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ABSTRACT

While inquiry teaching has been a popular term in the social studies literature over the last decade, the empirical research appears to have paid little attention to specific inquiry models. All published papers and dissertations purporting to measure inquiry teaching for the five year period, January, 1967 through November, 1972 are reviewed and analyzed in this paper. The major section of the paper presents details of the 28 studies reviewed. The analysis is based on results of experiments on inquiry teaching classified with respect to significance of results over other teaching methods, to inquiry situations and forms of evaluation, to criteria for selection of groups and group instructors, to sample size and period of time of experiments, and to experimental design and significance of results. While it is shown that the inquiry teaching method appears to be superior in terms of recall, transfer and retention of data and in terms of developing specific skills in questioning and concept building, these results are described as tentative due to research deficiencies and lack of specificity about the nature of inquiry teaching as perceived and measured. (Author/KSM)

An Analysis Of Research Findings On The Use Of Inquiry Teaching In Social Studies During The Last Five Years (1967-1972)

Introduction

Inquiry teaching has been a popular term in the social studies literature over the last decade with educators placing their own idiosyncratic meanings on the term with gay abandon.

Unfortunately, they seem to have been reluctant to come to terms with the meaning of inquiry per se. All kinds of confusion has resulted from educators using inquiry to refer to a multitudinous array of teaching and learning techniques and activities. Even more serious are the deleterious effects that this imprecision has had on empirical research dealing with inquiry teaching. Research studies purporting to measure inquiry teaching have been hampered by clear cut definitions about what they intended to measure.

The term inquiry teaching must be stated more rigorously by both academic writers and researchers if the present state of ambiguity is to be resolved. For example discovery, inductive teaching, critical thinking and problem solving have been used as synonyms for inquiry teaching. Suchman maintains that discovery is the "aha" aspect, the intuitive breakthrough in the analysis of a problem.[34] He sees inquiry teaching as subsuming discovery in that it consists of more than the procedural elements of analysis.

Inductive teaching requires the teacher to use concrete examples as a means of unravelling concepts and generalizations.[24] However the emphasis on induction as opposed to deduction places a restriction on the kinds of teaching activities that can be utilized. The teacher using inquiry techniques might on occasion use both inductive and deductive procedures.

Critical thinking is a term commonly used to describe the processes of inquiry, as evidenced by the several standardized tests that are used to measure

student performance on this variable. However because the emphasis is on convergent thinking elements it has a narrower frame of reference than inquiry teaching which encompasses both convergent and divergent thinking elements.

In problem solving situations, students are taught to explore and critically examine a problem. This involves a student in the task of not only applying critical thinking skills, but confronting the problem and using a range of synthesizing skills to come up with a solution.[18] In other words, problem solving requires a student to use creative and intuitive thinking processes in addition to a critical thinking mode. Inquiry teaching includes all of these thought modes and to this extent is similar to problem solving. A minor difference is that inquiry teaching may involve the examination of relatively open ended issues which have no immediate solution and therefore cannot be satisfactorily brought to closure.

The writer interprets inquiry teaching as being more than a unitary method of developing concepts or a specific set of procedures. Rather it encompasses a wide range of procedural and content components.[11] For example one inquiry teaching model could be a teaching situation in which there was a highly structured course content and a scholarly sequence of procedures. Another model might be a highly student centered teaching situation where data was utilized from a wide range of disciplines within a very loose procedural framework.

Empirical research appears to have paid little attention to specific inquiry teaching models. The writer reviewed all published papers and dissertations purporting to measure inquiry teaching for the five year period, January, 1967 through November, 1972. The research too frequently focussed on a small aspect of inquiry teaching such as a questioning skill or a specific simulation, in an attempt to demonstrate the advantages of inquiry teaching over traditional

teaching. Insufficient attention was given to a full explication of the inquiry teaching models being researched. In addition to this deficiency many of the studies had serious shortcomings in their research designs. Details of the twenty eight studies reviewed, are given in the following section of the paper.

