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Student Teacher Performance Related to Cognitive Style

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Abstract

Research conducted in the field of cognitive style suggests there are certain learning styles which can be identified, defined and measured. However, the literature points out that a neglected aspect of research is an exploration of relationships between students' cognitive styles and performance. The goal of this study was to explore whether the cognitive style manner of reasoning scales were jointly and differentially, related to student teachers' academic performance. The sample consisted of 40 primary school student teachers enrolled in the second year of the Diploma in Teaching course at the Townsville College of Advanced Education, Townsville, Queensland. Data was gathered by the Hill Cognitive Style Mapping instrument. Student teacher scores on an academic task were used to measure performance. The data were analysed by multiple and stepwise regression techniques. Results of the study were that: (a) cognitive style manner of reasoning scales, operating jointly, contributed 30.9% of the variance in student teacher academic performance and (b) cognitive style manner of reasoning scales — relationships, categorical and appraisal, operating differentially, accounted for 9.8%, 9.1% and 8.7% respectively, of the variance in student teacher academic performance. Results were statistically significant at the .05 level.

The increasing concern with both the disadvantaged learning student and matching student's learning styles with instruction has stimulated research into cognitive style. Cognitive styles are ways learners process information which comes from either outside or inside themselves (Witkin & Moore, 1974).

Research conducted in the field of cognitive style suggests there are certain styles which can be identified, defined and measured (Jones & Berneman, 1977). Moreover, Sigel and Coop (1974) posit that cognitive style relates to performance on academic tasks. If students' preferred learning styles are matched with instructional tasks effective student learning should be facilitated. This infers that teachers should draw on a repertoire of strategies to match the learning preferences of students with instructional tasks.

A theoretical framework around which cognitive style could be conceptualised, and this study designed, was provided by Joseph Hill of Oakland Community College in Michigan, U.S.A. (Hill, n.d.). Hill conceptualised cognitive style as being composed of four interacting elements: symbols and meaning; cultural determinants of meaning and symbols' modalities of inference; and neurological, electrochemical and biochemical aspects of memory functions. Cognitive style mapping (CSM) is an important component of the Hill model. CSM is a diagnostic technique

used to identify a learner's relative learning strengths on selected learning variables.

Cognitive style mapping identifies 23 learning skills which make up the following four elements of a person's cognitive style: theoretical skills — these focus on how learners prefer to take in theoretical information; social qualities — describes how learners supplement and filter information taken in such as viewing principles as important (ethic) and the ability to put yourself in another person's place (empathetic); cultural influences — this focuses on the learner's environmental preferences based on perceptions, peer groups, and family; and manner of reasoning — this component describes the learner's manner of reasoning, such as, the tendency for deductive reasoning.

The cognitive style map is then interpreted and a representation of the learner's strengths and preferences is developed. The information is used by teachers to adapt the learning task to the learner's cognitive style. Indeed, a fundamental concept of the Hill model is that the matching of student learning strengths and learning task leads to effective learning.

Goldstein (1978), in a review on research on cognitive style, reported that researchers have investigated: relationships among cognitive style, personality variables, psychopathology, and the academic environment. However, the educational implications of cognitive style have not yet been fully explored. Indeed a neglected aspect of research is an investigation of relationships between students' preferred learning styles and academic performance. Investigating these relationships might provide data to facilitate effective instruction as delivery systems could be planned to match instructional strategies with students' preferred learning style — using those learning preferences which relate to student performance.

Arising from this framework, the purpose of the present study was to explore whether cognitive style scales of manner of reasoning, operating jointly and differentially, were statistically significantly related to student teachers' academic performances. The manner of reasoning scales were selected because they reflect learning preferences for processing information inherent in academic performance tasks such as deductive reasoning, analysing relationships, and drawing contrasts from symbolic data.

METHOD
Subjects

The subjects consisted of 40 preservice primary school student teachers enrolled in the second year of the Diploma in Teaching course in 1979 at the Townsville College of Advanced Education, Townsville, Queensland. The subjects were students in a curriculum and instruction component of the Diploma course.

