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THE RELATIONSHIP OF COGNITIVE STYLE MAPS TO THE PREFERENCE FOR EXPERIENTIAL LEARNING OF UNDERGRADUATE STUDENTS

Marta B. Calás, University of Puerto Rico at Mayaguez
Marta Colon de Toro, University of Puerto Rico at Mayaguez
José H. Romaguera, University of Puerto Rico at Mayaguez

ABSTRACT

An exploratory study was undertaken to determine if cognitive styles of undergraduate business administration students would influence their preferences for learning through experiential methodologies. Cognitive maps for each student in the sample were obtained from Hill's Cognitive Style Interest Inventory, while their preferences on experiential exercises were determined by the scores on an evaluating instrument which was administered after completing each exercise. This procedure permitted the comparison of the elements in the cognitive maps of those who had low preference versus those who had high preference for experiential exercises. Results indicated few differences between the cognitive maps of both types of students. Moreover, additional comparisons suggested that their preferences might also be influenced by the similarities or dissimilarities between their cognitive styles and those of their instructors.

INTRODUCTION

The relationship of learning styles to instructional methodologies has become of particular importance *to* academicians in recent years. This interest appears to derive from certain developments which have occurred in the educational field over the past two decades. Some of these are:

1.The increasing evidence that motivation to learn and actual learning are closely related [8; 6; 26; *5]*.

2.The availability of alternative pedagogies and instructional modes which might augment the motivation within the learning situation.

3.The development of models which describe cognitive styles, and the design of instrumentation to determine cognitive styles of individuals. These styles have been related to preferred learning environments and activities.

For those instructors and researchers who have been using experiential methodologies in their courses and projects, Kolb's four-stage experiential learning model [2o]and its related instrument, Learning Style Inventory (LSI)[21] are well known. One important use given to the LSI has been to compare perceived learning in pedagogically different training situations, and to imply that certain pedagogies are better suited to specific learning styles[12;1;3519] . Nonetheless, over the past three years there have been some studies that indicate a definite bias on the current version of the LSI, rending it unreliable as a measuring instrument, even though not necessarily as a result *of* the limitations of the model upon which it has been developed [10; 4].

On the other hand, for those involved in teaching within the business and management fields, the conceptual framework of the Educational Sciences and the Cognitive Style Interest Inventory have seldom been applied for the purposes described above. Developed by Hill [15] at Oakland Community College, Michigan, it holds the assumption that learning has four distinctive groups of behaviors:

A.Behaviors which deal with receiving information, categorized as follows:

1. Being able to read and understand written or printed messages in (a) words, T(VL) or (b)numbers, T(VQ).

2. Being able to listen and understand spoken messages in (a) word; T(AL) or (b) numbers, T(AQ).

3. Sensitivities to stimuli not directly affected by the culture, received by the five senses:
(a)Sight- all those images not in coded language, Q(V).
(b)Sound- all those images not in coded language, Q(A).
(c)Smell- odors, scents, aroma, etc., Q(O).
(d)Touch- softness, hardness, coarseness, heat, cold, etc., Q(T)
(e)Taste- sweetness, sourness, acidity, bitterness, etc., Q(S)

4. Sensitivities to stimuli affected by culture, received as sensory images through the five senses:
(a)Empathy- receive data through sensitivity to the feelings of others, Q(REM). (b)Esthetics- receive data through perceiving beauty, Q(RES).
(c) Histrionics- receive data through perceiving staged behavior or role playing, Q(RH)
(d)Kinesics- receive data through understanding body language, Q(RK).
(e)Proxemics- receive data through judging the social and physical distance others desire, Q(RPR).

B.Behaviors dealing with the setting in which data is interpreted, categorized as follows:

1. Individuality- work independently to interpret data, I.

2. Associates- work with peers or associates to interpret data, A.

3. Authority Figures- work with authority figures *to* interpret data, F.

C.Behaviors dealing with reasoning to conclusions or decisions about data, categorized as follows:

1. Magnitude- reason inductively through the naming, organizing or classifying of data according to rules, policies, and/or definitions, M.

2. Difference- reason inductively through contrasting and differentiating data, D.

3. Relationship- reason inductively through relating and comparing data, R.

4. Appraisal- reason inductively through reflecting on or appraising data using all three of the above modalities, finally selecting one of the three to make a decision, L.

