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Many Voices-One Message

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Abstract

This study examines diverse sets of learners and their learning characteristics and asks the question: Are learning patterns universally dispersed among learners or are certain patterns found only in highly successful students, certain cultures, or among those individuals who *do not* have learning disabilities? Analysis of the data revealed several interesting insights. First, regardless of nationality, age, or culture, the scale scores of the four learning schema (Sequential, Precise, Technical, and Confluent) were clearly

substantiated by the written responses of the participants. Secondly, regardless of age, cultural background, ethnicity, or designation as a learner, the written responses werecouched in using very similar vocabulary and descriptive phrases. Finally, whether working with the sample of school children with perceptuo-motor dysfunction or the sample of vocational education students or the 39 1995 U.S. Westinghouse National Science Scholars no single learning scheme "typified" what teachers and administrators had previously labeled the student as: special education, regular education, vocational education, or gifted.

Introduction

Educational researchers have long been intrigued with finding a valid and reliable means for identifying how individual students learn, i.e., how each learner processes and responds to the learning environment in which s/he is placed. As often happens in life while searching in one direction for a new understanding a far more insightful outcome arises when one least expects it. This study reports a serendipitous finding which overtime was revealed through a series of data collections involving the development of a learning styles inventory. Key to understanding the significance of this finding is an understanding of the conceptual basis upon which the learning inventory/instrument was constructed and tested.

The Conceptual Basis

While educational research over the past twenty years has produced a virtual compendium of empirical data concerning the learning process, no single paradigm of learning styles has satisfied both researcher and practitioner. Snow & Jackson (1992) suggest that this is because the current learning style constructs lack clarity, a common theoretical base, and educational validation. Snow and Jackson further suggest that, "a common theoretical base for the concept of style will be found in an integrated model" which emphasizes interaction and adaptation (85). In response to Snow & Jackson's agenda, Johnston (1996) conceptualized the learning process (hereafter referred to as the Interactive Learning Model) as interactive patterns within the learner.

Conceptualization of the Learning Combination Inventory

The theoretical basis for the Interactive Learning Model (ILM), posits that learning processes consist of four internal patterns - each made up of the interaction of cognition,

conation, and affectation. Cognitive scientists have long held that the mind operates through the use of patterning. Their term for these patterns is schema. One researcher described schema as "structural tendencies" (Sander, 1930). Others refer to these schema as "patterns of activation and organization," (Pay, 1981) "individual possibility-processing structures," or "consistent patterns of transactions with the world" (Kolb, 1984). Cognitive science describes the schema as the composite characteristics of cognitive, affective, and physiological factors that serve as "relatively stable indicators of how a learner perceives, interacts with and responds to the learning environment" (Keefe and Languis, 1983).

The ILM operates under the assumption that the interaction of these patterns does not occur on a random basis. It occurs as a pattern of behaviors. Interactively these patterns involve the learner in processing, performing, and reflecting on the basis of sequence and organization; specificity and precision; technical performance and reasoning; confluence and intuition. Each is distinct from the other; each contributes to the other; each builds the wholeness of the learning process. These tendencies converge to form the basis of one's thought processes, mode of action, and feelings about ourselves. This convergence is what also forms a learner's patterns of learning behavior.

The Four Primary Patterns of Schema

The sequential pattern is that which seeks order and consistency. "I process information step-by-step. I act according to the rules. I want time to present a neat and complete assignment. I may need time to double-check what I have done. Don't rush me, please."

The precise pattern wants to know exactly what is going on. "I process information precisely. I read it precisely; I write it precisely; I store it precisely; and I respond to it precisely. I feel good about myself as a student when I get precise feedback and when I am able to point to specific things I've done that have earned me recognition."

The technical pattern processes technically using stand-alone, independent reasoning. It's that part of that says, "Let me figure this out - let me do this by myself ." This is where I use my technical know-how. "I see an instrument, a tool, and I know its use. More than that, I am intrigued and fascinated by its form and function - I know how it operates. I especially like the physical and mental challenge of using it successfully to do whatever the situation requires."