Instrument

The independent variable (manner of reasoning) was measured by Hill's Cognitive Style Mapping (CSM) instrument during may, 1979. The diagnostic CSM contains 92 items, where scores correspond to 23 cognitive style scales

falling into four general areas: theoretical skills, social qualities, cultural influences and manner of reasoning. This study used the manner of reasoning scales.

The manner of reasoning scales refer to one's preference in processing information. The five manner of reasoning scales are: *categorical,* the preference for using clearly stated principles in decision making; *differences,* which expresses the preference for a person to think of opposites or contrasts; *relationships* reflects the preference for a person to look for similarities, rather than differences; *appraisal* focuses on the person's preference for weighing both sides of an argument in decision making; *deductive reasoning* relates to a person's preference for making inferences from general to particular as logical proof used in geometry.

The reasons for selecting the CSM were: the instrument is known to have a high face validity for student teachers (Jones & Berneman, 1977); Goldstein (1978 p.28) reported that research results conducted on the CSM show that it has high reliability and there are indicators that the validity is moderately high as well; the CSM would have outcomes with some degree of overlap with existing Townsville College of Advanced Education teacher education course goals. A number of courses have objectives which relate to learning styles. Therefore, it would be advisable to select an instrument that would permit a careful study of preferred learning styles. This would also reinforce the face validity of the CSM; the CSM can be interpreted easily by students as feedback to them would be provided. Hence, the CSM lends itself to interpretation without being unduly complex; reports by educational researchers indicate an acceptance of the CSM (Jones, 1979; Thompson, 1979).

The dependent variable (academic performance of student teachers) was measured during June-July, 1979 using scores on an assessment device which required students to demonstrate information processing skills. Lecturers in the curriculum and instruction subject indicated their perceptions of student teachers' competence on academic performance by rating them on a 0 to 15 scale for the assessment device.

Analytical Procedures

Multiple and stepwise regression analysis was used to explore whether the independent variables (manner of reasoning scales) were jointly or differentially related to the dependent variable (academic performance).

RESULTS

The discussion which follows presents the findings pertinent to the purposes of the study. Multiple regression analysis was used to explore if manner of reasoning scales, operating jointly, were statistically significantly related to student teacher performance. This procedure enabled the researcher to determine the strength of the overall dependence of student teacher performance on the manner of reasoning scales operating jointly.

The analysis used the CSM's five manner of reasoning scales (categorical, differences, relationships, appraisal and deductive reasoning). These five variables were entered into the multiple regression analysis as predictors of the dependent variable — student teacher performance on academic tasks.

Table 1

Summary of Regression of Performance Scores on CSM Manner of Reasoning Scale Scores

	Multiple R	R^2	F
Sudent Teacher Performance	.5560	.3091	3.04*

Note: N = 40
  df 5, 34
  *p<.05

Table 1 provides summary statistics for the regression of student teacher performance scores on manner of reasoning variables.

Stepwise regression analysis was used to explore if the manner of reasoning scales were statistically significantly differentially related to student teacher performance. This analytical procedure provided for the addition of one or more independent variables into the regression equation in steps.

The R^2 reveals that 30.9% of the variance in student teacher performance was explained by the manner of reasoning scales operating jointly. The multiple regression coefficient produced an F value of 3.04, significant at the .05 level. This statistic was sufficient to support the hypothesis that student teacher performance is statistically significantly related to CSM manner of reasoning scales operating jointly.

Table 2

Regression of Performance Scores on CSM Manner of Reasoning Scale Scores

CSM Manner of Reasoning Variable	Multiple R	R^2	R^2 Change (%)	F
Categorical	.3031	.0918	9.1	3.84*
Relationships	.4360	.1901	9.8	4.49*
Appraisal	.5266	.2773	8.7	4.34*
Deductive Reasoning	.5505	.3030	2.5	1.29
Differences	.5560	.3091	0.6	0.30

Note: N = 40
  df 5, 34
  *p<.05

Table 2 shows that CSM manner of reasoning scales — relationships, categorical and appraisal accounted for 9.8%, 9.1% and 8.7% respectively of the variance in student teacher performance, all of which have F values significant at the .05 level for their partial regression coefficients. This supports the hypothesis that manner of reasoning scales are differentially related to student teacher academic performance.