5. Deductive- reason deductively through analyzing a Gestalt so as to discover its component parts, 0.

D.Behaviors dealing with expressing data, categorized as follows:

1. Having to do with expressing data through coded written (a) words or (b) numbers, T(EW).

2. Having to do with expressing data through coded spoken (a) words or (b) numbers, T(EV).

3. Having to do with expressing data in non-verbal modest
(a)Histrionics- express data through staging behavior or playing roles, Q(EH).
(b)Kinesics- express data through performing body movements such as facial expressions and gestures, Q(EK).
(c)Transactional- express data through maintaining an interaction which influences the goals or actions of others in a positive manner, Q(ETR).
(d)Ethic- express data through the use of behaviors indicative of commitment to the task or obligation, Q(EET).
(e)Temporal- express data through the use of a time framework imposed by others, Q(ETM).

As could be seen from the above descriptions, these learning behaviors are not described in the same terms as those in Kolb's model (even though Kolb's Convergers appear to be high in deductive reasoning, while Divergers and Assimilators appear to be high in the appraisal reasoning process according to Hill's model). Rather, its dimensions define on a more specific basis those individual characteristics and learning environments which an individual prefers to use in searching for meaning when involved with an educational task. Also, different from Kolb's and from other models [27;32;36] this model and its corresponding instrument were developed to identify specific strengths and weaknesses on the learning ability of individuals, in order to design educational prescriptions with alternative methods of instruction, as a mean to enhance students' achievement in their courses [29]

Numerous research studies support the view that when instruction strategies are matched to student cognitive styles a higher level of learning can be achieved C14; 33 16;34;24; 11] while few have failed to show otherwise [3] Moreover, Retzke [30] found that the use of cognitive style information in the classroom had a positive and significant effect the motivational level of the students. His research indicates that students whose cognitive styles may be described as experiential or project oriented, and independent, had lower motivational levels than other students in traditional learning environments. These students showed greater gains in motivational levels than students with different cognitive styles, when involved in non-traditional learning activities. Nonetheless, as previously mentioned, few studies have attempted to utilize Hill's model in research regarding leaning of bus mess-related subjects [7;31] even though some suggested its application in personnel selection and allocation 28;22J and in marketing for audience segmentation [13].

Therefore, because Hill's model, according to the review of the literature, appeared to be a promising alternative in the definition of learning styles which could be better related to certain pedagogies in business administration education, this study utilized the theory to determine whether any element in the cognitive style of business administration students was related to preference in learning from experiential activities [17]

Furthermore, two major research questions were formulated for the investigation:

1. Are certain cognitive elements unique to those business administration undergraduates who have a preference for experiential exercises as a learning methodology?

2. Are certain cognitive elements unique to those business administration undergraduates who have a dislike for experiential exercises as a learning methodology?

METHODOLOGY

During the second week of classes, thirty five business administration students undergraduates who were enrolled in an introductory Personnel Management course for the first semester of academic year 1981-1982 responded to the Cognitive Style Inventory developed by Hill. These students comprised 62% of total enrollment for the course distributed in two sections, each with a different instructor.

Student responses to the 232-question instrument were recorded and analyzed as to define a cognitive style map for each subject, listing the elements of their cognitive styles in the 29 categories within the four groups of behaviors identified by Hill.

After the third week of classes, the instructor of each section initiated the use of one experiential exercise each week to illustrate the concepts being discussed in the course at that time. Once the exercise was completed and debriefed, the students had to evaluate it using a modified version of an instrument designed by Hoover and Whitehead [18] to evaluate courses using alternative teaching methodologies. This instrument is shown in Appendix I. The instructors chose the exercises by mutual agreement and maintained uniformity in the administration and debriefing procedures, to control for variation in perception regarding the exercise itself.

The scores which resulted from the evaluation of six exercises were used to construct two groups with the 35 students. Group I, with 18 students, showed high preference for experiential exercises, while Group II, with 13 students, showed low preference for experiential exercises. High preference was defined as composite mean scores, in the evaluating instrument for the exercises, of 4.3 and above on scales with a range from 1 to 7. Also, they have to show scores above the mean preference scores for no less than three exercises. Low preference was defined as composite mean scores below 4.3 on the same scales, which were also below the mean preference scores for no less than three exercises. On account of these definitions, four cases which did not fulfill both requirements were eliminated from the original sample.