TABLE 1

RESULTS OF EXPERIMENTS ON INQUIRY TEACHING CLASSIFIED WITH RESPECT TO SIGNIFICANCE OF RESULTS OVER OTHER TEACHING METHODS (January, 1967 - November, 1972)

Variables	Significant	Not Significant	Favorable results but not statistically significant
Recall	9,21,1,29,36	13,30	22,3
Transfer	10,29		
Retention	1		
Specific Inquiry Variable (e.g. questioning skill)	14,8,5	35	19,37,12,7,16,23
Inquiry Relationship (e.g. student interest)	33,27	20,32	15,25,31,4

Analysis of Studies on Inquiry Teaching

A superficial examination of these results would give the reader the impression that inquiry teaching is infinitely more successful than non-inquiry methods in producing certain learnings. Thirteen of the twenty-eight experimental studies produced statistically significant advantages for inquiry teaching compared with five non-significant results. In addition the remaining studies

had 'near' significant results with experimenters concluding with such qualitative comments as the children were more interested, or more enthusiastic or just more active!

Nevertheless, such superficial optimism about the advantages of inquiry teaching must be examined more closely. Some of the experimenters who claimed significant results from a general inquiry teaching method, committed the error of confounding the variables.[20,27] Hunkins[20] used case studies as a vehicle to promote critical thinking but he failed to establish the specific differences in teaching between the experimental and control groups. Furthermore, it seemed doubtful that the standardized test used for evaluating student results measured the skills developed from studying the case studies. McKeown[27] had similar difficulties specifying differences in student interest between his eight groups. Researchers since 1970 seem to have been more aware of this problem as they have concentrated on specific inquiry variables rather than the 'blanket' term of inquiry teaching. Cook[8] tested specific conceptualization skills while Grieve and Davis[16] focussed on global and analytic cognitive styles.

Part of the present difficulties with empirical research is the dearth of suitable evaluation instruments. Earlier experiments on inquiry teaching such as those carried out by Bayles[2] at the University of Kansas in the 1940's, relied upon achievement test evaluations for comparison of teaching methods.

Table 2 indicates that researchers are now using a variety of evaluations, although the written achievement test and the written test on critical thinking (commonly the Watson-Glaser Critical Thinking Appraisal) are still widely used. Evaluation of verbal responses through interaction analysis ratings and indirect measures of affective states via the semantic differential technique were uti-

TABLE 2

EXPERIMENTS ON INQUIRY TEACHING CLASSIFIED WITH RESPECT TO INQUIRY SITUATIONS AND FORMS OF EVALUATION

	Form of Evaluation					
	Inquiry					Achievement
	Observation	Verbal Responses	Written Test (Cognitive)	Written Test (Affective) Direct	Indirect	Written Test
Recall	9,29	21,1	21,1,13,30 22,3		30	1,13,30,22
Transfer	29		10			
Retention			1			1
Specific Inquiry variable	35,8,5	12	37,14,7,16,23			35,16,23
Inquiry Relationship	19	33	25,33,31,4	25,33,32	27,32	15,20,4

lized by Frasier[12], Sprague[35], Torrance[38], Pierleoni[31], McKeown[27], and Shaver[34].

Another difficulty for researchers is establishing comparability between groups. A perusal of Table 3 indicates that researchers tended to use a combination of intelligence quotient, chronological age and sex as the variables for selecting their experimental and control groups. Other variables may be of much greater importance under conditions of inquiry teaching. Personality factors were utilized in studies by Pratt[32] and Boedeker[4]. Other criteria that appeared very useful but were infrequently cited included verbal ability[15] and anxiety levels[7].

TABLE 3

EXPERIMENTS ON INQUIRY TEACHING
CLASSIFIED WITH RESPECT TO CRITERIA FOR SELECTION OF GROUPS

Criteria	
Intelligence Quotient	21,19,30,22,14,25,29,8,7,23,32
Sex	25,8,7,36
Chronological Age	27,8,7
Reading Ability	21,22
Verbal Ability	15
Cognitive Style	16
Creative Ability	9
Anxiety Level	7
Dogmatism Level	31,4

A comment on the comparability of tasks for experimental and control groups should be made also. Relatively novel tasks tended to be selected for study for the experimental groups. Out of the twenty eight studies, twenty included such tasks as a simulation exercise[1], a programmed unit[31] and an experimental project[14]. One can only assume that the control groups used equally novel materials.

