based descriptive categories of individual behaviors. Each is based upon different aspects of human behavior such as tempo, autonomy, level of energy; stage of social, physical, or emotional development; or means of instigating action. For example, Thomas and Chess categorize learners as "plungers," "sideliners," "go-alongers," and "non-participants." Kolbe labels individual's conative Action Modes(TM) Fact Finder, Follow-Thru, Quick Start, and Implementor(KCC). Merrill and Reid refer to persons as having driving, analytical, expressive, or amiable styles. McCarthy & Sanders (1989) use the terms imaginative, analytic, common sense, and dynamic to describe an individual's style of learning. While each of these perspectives provides insights into the process of learning, each has limited its explanation to examining either a combination of cognitive and affective dimensions or a single aspect of conation leaving at least one of the members of the triology un-accounted for in the conceptualization.

While not discounting these orientations, this researcher has departed from the two-axes conceptualization and has formulated discrete tripartite combinations of individual integrated learning processes. Each combination includes a cognitive orientation, i.e., the manner and extent to which a learner gains his/her knowledge and understanding; a conative orientation, i.e., the directed effort and the manner of performance; and an affectative orientation, i.e., the attitude which the learner holds toward the completion of a learning task and the development of self-esteem as a learner (See Figure 3).

Each combination of these orientations forms a distinct set of learning schema based upon the interaction among the following: 1) the learner's cognitive processing as indicated by the individual's structuring of the task, avoidance of conventional approaches to completing the task, use of concrete reasoning, and reliance on data collection; 2) the nature of an individual's conative performing which can be observed as a sequential process; a confluent process, a technical process; or a precise, detailed process; and 3) the individual's affective status-as-a-learner based upon his/her attitude of "If I have step-by-step directions to complete the task, I can succeed;" "If I am allowed the freedom to risk, fail, and try again, I can succeed;" "If I am given the opportunity to work autonomously unencumbered by physical or social requirements, I can succeed;" or "If I have detailed information, I can succeed."[3]

The idea that cognition, conation, and affectation combine as interactive behavior is not a recent discovery nor can it be attributed to any one individual. Over 65 years ago, Ach, Michotte, and Prum referred to these patterns of behavior as "Determining Tendencies." Sanders (1930) writes, "Whenever in a connotative unit we meet with a member which does not conform to the unit character as a whole, ...or jeapardizes its unity (experienced as totalities) the entire consciousness has the emotive colouring of something ill-tuned, contradictory, and insufficient, unfinished, and open (p.202). He then continues his discourse with a description of cognitive/conative/affective behaviors which he describes as a Gestalt or "dynamic and differentiated substructures" of "structural tendencies pressing again and again for a satisfactory conclusion; chaos fall(ing) into visible order; fragmentary items acquire meaning and ...long-sought and suspected connections suddenly flash into mind; confusions resolve themselves in a liberating sense of correctness and definiteness" (p.202).

The literature is clear that it is these patterned action tendencies (Philip, 1936) which direct an individual to repeat procedures and consistently perform overt actions which produce specific products. They form unique and discrete patterns of learning behaviors involving a specific, covert mental processing. These, then, emerge as specific overt outcomes identified through observable behaviors, patterns of communication, and tangible products (See Figures 4: a, b, c, & d). For the purpose of understanding the learner, this writer has labelled these distinct learning combinations Methodical Organizer/Sequential Processor; Intuitive Risk-Taker/Confluent Processor; Independent Reasoner/Technical Processor; Data Collector/Precise Processor.

The research literature does not suggest that there is a hierarchy to these interactions, but instead that there exists a composite of all four which make up an individual's interactive learning process. However, while each individual to some degree performs using each of these four orientations, it is likely that an individual has a dominant schema or combination of schemas which drive his/her learning process. An example of the dominant schema, Methodical Organizer/ Sequential Processor, would be the individual who requires an overview of a learning task prior to beginning it. This individual seeks clear directions, time to absorb what the expectations of performance are along each step of the process, opportunities to double-check work for thoroughness and completeness, and a means of determining how s/he will know when the task is accomplished successfully. An example of a combination of dominant schemas such as Methodical Organizer/Sequential Processor and Independent Reasoner/Technical Processor would be the individual who requires both a plan for engaging in the learning task and the opportunity to accomplish the task autonomously by "wrestling with the problem" until the task is successfully completed.