The confluent pattern pulls together all the areas of experience and forms them into a sense of "I've been here before. I understand this territory. This is how this fits together." It's the confluence of what I take with me into each task that I do. It is also that part of me which says, "Okay. So you haven't been here before. So what. Make a guess. Take the risk." This part works on intuition rather than specific information or structure or knowledge

of how something works. "I go with my gut. I have a sense - not a measurable sense-but an intuitive sense of how to proceed, and I move on that. I don't mind failing. I can always start again with a new idea." This is the pattern that takes pleasure in the totality of who the learner is - all the learner can bring to bear to the situation from his/her various experiences.

Each of these patterns operates within the interactive learning process simultaneously. To capture the degrees to which the learner uses each of these patterns, the *Learning Combination Inventory* was developed.

The Learning Combination Inventory

The Learning Combination Inventory (LCI) is a 28-item self-report scale which consists of two parts: a written portion and 28 descriptive sentences which the learner reads and then indicates his/her responses on a five point numerical continuum. The Likert-type scale and three parallel question stems indicate the learner's use of the following four schema: Sequential Processor, Precise Processor, Technical Processor, and Confluent Processor. Subjects

A total of 2057 students from the U.S., England, Ireland, and the Republic of Malta participated in this study. Student subjects included 600 regular education primary school children in Northern Ireland, 100 regular education primary age students from the Republic of Malta, 76 special education students from Southern New Jersey, 30 children with visual and perception and motor coordination difficulties from Yorkshire, England, 400 students from vocational and regular education sites in New Orleans, 812 regular education students from the Delmarva Region of the Mid-Atlantic states, and 39 U.S. Westinghouse National Science Scholars. From this number, 561 were randomly selected for analysis of their written responses along with all 39 Westinghouse Scholars' responses.

Methodology

Researchers at each of eight sites group-administered The *Learning Combination Inventory (LCI)* to specified learner populations within specific locales. The LCI uses a 5-point Likert-type scale and parallel question stems. The instrument was used in its English form although teachers translated items as needed for students in Malta. Scale scores were computed for each set of individual student responses in the following manner:

The Learning Combination is first reported in a sequence of scores divided into ranges for each of the four schema, i.e., 7-16 = I avoid; 17-25 = I use as needed; and 26-35 = I chose to use this first. Each range of the Learning Combination Inventory indicates the extent to

which a student chooses to use a schema first, to use a schema as needed, or avoid a certain schema when completing a learning task. The first set of scores in the student's profile represents the learner's tendency to use Sequential Processing, the second Precise Processing, the third Technical Processing, and the fourth, Confluent Processing. The student's Learning Combination is further described by his/her written answers. For example, a student whose numerical scores are high in Sequential Processing might write responses which read similar to the following: "Assignments are frustrating when they aren't thoroughly explained." or "When I'm not given enough information about an assignment and then told I've done it wrong." The written responses are often done in outlined form or as a list of items set off by a dash or an asterisk.

A student whose numerical scores are high in Precise Processing might write "I prefer to demonstrate my knowledge by answering essay questions or writing a paper." "If I were the teacher, I would have students read, take notes, and demonstrate their understanding by essay or a verbal demonstration." The Precise Processor's written responses may also be identified through their wordiness, thoroughness, and exactness. Their answers often spill over the borders of the space designated indicating a need to write all the student deems important to prove the student's knowledge to the teacher.

A student whose numerical scores show Technical Processing as the dominant first choice would most frequently describe,"not wanting to be here." "I hate doing things that make no sense. What's the purpose." "I would teach by letting students learn in their own way." "Let them get out into the real world." "Take us to see how things really work. Not learning from a book." These learners use the fewest words or sentences when writing their answers.

A student whose numerical scores on the four schema indicate a strong tendency to use Confluent Processing may write "I don't want to be forced to do an assignment in only one way." "I would like to see teachers present lessons and material in a variety of ways." "I would prefer to get up and do a skit." "Give an oral presentation."