Thereafter, the 29 elements in the cognitive maps of students in Group I were compared to the same elements in the cognitive maps of students in Group II, using t-tests to measure the differences in the scores.

RESULTS

Only two cognitive elements appeared to be significant in the differences between Group I and Group II. These were: preference to receive data through perceiving beauty Q(RES) and preference to express data through maintaining an interaction which influenced the goals or actions of others in a positive manner Q(ETR). in both instances, Group I (those with a high preference for experiential exercises) had high scores in the cognitive elements while Group II (those with a low preference for experiential exercises) had low scores. The differences were significant at the .01 level.

Moreover, since only two differences were found, an additional inspection of the data was performed. At this time each group was separated by instructor, and cognitive elements of each were again compared. It was suspected that the similarities in the cognitive styles of high preference and low preference groups could be a result of students indicating preference for the exercises on account of their like or dislike for the instructor rather than for the exercise as such.

Other studies have shown that a high degree of match between the cognitive maps of students and teachers could account for positive perceptions of each other, while the opposite might hold true when the cognitive maps are dissimilar (25; 2; 23]. In this case the instructors' cognitive maps presented differences between themselves in 13 of the 29 cognitive elements, which could ,therefore, influence the preference of students in opposite directions.

Groups I from both sections were compared and no significant differences were found, but the comparisons between Groups II indicated significant differences (at the .05 level) in their preference to work with authority figures F, and their preference to express data through performing body movements such as facial expressions and gestures, Q(EK). Furthermore, these two elements were different in the cognitive maps of the instructors.

The responses indicated a tendency to have low preference for the exercises if there were low similarities between the cognitive elements of the students and of the instructors, while the opposite was true for those who had high preference for the exercises.

Comparisons between Group I and Group II for each section showed significant differences (at the .05 level) in the four items mentioned above.

DISCUSSION

The results indicate that the cognitive style concepts as defined by Hill, and the Cognitive Style Interest Inventory could provide a functional system to determine if experiential methodologies could be successful in a particular course. The criterion of success, however, was defined as preference for the methodology and its ensuing motivation, rather than the degree of achievement in the course.

On the other hand, interactions between the cognitive elements of students and instructors, as well as the cognitive elements which might be required by the methodology, could help to explain some of the ambiguities observed. For example, high Q(RES) and high Q(ETR) appear to be logical elements in the cognitive maps of those who might have high preference for experiential exercises, but the same could be said for other factors such as T(EV), Q(A), Q(V), Q(R~21), Q(RH), Q(RK), A, L, Q(EH), Q(EK), Q(EET), and Q(ETM). However, most students in the sample were high in these elements, regardless of their preferences for experiential exercises. This suggest that consideration should be given to other factors before prescribing the experiential methodology in courses where students indicate high scores in cognitive elements such as those mentioned above.

Further, Group I in one section had high scores in F, which is the preference to work with authority figures to interpret data, while Group Tin the other section had low scores in the same element, but their scores, within each section, were similar to that of the instructor. It is implied that high scores in this particular element should be considered a negative factor for the experiential learning situation, unless accompany by high scores in A, the preference to work with peers and associates to interpret data. Nevertheless, all the groups (I and II) in both sections were low in A, while the instructors were high in that element.

The above observations suggest complex relationships derived from the application of the Educational Sciences concepts to the experiential pedagogies, but these results should be interpreted with caution since the data were obtained from a limited sample, and only a small number of experiential exercises were performed. Also, the validity of the instrument used to evaluate preference for the exercises could be challenged.

CONCLUSIONS AND RECOMMENDATIONS

Cognitive Style Maps permitted to define learning characteristics of business administration undergraduates, and to determine those elements which might influence their preference for experiential learning methodologies. Some of these elements appeared to be related to preferences for experiential exercises, while other appeared to be influenced by the instructors' cognitive styles. Nevertheless, limitations in the data prevent further generalizations.

Future studies, with larger samples, and within more intensive experiential courses, could permit the definition of a cognitive profile for those who derive motivation when learning in experiential environments. Moreover, other investigations should indicate if there are any relationship between achievement and certain cognitive elements in experiential courses.

APPENDIX I

How I Evaluate This Exercise

Listed below are sets of items. Circle the number on the scale which best describes your feelings about this exercise. Please indicate only one number for each set.