Just as anyone who has worked a combination lock knows, the learner must be prepared to spin the dial of the learning combination back and forth as s/he seeks to have the tumblers fall into place. Should the outcome at any point along the learning operation fail to meet the processing, performing, and developmental expectations of the learner, the learner has an opportunity to examine metacognitively where the match of cognitive processing, conative action, and affective response did not provide an effective interaction, and consciously intervene to re-process, re-activate, and re-invest his or her energies in a manner which would most naturally lead to the successful and productive completion of the task. As this model suggests, learning does not necessarily occur in a linear or sequential fashion. The lock-metaphor implies that the learner may require many turns of the dial before s/he is able to discover the combination of particular schema or orientations that best explain how the individual learns most effectively.

The Tripartite Theory of the Human Mind: Operationalizing the Concept of Conation

The test of any construct, conceptualization, or theory is its ability to be observed empirically and documented. Cornu (1993) identified such testing of reality as the next step in the development of a theory of volition when she wrote, "Despite the distinctions (among the conceptualizations of conation), this collection of characteristics forms a coherent psychological construct that has something to do with learning from schooling and therefore ought to be a target of educational research" (p.14). Those who have articulated a research agenda for conative effects have stated, "It is important to establish experimental tasks in which student performance is best explained by a combination of cognitive, motivational, and volitional factors, with volition(conation) as a necessary condition"(p.20).

Three recent studies (Johnston, 1993; Johnston & Dainton, 1994a; Johnston & Dainton, 1994b) have begun this process by examining students' conative action schema within a learning context. Having chosen action schema as the focus of a study, the researchers in the first study examined the effects of the phenomena of conative action schema upon students' task completion and learning achievement.

To identify each student's conative action pattern, the researchers used the Kolbe Conative Index(AA)R,.[4] Kolbe termed conation action schema, Action Modes(TM). With these as observational guidelines, the researchers observed 132 students in each of three schools over a 12 week period. The observers viewed students within three instructional settings (math, English, and world history) as they completed focused learning tasks which required the primary use of each of the four conative Action Modes(TM) as defined by Kolbe.

As the students completed each of four assignments, their verbal and behavioral responses were recorded by two trained observers at each school site. In addition, upon completing the conatively insistent task, the students recorded their responses to each assignment in reaction journals. Classroom teachers at each site also recorded their observations of student reactions to the assignment. As a means of confirming the students' efficacy as recorded in their journals, students were asked to participate in audio-taped interviews at which time they were asked to discuss their ability to perform the task or accomplish the assignment in the manner in which it was required. Student grades and samples of student work were also collected as representative of the student's task achievement. The findings of this 12 week study (n=132) suggest that students who are asked to perform learning tasks which go against their conative grain will suffer a loss of self-efficacy and may also experience a loss of task achievement.

The second study examined the effect of conation upon student self-esteem within a cooperative learning context. The self-esteem of group members was examined within two conative group compositions: non-synergistic or synergistic. Utilizing direct observation, student journals, and student interviews, a double-blind study was conducted over a three month period analyzing and comparing group conative balance and group member's self-esteem. As predicted, students placed in learning groups that were synergistically configured, i.e., balanced on the basis of cognition, affectation, and conation, reported a consistently higher level of self-esteem within the group than students placed in non-synergistic groups. A significant association was identified between the synergistic configuration of cooperative learning groups and levels of self-esteem X2 (1, N = 371) = 15.16, p <.0001. The study raised the question, "How does the balancing of conative behaviors within a cooperative learning group affect the individual group member's self-esteem when participating in the group's completion of an assigned learning task?" In raising this question, the researchers sought an explanation of how one's self-esteem can grow or diminish because of the learning group's perception of the individual's cognitive, affective, and conative contribution to the group's task achievement.