Data

A total of six tests of validity and reliability were run on each of the eight data sets. Only the test of construct validity is reported here. The results of that test bears specifically on the serendipitous findings which form the basis of this report. For the test of construct validity, a rating of 561 randomly selected respondents and all 39 Westinghouse Science Scholars' written responses were analyzed comparing the match between student scale scores and their written responses. It was predicted that the four scale scores of student respondents would correlate at a <.01 level of significance with their written responses.

Using scoring protocols similar to those cited above, a group of three individuals consisting of a member of the research team and two teachers trained in the interactive learning

model [interrater reliability .92], assigned numerical values to each of 600 respondents' three writing samples (sequential responses = "0"; precise responses = "1"; technical responses = "2"' and confluent responses = "3"). a correlation was then run of respondents' scale scores to their specific written responses. based upon the numerically assigned values (0-3), it was predicted that if (s)equential written responses matched respondents' (s)equential scale scores, the correlation would manifest itself on a continuum of 0-3 as the most negative; if (p)recise written responses matched respondents' (p)recise scale scores, the correlation would manifest itself on a continuum of 0-3 as slightly negative; if (t)echnical written responses matched respondents' (t)echnical scale scores, the correlation would manifest itself on a continuum of 0-3 as slightly positive; and if (c)onfluent written responses had a strong relationship to respondents' (c)onfluent scale scores, the correlation on the continuum of 0-3 would be the most positive.

Table 1.1a
Correlation coefficients of ages 10-13 writing samples

sequential	-.5720*
precise	-.3196*
technical	.1304
confluent	.2685*
*significant at <.01	

Table 1.1b
Correlation coefficients of ages 14-18 writing samples

sequential	-.5475*
precise	-.2151*
technical	.3226*
confluent	.5909*
significant at <.01	

The correlations reported in tables 1.1 a-b occurred in the predicted directions for both forms of the lci (ages 10-13 and 14-18). These predicted outcomes demonstrate the strength of the relationship between student scale scores and student self-generated written responses.

Other data generated from the test of construct validity included the written responses themselves. The charts which follow were constructed from the pool of 1800 lci written responses (three per participant). Each chart represents a primary mode of processing. each phrase is annotated with the age, educational classification, and geographic location of the respondent (see charts 1.1-1.4).

Chart 1.1

correlated written responses of scale scores for sequential processor at a score of 27 or above annotated with age, educational classification* and geographic location**	students whose scale scores for sequential processor were 27 or above, indicating that they choose this pattern first to begin their learning, answered the lci written question 1 ("What makes learning frustrating for you?") in this manner:
[09/sped/us]	1) when i have to listen to not clear enogh (enough) instructions.
[12/sped/eng]	2) when the teacher doesn't give directions slowly and clearly.
[13/sped/us]	3) if i don't have step-by-step directions or

	if i start one way and the teacher changes them (the directions).
[08/r/ni]	4) if i can't understand the directions
[17/wss/us]	5) when assignments are given spur of the moment and seems unclear and overwhelming and two days later the teacher forgets she assigned it.
*r=regular education; sped=special education; wss=westinghouse science scholar	**us=United States (New Orleans, Mid-Atlantic, Milwaukee); ni=Belfast, Northern Ireland; eng= Harrogate, England; ma=the Republic of Malta)

Chart 1.2

Correlated written responses of scale scores for precise processor at a score of 27 or above annotated by age, educational classification*, and geographic location**	Students whose scale scores for precise processor were 27 or above answered the lci written question 2 (how would you like the teacher to know how much you know?") in this manner:
[11/r/ma]	1) By asking me some facts and questions. I like quizzes.
[17/wss/us]	2) By posing interesting and challenging questions.
[11/sped/eng]	3) By having them ask me questions and then telling them the

	answers.
[15/r/us]	4) By answering all the teacher's questions. I like trivia.
[11/r/ni]	5) By having the teacher read my work and ask me questions.
*r=regular education; sped=special education; wss=westinghouse science scholar	**us=United States (New Orleans, Mid-Atlantic, Milwaukee); ni=Belfast, Northern Ireland; eng= Harrogate, England; ma=the Republic of Malta)

Chart 1.3

Correlated Written Responses of Scale Scores for Technical Processor at a score of 27 or above annotated by age, educational classification* and geographic location**	Students whose Scale Scores for Technical Processor were 27 or above answered the LCI written question 3 "how would you like to structure your learning activities?" in this manner:
[18/sped/us]	1) Have a better learning environment. How is learning fun when you are surrounded by four white cinder block walls with children's posters.
[12/r/ma]	2) Take more breaks and have lessons in the countryside.