Comparability of instructors may be a factor which is often overlooked in research studies. It is assumed that if the experimenter carries out the teaching of all the groups himself, he has both the interest and expertise to implement the tasks adequately[1,25,34]. What cannot be assumed is the equating of teachers on the basis of a similar number of years of teaching experience or academic qualifications (Table 4). Herman's study[19] was of interest in this regard in which he matched teachers on their verbal ability prior to allocating them to experimental and control groups.

TABLE 4

EXPERIMENTS ON INQUIRY TEACHING
CLASSIFIED WITH RESPECT TO CRITERIA FOR SELECTION OF GROUP INSTRUCTORS

Criteria	
Self (Experimenter)	1,25,32
Years of Teaching Experience	19,13,16
Academic Qualifications	19
Teachers who participated in special training sessions.	12,14,7,23

TABLE 5

EXPERIMENTS ON INQUIRY TEACHING
CLASSIFIED WITH RESPECT TO SAMPLE SIZE AND PERIOD OF TIME OF EXPERIMENTS

	Period of Time of Experiments			
Size of Sample	1-2 weeks	3-6 weeks	12-15 weeks	1 year and over
Under 25		9		
26 - 50	12,29	30	25	23
51 - 100		21	22,32	
101 - 200	8,31,36	1,10,27		15,4
201 - 300	37,35,16		3	
Over 300	7,5	19,13,33	20	14

Limitations of insufficient research rigour in experimental design must also be considered when assessing research findings. It is unfortunate that for many doctoral studies, time and money costs preclude extensive experimental studies over long periods. For example an examination of Table 5 indicates that the brevity of the sample and the length of time of some of the experiments would

raise serious questions about the reliability of the results. Specifically, six of the studies used population samples of less than fifty subjects and ten studies were carried out with classes over a period of less than two weeks.

TABLE 6

RESULTS OF EXPERIMENTS ON INQUIRY TEACHING
CLASSIFIED WITH RESPECT TO EXPERIMENTAL DESIGN AND SIGNIFICANCE OF RESULTS

Experimental Design	significant	not significant	favorable result but not significant
Two or more Comparison Groups	9,29,8	35,32	19,3
Two Groups Pre Test Post Test	21,10,36	30	12,22,15,25,7
Four or more Groups Pre Test Post Test	1,27	13,20	4
Two Groups Post Test	14,33,5		37,31,16,23

Table 6 depicts the range of experimental designs used by the researchers. Eight of the studies used comparison groups which although relatively convenient to establish, have serious internal validity deficiencies. Campbell and Stanley[6] emphasize the difficulties of comparing two groups on either the presence or absence of one variable as this presupposes perfect homogeneity on all other variables. The two group, pre-test - post-test design appears to be a more viable research design and this was used by eight researchers. The more recent studies, such as those by Pratt[32], Grieve[16], Boller[5], and Levin[24], used a two group post-test design which eliminates bias resulting from prior exposure to a test.

Finally, mention must be made about the detailing of procedures used with both experimental and control groups. The writer noted procedures for the control groups in only sixteen of the twenty eight studies. To facilitate replication of experiments it is most necessary that full detailing, be provided, as exemplified in Suchman's studies at the University of Illinois[36].

Conclusions

From an examination of twenty-eight experimental studies dealing with inquiry teaching in social studies, it might appear that the inquiry teaching method is superior in terms of recall, transfer and retention of data and in terms of developing specific skills in questioning and concept building. However, these results are very tentative because many of the studies contain research deficiencies such as sample size, lack of comparability of groups and instructors and in adequate forms of evaluation. Above all, the studies lack specificity and precision about the nature of inquiry teaching as they perceive it and measure it.

It is quite clear that substantial, comprehensive research programs are needed to elucidate the relative worth of inquiry teaching procedures. It is equally clear as indicated by Massialas and Cox[26], Gross[17], and Merwin[28], that the present range of fragmented studies, largely carried out by doctoral students, cannot hope to provide any real solution to the problem.

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