The third study, a composite case study of 17 Implementor/Learners previously identified by use of the KCI(AA)R, focused on the negative effects these individuals experience as they are forced to learn within the confines and accoutrements of the typical classroom/desk setting. The study profiled this disaffected learner, characterizing the student's response to typical classroom assignments and daily operations and detailing the plight of this learner and his/her schooling experiences. The study concluded that these "students of few words" often have their learning process demeaned by those who give more weight to rote-acquired knowledge bases.

These field explorations into the effect of conative orientations upon a student's learning behavior have yielded three insights. First, they indicate that an individual's conative orientations in interaction with particular learning task structures have a significant impact upon an individual's learning achievement, ability to work cooperatively with others, and sense-of-self as a student. Second, these studies point to the promise which further investigation into the interactive effect of conative constructs holds for understanding our learning processes. Third, these studies point to the difficulty of measuring empirically an interactive learning process given the state of current instruments. In each of the studies, the researchers were limited to using instrumentation which focused on only one dimension of the learning interaction and which was not designed to capture the interactive effects of cognition, conation, and affectation.

The Problem

The purpose of this study was to test the use of a 64 item forced-choice and open-ended Learning Combination Inventory which asked students to describe their learning actions as they pertain to the interactive behaviors of cognitive processing, conative performing, and affective perception of self. The question this study sought to answer is, "What is the content and format of a reliable and valid instrument which is able quantitatively and qualitatively to capture a student's cognitive, conative, and affective learning combination?"

The Methodology

Participants

During May, 1994, a total of 2010 Learning Combination Inventories were piloted within thirteen educationally diverse school districts. Of the 2010, 1715 were completed with all data recorded. The student pool ranged in age from nine to 21 and represented a diverse population (See Table 1).

Table 1

Characteristics of Study Sample (N=1715)

Public School	**suburban** 987	**urban** 209	**rural** 374	**special services** 25	**Total** 1595	
Private School	**suburban**	**urban** 114	**rural**	**special services** 6	**Total** 120	
Gender	**Male** 840	**Female** 875				
Age	**7-11** 210	**12-14** 855	**15-18** 632	**19-21** 18		
Race	**African-American** 165	**Hispanic** 59	**Asian** 18	**Caucasian (Non-Hispanic)** 1249	**Other** 0	**Missing data** 224

Measures

The Learning Combination Inventory (LCI) contained both qualitatively and quantitatively scored items to measure the student's cognitive, conative, and affective learning combination. The initial draft of the instrument used information gained during three previous studies (Johnston, 1993; Johnston & Dainton, 1994a; Johnston & Dainton, 1994b), in which the researchers observed overt learning behaviors as they related to the constructs of action control theory, self-regulated learning, and action schema. Using the journals and interviews gathered from these studies, the researchers selected key repeated phrases and student-reported experiences to formulate 64 forced-choice and three open-ended questions for the pilot inventory.

The first iteration of the instrument included 20 Likert-type forced-answer items concerning how a student approaches the task of learning. The possible responses were based on a three point scale: That's me! That's me sometimes. That sure isn't me! The other 44 forced-choice items included an unrestricted selection of fourteen descriptors which the respondent most often heard family and friends say about them; fifteen multiple choice answers concerning issues of motivation and frustration; an unrestricted selection of up to eight sentences describing how the student approaches an assignment; a set of twelve forced-choice answers consisting of paragraphs describing how the student typically prepares for a test; and three open-ended questions to which the students could respond in their own words.[5]

The first draft of the instrument was field-tested with 80 students who had participated in the previous studies (Johnston, 1993; Johnston & Dainton, 1994a). The piloted responses were read and examined in light of the oral and written comments made by the students during their completion of the instrument. Those questions which were vague in wording or confusing to the students were rejected outright or edited for clarity and maintained as a part of the instrument for the next iteration. Teacher review of the instrument also was used to determine face validity. For example, members of child study teams studied the instrument and then made recommendations concerning the inclusion of items as well as the physical arrangement of the items within the instrument. A much refined version of the inventory was then administered to 2010 students in thirteen private, public, and parochial school districts in New Jersey.