[17/r/us]	3) Explore things around us. Our school is not a mile from a state park and yet we've never gone there to study anything, plants or animals.
[12/r/ni]	4) Do more activities. Like we've got a miniature wood near us and we've never been in it. Instead of learning from drawings we should go out to see things.
[08/sped/eng]	5) Visit places of interest and make things.
*r=regular education; sped=special education; wss=westinghouse science scholar	**us=United States (New Orleans, Mid-Atlantic,

	Milwaukee); ni=Belfast, Northern Ireland; eng= Harrogate, England; ma=the Republic of Malta)

Chart 1.4

Correlated Written Responses of Scale Scores for Confluent Processor at a score of 27 or above annotated by age, educational classification*, and geographic location**	Students whose Scale Scores for Confluent Processor were 27 or above answered the LCI written question 3 "how would you like to structure your learning activities?" in this manner:
[11/r/ni]	1) Turn ordinary lessons into fun lessons by doing lots of different things.
[14/r/us]	2) Do class projects like plays to show what we know already and compare them to each others

	and pick up facts.
[10/sped/eng]	3) Do lots of games and projects.
[12/r/ma]	4) Let me do artistic or crafty things.
[15/r/us]	5)Give more freedom. Allow more creativity in what we do.
*r=regular education; sped=special education; wss=westinghouse science scholar	**us=United States (New Orleans, Mid-Atlantic, Milwaukee); ni=Belfast, Northern Ireland; eng= Harrogate, England; ma=the Republic of Malta)

Discussion

This study examined the scale scores and written responses of learners of differing ages,

level of academic performance, aptitude, ethnicity, and culture and asks the question: "are learning patterns universal and equally dispersed among the learners." The scale scores as well as the written responses suggests that the learners (regular, special and gifted) who were participants in this study use the same "stable over time" patterns of cognition (intelligence, aptitude, experiences, levels of abstraction), conation (pace, autonomy, natural skills) and affectation (sense of self, values and range of feelings) to engage in a learning tasks. Worthy of note is the observation that students, regardless of their perceived status as a learner, who shared the same "within range" scores on the LCI, wrote similar or identical statements on the open-ended questions of the LCI, to express their frustrations and describe what makes learning work best for them. The written responses of the students when read in their completeness indicate they share common concerns and common learning needs. One has only to read the responses of students grouped as high in any one of the four patterns to recognize that a difference among the respondents on the basis of age, aptitude, or ethnicity is virtually impossible to identify.

The findings of this study suggest that the LCI possesses the features of a learning styles inventory which has universal application. Clearly students, regardless of age, educational classification, gender, ethnicity, or geographic locale were able to respond to the 28 items in a manner which validated the construct validity of the instrument. Further the written responses confirmed the unity between scale scores and self-generated responses suggesting that the LCI can help teachers understand learners because it provides a valid mechanism for capturing the respondent's thoughts about how s/he learns.

Significance

This collection of data represents a significant finding - the unified voice of students who seek to have their interactive learning process understood, respected, and nurtured regardless age, gender, ethnicity, cognitive aptitude, or physical capability.

When work on the learning styles instrument was begun, no one could have foreseen that its development would lead to an awareness of the universality of the expression of individual learning patterns. This serendipitous finding should give all educators pause to rethink the external labels and classifications as well as the classroom barriers we have artificially developed to elevate, isolate, and/or remediate learners. The words of a teacher written during a workshop on learning suggests what we as educators might gain from listening to the words of our charges, our students:

Reflection on Learning

What powerful understandings resides within our students. All we have to do is listen to them. They will tell us who they are and, if we listen, they will guide

our learning together - it is our responsibility to listen, listen. What a challenge we have - what an opportunity - what a responsibility!

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