This exercise was:

Interesting	7 6 5 4 3 2 1	Boring
Satisfying	7 6 5 4 3 2 1	Dissatisfying

Informative, packed with pertinent knowledge	7 6 5 4 3 2 1	Uninformative, barren without useful knowledge
Applicable to the "real world"	7 6 5 4 3 2 1	Unrealistic and nonapplicable
Learning processes were simplified	7 6 5 4 3 2 1	Learning processes were too complex
Helped to develop my managerial skills	7 6 5 4 3 2 1	Did not develop my skills
The learning process was pertinent to my self-development	7 6 5 4 3 2 1	The learning process was irrelevant to my self-development
I felt I could express myself easily and freely	7 6 5 4 3 2 1	My self-expression was difficult or dicouraged
Helped integrate course material	7 6 5 4 3 2 1	The exercise confused students
I felt the exercise challenged me	7 6 5 4 3 2 1	The exercise did not challenge me
I felt active and "involved"	7 6 5 4 3 2 1	I felt passive and "aloof"
I felt the exercise required me to exert a great deal of initiative	7 6 5 4 3 2 1	I felt the exercise required me to exert very little initiative

REFERENCES

[1] Brenenstuhl, David C., and Ralph F. Catalanello, Can Learning Styles be Used as Curriculum Aids?", Journal of Experiential Learning and Simulation, Vol. 1, No. 1, 1979, pp. 29-37.

[2] Brodbeck, Ned A., Influence of the Degree of Match Between Counselor and Counselee in the Terms of Educational Counseling Situation, doctoral dissertation, Michigan State University, 1974.

[3] Brose, William P., Analysis of Student Interaction with an Instructional Video Tape Package in Terms of Cognitive Style, doctoral dissertation, The University of Florida, 1974.

[4] Certo, Samuel C., and Steven W. Lamb, An Investigation of Bias Within the Learning Styles Inventory Through Factor Analysis", Journal of Experiential Learning and Simulation, Vol. 2, No. 1, 1980, pp. 1-7.

[5] Clark, Phillip, Psychology, Education and the Concept of Motivation", Theory into Practice 9, April 1970, pp. 33-46.

[6] Cofer, C.M., and M.H. Appley, Motivation: Theory and Research, (New York: John Wiley and Sons, l964)

[7] DeNike, Lee, "An Exploratory of Cognitive Styles as a Predictor of Learning from Simulation Games", paper presented at the Association for Educational Communications and Technology Annual Convention, 1975.

[8] Dewey, John, Experience and Education, (New York: MacMillan, 1947).

[9] Ervin, Thomas D., The Human Element in the Establishment and Operation of a PPBS in an Educational Using Role-Sets Based on Cognitive and Administrative Styles, doctoral dissertation, The University of Michigan, 1974.

[10] Freedman, R.D., and S.A. Stumpf, 'What can One Learn from the Learning Style Inventory', Academy of Management Journal, Vol. 21, 1978, pp. 275-282.

[11] Frever, William E., An Exploratory Study of Prescriptive Instruction in Social Science Employing Educational Cognitive Styles and Systemic Analysis, doctoral dissertation, Wayne State University, 1975.

[12] Fritzsche, David J., "On the Relationship of Learning Style, Perceived Learning, and Performance in an Experiential Learning Environment', in Computer Simulation and Experiential Learning Theory, (Austin, Texas: The University of Texas at Austin, 1977).

[13] Furse, David H., An Exploratory Investigation of Audience Segmentation in Advertising Based on Cognitive Style, doctoral dissertation, Georgia State University, 1974.

[14] Hauser, Edward J., An Analysis of Learning an Environmental Education Concept from an Audio- Tutorial Method and a Print Self-Instructional Package Based on the Educational Science of Cognitive Style, doctoral dissertation, Kent State University, 1975.

[15] Hill, Joseph E., Educational Sciences: An architectonic schema, (Detroit: Wayne State University, 1966).

[16] Hollis, Joseph H., A Pilot Study of a Personalized Mathematics Programs for Fourth, Fifth and Sixth Grade Students to Explore the Relationship Between Cognitive Style Performance Objectives and Achievement, doctoral dissertation, Wayne State University 1974.