Results Factor Analysis

Mean scores were calculated for each item, and the item-correlation matrix was factor analyzed. This resulted in a twenty-three factor solution. Prior to the second iteration of the first order factor analysis, items were eliminated which did not load conceptually or psychometrically. The criteria of a minimum factor loading was .34. In addition to its mathematical contribution to the factor, each item was evaluated for conceptual clarity and fit.

The second iteration of the first order analysis resulted in a seventeen factor solution. Four factors with eigenvalues from 4.54 to 1.18 explaining 47% of the variance were retained. The four-factor solution, after varimax rotation, is summarized and presented in Table 2. A second order factor analysis was then performed on the subscales of the four factors. The four factor solution after varimax roation yielded two well-defined Factors and third Factor which loaded on two subscales. The first two Factors were interpreted as discrete categories of learning combinations. Target loadings were moderate to high for Factors 1 and 2 (.55 - .83) The subscales which collapsed into the third Factor require further analysis and discussion. (See Table 3 and Discussion).

Table 2

Four Factor Solution of the Second Iteration, First Order Factor Analysis of Sixty-four Items of the Learning Combination Inventory

Item	Factor 1	Factor 2	Factor 3	Factor 4
Organization Building Data Ideas	- - - 1 .75073 2 .73176 3 .67881 4 .64090 5 - 45634 - - -	- - - 6 .75192 7 .67603 8 .64000 9 .41429 10 -.32227 - - -	- - - 11 -.90665 12 .73058 13 .67233 14 .66294 15 .63846 - - -	- - - 16 .64680 17 .61278 18 .53803 19 .64530 20 .35427 - - -
Eigenvalues	4.54	2.07	1.84	1.18

Table 3

Factor Solution of the Second Order
Factor Analysis of Learning Combination Inventory Items

Item	Factor 1	Factor 2	Factor 3
Organization Data Building/ Ideas	Organization .71857 Directions .73176 No Direct. -.62788 Neatness .55163	- - - Facts .83124 Data .56327 Neatness -.41089	My Way .70650 Technical .65003 On the move .61526 Ideas .51960
Eigenvalues	2.05	1.07	1.21

Qualitative Analysis

Five student responses from each of the thirteen participating school districts were chosen at random to be read and analyzed vis a vis the frequency patterns of students' responses to the forced-answer items. Using three categories, the readers of the 185 responses (65x3 open-ended questions) identified whether what the student wrote confirmed his/her selection of forced-answers, confused the issue by being a "mixed bag," or contradicted the answers logged on the fixed-response part of the inventory. A Chi-square was run to determine whether students significantly differed on the basis of their written responses when compared to their forced-choice answers. A significant association was identified between the students' forced-choice answers and their self-generated responses to the three question prompts X2(2, N=165)=44.52, p<.0001. The written data confirms the forced-choice answers.

The Discussion

The Cluster Effect of the Data

The quantitative and qualitative data reported here confirm a learner's ability to describe the interactive behaviors of cognition, conation, and affectation which form the basis of his/her combined learning process. Questions constructed to capture the combined interactive schema of cognition, conation, and affectation, when factor analyzed, grouped to form two categories of interrelated learning behaviors. Two factor-constructs collapsed into a single factor rather than remaining discrete.

While the factoring of the 64 force-answer items provides clear insights into all of the four discrete categories of learning behavior, it particularly illuminates the learner's orientation toward organization. Items formulated to capture the interactive behaviors of methodical organization clustered into three highly related constructs: the physical arrangement of materials; the appearance of neatness; and the organized process of following directions.

The data also formed a discrete clustering around the concept of the processing of detailed data and a learner's immersion in specifics. For example, questions dealing with data collection and the gathering of information aggregated into two highly related factors: the amount of information the person knows and the perception by others that the individual is a "walking encyclopedia."

Items describing the interactive learning behaviors of the independent reasoner loaded well focusing on the independent nature of the technical processor. The first factor was based upon inventory items which emphasized, "Don't interrupt me"; "Let me do things my way." and "I need to figure things out for myself without someone directing me or looking over me. " The second set of items which clustered within this group did so on the basis of the technical nature of this learner, involving the learner's sense that "I can build anything without relying on some else's help." Interestingly, items involving the interactive learning behaviors of intuitive risk-takers also loaded on this factor. This researcher believes that this occurred because items which used the phrase "do projects" was interpreted by technical processors as "building" activities and by confluent processors as opportunities to break free of following a routine by doing an alternative project using the individual's own creative thinking.