DISCUSSION

The research findings support the following conclusions. The finding that CSM manner of reasoning scales are related to student teacher performance adds validity to the theoretical background that preferred learning styles are related to performance. This finding is useful for several reasons. First, it confirms the belief that a student teacher's performance on academic tasks can be conceived as a number of manner of reasoning scales operating jointly. Hence there is reason to expect that in the consideration of student teacher academic performance a number of preferred manner of reasoning scales need to be examined.

Second, it would seem reasonable for teacher education programs to gather data on the student teacher's preferred manner of reasoning so that insights can be gained into the student teacher's academic performance. Moreover, it can be inferred that the teacher preparation program should be designed to assist prospective teachers to use their preferred manner of reasoning styles to the best advantage. If student teachers' preferred learning styles are reflected in deductive reasoning, teacher educators should adapt the respective learning task to the learner's cognitive style.

Third, the student teacher will bring into the teacher education program learning style preferences. These preferences could relate to how well the student teacher performs and hence teacher effectiveness. The program's instructional mode might include alternative instructional tasks which cater for a number of preferred learning styles. Moreover, these alternatives may both match existing learning tasks and styles, and expose student teachers to other learning styles.

The finding that CSM manner of reasoning scales are differentially related to student teacher performance on academic tasks suggests several conclusions. First, the student teacher's academic performance is likely to be related with: (a) lecturer's well organised presentations, with clearly stated principles and straight-forward logic when there is a learner preference for categorical manner of reasoning; (b) lecturer's illustrating how arguments fit together, and encouraging students to find out "why" when there is a preference for relationships in manner of reasoning; and (c) lecturer's giving in-depth analysis of issues when the learner's preference is for appraisal in manner of reasoning.

Second, in terms of raising student teacher performance teacher educators might consider selecting candidates on the basis of students' preferred learning styles which relate to performance. This means that it is likely to be more effective to take candidates selected on these criteria than attempt to develop such behaviours.

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Epistemic Authority, Rationality and the Fallacy of Educational Democracy

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In any rational authority system, authority must be closely connected to point, purpose and function. The situation of authority in colleges and universities (T.E.I.s*) provides a special case of such point, purpose and function.

The present paper tries to show the quite special features of the epistemic (knowledge) authority of academics that provide rational justification for their being in many positions of social authority in their institutions. To do this, (1) the partucular aspects of the point, purpose and function of such epistemic authorities will be demonstrated, (2) the logical necessity of academic disciplines for rational endeavour will be pointed out, and (3) the mistakes involved in the common notion of educational democracy will be exposed.

The Point, Purpose and Function of Epistemic Authority

Firstly, some general societal aspects of epistemic authority should be indicated.

It is clear that no person can hope to master more than a minute part of the knowledge that exists. In order that it is all mastered, there need to be knowledge specialists: this is similar to saying that there need to be epistemic authorities. Concomitantly, it can be argued that the vast body of knowledge has to be mastered by people who become epistemic authorities, if the modern, complex, industrial, liberal Western democracies are to continue to exist.

Furthermore, what makes the existence of knowledge or epistemic authorities a sort of natural necessity, is that mastery of any area of knowledge is itself a slow and laborious business, that must be gone through before any person is in a position to understand, let alone, to criticise, judge, or further develop the area, in an informed rather than a superficial way. (It is also the case that some people just seem to be 'drawn' to particular specialisms and to do well at them, while there are areas of knowledge that the less intelligent part of the population is just incapable of understanding.) Again, as de George says,

> Reliance on authority is a way in which knowledge can be transmitted and shared, so that more men may know and use this knowledge than would otherwise be the case. This, in brief, is the basis for the argument that epistemic authority is in general legitimate. The argument is a

*T.E.I. = tertiary educational institution