[17] Hoover, J. Duane, "Experiential Learning: Conceptualization and Definition' in James Kenderdine and Bernard Keys (editors), Proceedings of the Association for Business Simulation and Experiential Learning, 1974, p. 35.

[18] Hoover, J. Duane, and Carlton J. Whitehead, "An Experimental Evaluation of a Cognitive Experiential Learning Methodology in the Basic Management Course', Journal of Experiential Learning and Simulation, Vol. 1, No. 2, 1979, p. 119.

[19] Kevin, R.C., and P.G. Liberty, 'Students Personality, Attitude and Learning Styles as Predictors of Performance in an Undergraduate Organic Chemistry Course using Computer Based Education", U.S. Educational Resources Information Center, ERIC Document ED 115 210, 1975.

[20] Kolb, David A., "On Management and the Learning Process", Organizational Psychology: A Book of Readings, David A. Kolb, Irwin M. Rubin, and James M. McIntyre (editors), (Englewood Cliffs, N.J. *2* Prentice-Hall, 1974, pp. 27-41)

[21] Kolb, David A. "Individual Learning Styles and Learning Process, Working Paper # 535-71, M.I.T. Sloan School * 1971.

[22] Korin, Uri, An Investigation in the Educational]Sciences to Determine the Administrative Style of]Successful Principals and Graduate Students in]Educational Administration, doctoral dissertation, Kent State University, 1974.

[23] Kunchiskas, Gloria A., A Exploratory Study of the Relationships Among Cognitive Styles of Teachers, Students, and Their Reading Materials in Second and Fourth Grade Classrooms, doctoral dissertation Florida Atlantic University, 1974.

[24] Lepke, Helen S., An Exploratory Study of Cognitive Style as an Aspect of Prediction of Achievement in Individualized and Conventional Instruction in Beginning College German, doctoral dissertation, The University of Akron, 1975.

[25] Lipson, Paul E., Influence of Educational Cognitive Style and Teaching Style on Grading Practices in Junior High School, doctoral dissertation, Wayne State University, 1974.

[26] Lynton, Rolf P., and Udai Parrek, Training for Development, (Homewood, Ill: Richard D. Irwin, Inc 1967).

[27] MacNeil, Richard D., 'The Relationship of Cognitive Style to Learning Performance of Undergraduate Students", Journal of Educational Research, Vol. 73, No. 6, 1980, pp. 354-359.

[28] Niles, Thomas R., A Comparison of Cognitive Styles Between the Most Successful Michigan Directors of Community Education and Other Michigan Directors of Community Education, doctoral dissertation, Western Michigan University, 1974.

[29] Nunney, Derek N., "Educational Cognitive Style: A Basis for Personalizing Instruction, The Educational Scientist, Fall 1975, pp. 13-26.

[30] Retzke, Ron, "Using Educational Cognitive Style Mapping to Increase the Motivation of Junior High Students', The Educational Scientist, Fall 1976, pp. 16-27.

[31] Smith, Roger A., An Exploratory Study of Cognitive Learning Style Components for Achievement Using Computer Simulation Games, doctoral dissertation, Iowa State University, 1974.

[32] Steckroth, Richard L., John W. Slocum, Jr., and Henry P. Sims, Jr., "Organizational Roles, Cognitive Roles, and Problem-Solving Styles", Journal Experiential Learning and Simulation, Vol. 2, No. 2 1980, pp 77-87.

[33] Stringfellow, Hart R., Jr., Cognitive Style Differences Among Dental Students and Achievement in Oral Diagnosis Using Computer Assisted Instruction - An Experimental Study, doctoral dissertation, The University of Florida, 1975.

[34] Wangler, John A., Personalizing Education by Means of the BURST Configuration Utilizing the Educational Sciences in the Study of Social Science, doctoral dissertation, Wayne State University, 1974.

[35] Wolfe, Douglas E., and Eugene T. Byrne, 'A Comparison of Perceived Learning in Three Pedagogically Different Sections of a Required Business Policy Course", Association for Business Simulation and Experiential Learning Proceedings, 1976, pp. 474-482.

[36] Wooten, Kevin C., and Louis P. White, CBID: Cognitive, Behavioral, and The Interpersonal Development - A Social Learning Approach to Skill Development', Journal of Experiential Learning and Simulation, Vol. 2, No. 2, 1980, pp. 89-99.