Other items which collapsed into this factor indicating a commonality between the intuitive risk-takers and independent reasoners include a combination of items which described these learners as disengaged from the classroom routine: "I stare out the window"; "I get bored"; "I am the class clown"; and "I jump from one thing to another." Conceptually these can be explained as "fitting" both the intutive risk-taker and independent reasoner because these individuals' learning combinations do not match the standand instructional learning procedures of a typical classroom. It is this researcher's observation that these students do not exhibit the same learning behaviors which bring recognition and rewards to those learners whose dominant processing schemas focus on detail and sequence. As a consequence of this mismatch between learning combinations and instructional methods, the intuitive risk-takers and independent reasoners frequently are labelled as underachievers or as disaffected because of their loss of engagement in the learning process.

The factoring process also identified those questions which negatively correlated. For example, those questions which factored as pertinent to the collection of data and exact information were highly negatively correlated with the question, "I'm not willing to guess at an answer. I'd much rather know." Questions factored as indicators of intuitive risk-taking behaviors were highly negatively correlated with items such as, "I need to understand directions well." and "I read directions carefully." These constructs which are negatively correlated provide additional insight into the conceptual consistency of the four learning schemas.

The Interactive Nature of the Data

Central to a discussion of the data gathered as a part of this study is the degree to which the data support the theoretical interactive conceptualization of the Learning Combination Inventory. After all, it is one thing for Snow and Jackson (1993) to write "The distinction between cognition, conation, and affectation, is convenient and historically well-founded in psychology though it should be regarded as a matter of emphasis rather than the partition. All human behavior, especially including school learning and achievement, involve some mixture of all three aspects," (footnote 6: Snow who recently completed an extensive review and analysis of existing measures of conative behaviors devotes a portion of each review of a particular instrument to identifying the key issues of construct validation which he feels have not been addressed by the developers of the instrument being reviewed. Primary among his criticisms is the lack of linkage among related constructs, the theoretical basis of the instrument, and the assessment procedures used.) and it is another to identify empirically this "mixture" in a classroom setting. Therefore at issue in this study is the question, "Do the data validate the premise that an individual's learning process is most efficiently represented as an interactive set of schemas involving cognitive processing, conative performing, and the affective development of self?"

An analysis of the data suggests that those items of the Learning Combination Inventory which clustered into the two distinct categories did so on the basis of the respondent's tripartite interactive learning process. Evidence to support this statement is found at two levels. First an examination of the descriptive content of the questions which factored to form each of the four categories suggests the interaction of the constructs of cognition, conation, and affectation. Secondly, the student responses to the three open-ended questions confirm the interactive behaviors as described in the "That's me!" "That sure isn't me!" choices on the forced-answer portion of the instrument.

In the first instance involving the factoring of objective responses, the data afford examples of the tripartite learning schema as it appears within two of the learning behavior clusters (data collection and methodical organization).

For example, the data collection cluster includes questions with eigenvalues above 1 which address cognitive processing ("I don't miss a single piece of information"; "I have no problem knowing what facts to remember" "I want as much information as possible"); conative performing ("I have to write information down"; "I ask lots of questions"); and the affective perceived status as a learner (People tell me I'm giving too many details"; "Teachers, parents, or friends tell me I ask too many questions" and "Teachers, parents, or friends tell me I'm a walking encyclopedia").

The questions with eigenvalues over 1 which factored into the methodical organization schema demonstrate the same interactive cohesiveness. However, unlike the data information items, these responses focused on organization and procedures. Again, statements concerning cognitive processing ("I need to understand the directions" "I read directions carefully"); conative performing ("I follow step-by-step directions in completing my assignments" "I make certain I've followed all the directions." "I double-check my answers"); and affective perception ("I like to be neat and organized." "My friends like to borrow my notes to copy because they say they are neat and organized) support the existence of an interactive pattern of behavior consistent with a methodically organized learning combination.

The presence of all three constructs of cognition, conation, and affectation within the mixture of forced-choice answers suggests the validity of the construct that one's learning combination, although made-up of a dominant pattern or schema of behaviors, is still tripartite in make-up. No one is more cognitive than conative or more affective than cognitive. Each individual uses all three essences of the mind to formulate a schema of learning behaviors which consistently guides the individual's learning process.

A final confirmation of the tripartite construct of an individual's learning combination is derived from the respondents' answers to the open-ended questions. Not only did the students' written responses corroborate the forced-response data, but they provided a template for the development of protocols for each of the four learning behavior schemas. This is possible because in responding to the open-ended questions, students across the sample population used words and phrases, which regardless of the respondent's age,form a pattern of verbal response indicative of one or more of the four learning schema.

Examples of this include an eight year old whose forced-answer responses showed his preference for being allowed to take risks in completing his assignments. Consequently on the forced-answers he chose answers such as "I don't wait for the teacher to give me directions" and "I become frustrated when I have to follow specific directions." "I prefer to come up with my own ideas."

His individually generated written response to the prompt, "Here is your chance to add your own thoughts about what makes doing class assignments frustrating for you" stated, "I awalys have to wate for drecshons." To the prompt, "Here is your opportunity to send a message to your teachers about how you would like to do learning," he wrote, "Dear Mrs. P, I DON'T want to wait for derechshons. I want derecshons only if I need them."

A seventeen year old whose forced-choice answers formed the same frequency pattern as the previously cited student wrote, "Don't give me lots of instructions. Let me be creative. I'd like the teacher to get out of my way and let me learn how I would like to learn. It's stupid to make me follow directions just in a certain way only because it's what the teacher says. I like to do it myself." The risk-takers also became bored with repeated seat work and wrote, "I like to go over things once, that's it."

Students whose frequency of responses indicated a learning schema as a methodical organizer wrote, "I need to see a sample of the work before I begin." "Learning should be done in a format like outlines. It should be neat and organized." "I like it when the teacher takes it step-by-step." These students clearly have a sense of structure and process. As one student wrote, "I know what an average fourth grader knows. I'm a whiz at math. I like showing the steps on the board. I would like to help others and teaching them what I know."

Students whose tallied responses showed a high frequency in data collection wanted, "Specifics." "Don't make me guess." One twelve year old wrote "I hate it when different words that mean the same thing are on the same page (of the workbook) and I don't know which one goes where." These students need to have specific information in order to be certain that they have the right answer.

Most consistent in phraseology of expression were those students whose forced-choice answers included a predominance of independent reasoning and technical processing. These students, regardless of age, expressed, "I'd rather be at home, working on my own." "Let me show you what I know because I know alot about certain things or subjects." "Give me one hr. and I'll show you what I know. Not on paper though. I don't like doing seat work." "I'd rather being doing this work by myself in my room." "I wish we could do more projects." Finally, there were those students whose answers indicated a very high frequency of "That sure isn't me!" answers on one or more of the learning behaviors. These students when given the opportunity to write about their learning experiences expressed frustration as to how others perceive them and how they feel about themselves as learners. For example, a twelve year old whose frequency of responses indicated that she would not take risks because she needed specific information and a set structure to follow when doing assignments wrote, "My parents and teachers say I am slow. But I get frustrated when I can't figure out the problem. I would like to take it step-by-step until I can manage to figure it out. If you want to know what I know just let me show you on a piece of paper and work the problem out." A student whose forced-choice answers demonstrated he did not use data collection as his primary schema for processing his learning experiences wrote, "I never feel totally right about the answers I give. I'm always nervous about what I give as an answer" Here is an individual who does not seek information and recognizes the affective effect which this behavior has upon his perceived status as a learner.

The forced-choice answers and the responses to the open-ended questions indicate, the Learning Combination Inventory content and format permitted students to describe their interactive processing of completing learning tasks. The data also suggest that when given the opportunity, students are capable of and are willing to articulate their discrete combination of processing, performing and self-reflective behaviors.

Implications for Further Study

The Learning Combination Inventory is an attempt to capture a student's interactive processes of cognition, conation, and affectation. It is based upon Kant's supposition that "The human mind is an active, forming participant in what it knows" (May, 1969). The preliminary loadings on the original 64 items suggest that the inventory can capture the discrete interactive cognitive/conative/affective schemas of two primary interactions: information processing and predisposition to organize and has the potential for capturing the interactive learning schemas involving a learner's willingness to risk and/or a learner's propensity to rely on technical reasoning and tacit knowledge.

The factor analysis identified the need to develop tighter inventory items which would further identify the independent reasoner and the intuitive risk-taker. Work remains to be done in those areas.

Other issues which remain to be developed include refining the reporting of the results in a manner which can be understood and correctly interpreted by students, teachers, and parents. At issue here is how to report dominant and secondary schemas? How to inform students of the potential of their interactive learning processes? How to impart strategies which learners can use for greater success?

While much work remains to be done, the insights gained from the analysis of the initial piloting of the Learning Combination Inventory provide a sound beginning for the development of an instrument which can idenifty an individual's trilogy of interactive learning processes. A re-test of the original student sample will be completed Fall, 1994. Additional administrations of the refined instrument will be conducted in four public school districts across the U.S. and five international sites. The results of the continuing study will be reported Winter, 1995.

References

Assagioli, R. (l973). *The act of will*. New York: Viking Press.

Atkinson, J. & Birch, D. (l970). *The dynamics of action*. New York: John Wiley & Sons.

Beckmann, J. & Kuhl, J. (l985). *Action control: From cognition to behavior*. Berlin: Springer- Verlag.

Bodienov, M. (l986). *Typology of mental activity as a temperamental trait and the level of activation of the nervous system in The biological bases of personality and behavior*. Vol. 2, New York: Hemisphere Publishing Corp.

Brophy, J. (1987). "Synthesis of research on strategies for motivating students to learn." *Educational leadership*. ASCD. October.

Caine, R.N. & Caine, G. (l991). *Teaching and the human brain*. ASCD, Alexandria, VA.

Chess, S., Thomas, A., & M. Cameron. (l976). "Temperment: Its significance for school adjustment and academic achievement." *New York University Educational Review*, 7, 24-29.

Corno, L. (l993). "The best-laid plans: Modern conceptions of volition and educational research." *Educational researcher*. Vol. 22, No. 2, March. Washington, DC.

Elliott, P. (l986). "Right (or left) brain cognition, wrong metaphor for creative behavior: It is prefrontal lobe volition that makes the human difference in the release of creative potential." *The journal of creative behavior*. Vol. 20, No. 3, 202 .

Gholar, C. (l99l). *Wellness begins when the child comes first: The relationship between the conativedomain and the school achievement paradigm*. Paper presented at the Annual Convention of the American Association for Counseling and Development, Reno, NV, April 2l-24, l99l.

Gordon, E. and Thomas, A. (l967). "Children's behavioral style & the teachers' appraisal of their intelligence." *Journal of school psychology*, 5, 292-300.

Hilgard, E. (l980). "The trilogy of the mind." *Journal of the history of the behavioral science, l6, 2, l07-ll7*.

Isaacson, R.L. (1982). *The limbic system*. 2nd. ed. New York: Plenum Press.

Johnston, C. & Dainton, G. (1994a). "Death by classroom." Occasional Papers. Rowan College of New Jersey.

Johnston, C. & Dainton, G. (1994b). *Cooperative learning - chaos & inertia or synergy: The effects of conative group balance on student self-esteem*. A paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Jung, C. (l923). *Psychological types*. New York: Harcourt Brace.

Kolbe, K. (1990). *The conative connection: Uncovering the link between you and how you perform*. Reading, MA:

Addison-Wesley.

Kuhl, J. (l983). *Motivation, konflikt, and handlungskontrolle*. Heidelberg: Springer.

Lundholm, H. (1934). *Conation and our conscious life: Prolegomena to a doctrine of urge psychology*. Durham, NC: Duke University Press.

May, R. (1969). *Love and will*. New York: Norton & Co., Inc.

McCarthy, B. & Sanders, S. (l989). *Leadership Behavior Inventory*. Barrington, IL: EXCEL, Inc.

McClean, P.D. (1978). "A mind of three minds: Educating the triune brain." in *The 77th Yearbook of the National Society for the Study of Education, pp. 308-342*. Chicago: University of Chicago Press.

Merrill, D. & Reid, R. (l977). *Style awareness simplified: An overview*. Denver Co.: Personnel Predictions and Research (Tracom Corp.).

Nadel, L. (1989). "Down's syndrome in neurological perspective." Unpublished manuscript.

O'Keefe, J., and L. Nadek. (1978). *The hippocampus as a cognitive map*. Oxford: Clarendon Press.

Perkins, D. (l993). "Teaching & learning for understanding." *NJEA Review*. October.

Philip, H. (1936). *An experimental study of the frustration of will-acts and conation*. Cambridge:University Press.

Powers, W. T. (1989). "Volition: A Semi-scientific essay" in *Volitional Actions*. London: North- Holland.

Sallstrom, P. (1991). "The essence of dialogue" in *Dialogue and technology: Art and knowledge*. B. Goranzon & M. Florin, (eds). Berlin: Springer-Verlag.

Sander, F. (1930). *Structure, totality of experience and Gestalt*. Physchologies., p.202.

Sagan, C. (1977). *The dragons of eden*. New York: Ballantine Books.

Seegars, J.(l977). "Identification and intervention in child personality temperament." cited as in preparation in *Temperment and Development* (1977).

Snow, R.E.(1989). "Toward assessment of cognitive and conative structures in learning." *Educational researcher*, 18, (9), pp. 8-14.

Snow, R. & Jackson, D. (l993). *Assessment of conative constructs for educational research and evaluation: A catalogue*. Stanford University.

Sockett, H. (l988). "Education and will: Aspects of personal capabilities." *American journal of education*, 96, l95-214.

Spearman, C. (1927). *The nature of intelligence and the principles of cognition*. London: Macmillan.

Thomas, A. & Chess, S. (l977). *Temperament and development*. New York:Brunner/Mazel Publishers.

Footnotes

1. This part of the cognitive processing interaction reflects Piaget's work on assimilation and accommodation.

2. Footnote 2: Internal communication is also referred to in the literature of cognitive psychology as "behavioral chatter," "presence of mind," cognitive dialogue, or awareness (Sallstrom, 1991); Atkinson & Birch, 1970).

3. Philip (1936) carefully established the categories of cognitive, conative, and affective interaction in his extensive study of individuals engaged in solving 300 different puzzles. Philip meticulously recorded the written and spoken descriptions of the participants' reflections at the very time they engaged in each task. He then examined each of the subject's cognitive, conative, and affective reflections devoting much of his discussion to the interactions of same. Of note is his recording of key words and phrases used by the participants as they described their problem-solving experiences. "I was determined to solve it in order." "I concentrated on grasping the details... my volition did not take place until I grasped the details." "Once again I had to check my desire to begin before the directions were read and understood." "I made a conscious effort to wrestle with the problem as a whole." "With very few seconds concentration, I found the solution; I didn't need to verify the solution before I signalled back." "My method was very easy. I ran through as many names as I could remember..." "My method was 'trial and error.'" "I began with my usual method of trying to get combinations..." "I'm not certain that is a word, but I'll risk it." "The whole question struck me on the first reading as meaningless, and I gave up and waited for the buzzer." "I exactly retraced the steps which led to the obstruction." "I commenced in a methodical way." "I think the chief feeling all the time was that I was in a hurry. The hurry accounts for the wild guesses."

4. This is the adolescent adaptation of the adult KCIR, an instrument developed by Kolbe to identify an individual's insistent and resistant Action Modes(TM) for the purpose of "fair selection," effective team building, or other personal/professional uses.

5. "What frustrates me most about learning is when..."; "What I prefer to do when I'm learning is..."; and, "If you want to know what I know, just let me ...."