Cognitive Skill Development: Attitudes and Use Among Agricultural Education Professors in the United States

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Teacher education programs have come under fire as the education reform movement of the 1980's progresses. Major recommendations for the improvement of teacher education programs have included higher admission standards for entering students, more credit hours in subject matter areas for teacher education students, competency testing of beginning teachers, stiffer graduation requirements, more emphasis on supervised student teaching, and the development of five-year teacher education programs (Winkler, 1985).

Many of the "reform" reports have also emphasized the need to develop thinking skills among students of all ages. The education basics proposed for the future have included skills in evaluation, analysis, critical thinking, problem solving, organizing, synthesis, application, creativity, decision making and communicating (Despain, 1983). These skills, along with others, have been cited as thinking or cognitive skills (Isaksen, 1983; Raths, Jonas, Rothstein, & Wasserman, 1967).

In agricultural education, the problem solving approach to teaching has probably been the most prevalent cognitive skill development technique used (Krebs 1967; Phipps, 1980). Crunkilton and Hemp (1982) reported that while college-level agricultural educators believed that their students should learn to teach problem solving, those same educators reported that their programs were not excelling in the teaching of these skills.

Changes in the agricultural teacher education programs are likely to occur as a result of the educational reform reports, legislative action and national studies. The push for thinking skills development for survival in the information age will also probably continue. Agricultural educators have a long history of support for cognitive skill development in the narrower context of problem solving. What attitudes do they currently hold toward cognitive skill development? What thinking skills techniques do they use in their own classes?

Purpose

The study's major purpose was to determine agricultural education professors' attitudes toward the use of cognitive skill development within the university classes they teach. Null hypotheses were:

1. No significant differences exist in agricultural education professors' attitudes and frequency of use composite scores when grouped according to selected independent variables.

2. No significant relationships exist between either the attitude composite scores or the frequency of use scores and selected independent variables.

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Methodology

Population and Sample

The population for the study was all agricultural education faculty in the United States. Agricultural education professors were defined as individuals whose positions were held within an organizational unit responsible for preparing persons for careers as teachers of agriculture, extension personnel and/or employees in the related fields such as agricultural mechanics and international agricultural education. To be included in the population, individuals had to hold a minimum rank of assistant professor, be employed by a four-year, post-secondary educational institution within the United States and be listed in the 1984-85 Directory of Agricultural Teacher Educators. Of the 319 individuals identified, a random sample of 176 faculty was drawn by using a microcomputer random numbers generation program.

Data Collection and Analysis Techniques

A descriptive research method was used with data collected through the dissemination of a questionnaire designed to ascertain attitudes, use and demographic information as prescribed in the study's objectives. Alpha was set at .10 because of the study's exploratory nature.

Included in the questionnaire were 36 items regarding professors' beliefs toward the cognitive learning theories, another 36 items regarding cognitive skill development techniques professors might have been using in their classes, and 10 demographic items.

The Certainty Method of Response was used to measure attitude and use with an 11-point scale transformed to a 16-point scale as recommended by Warren, Klonglan and Sabri (1969). For each item, respondents were asked to make two responses. First, they were asked to determine whether they agreed or disagreed with the item. Next, they were asked to indicate the strength of their agreement or disagreement, from slightly to strongly agree or disagree. A neutral response was recorded by the respondent circling the agree-disagree frame and leaving the scale blank.

To establish questionnaire validity, a panel of experts was used. The panel included Iowa State University agricultural education faculty, graduate students and an educational psychologist. An extensive literature review was also used.

The first mailing was made on November 1, 1984. On November 16, 1984, a follow-up questionnaire was sent to non-respondents. One respondent was removed from the study because he or she was lacking the minimum professorial rank established for the study. The final useable response rate was 78.97% (n=139). Statistical procedures revealed no significant differences between respondents and non-respondents.

Results

Post hoc reliability tests using Cronbach's alpha resulted in coefficients of .73 for the attitude measure, after the removal of six items from the composite score, and .78 for the utilization measure with no items removed.

Agricultural education professors had a positive attitude toward cognitive skill development with a mean composite score of 10.34. They also indicated a frequent use of cognitive skill development techniques with a mean composite score of 9.64.

As shown in Table 1, a significant mean difference, using t-tests, was found in the attitude and use mean composite scores of professors when grouped according to their major level of teaching. Those who had major teaching responsibilities at the graduate level had a significantly higher attitude composite score ($\bar{x}$=10.64) than did those who taught primarily at the undergraduate level ($\bar{x}$=10.17). Those with mostly graduate teaching responsibilities also had a significantly higher frequency of use composite score ($\bar{x}$=9.84) than those with primarily undergraduate teaching responsibilities ($\bar{x}$=9.51). No significant differences were observed in the attitude composite scores or the use composite scores for the other independent variables reported in Table 1.

Table 1

Means, Standard Deviations and t-Values of the Learning Theories Attitude Composite Score and Frequency of Use Composite Score by Selected Independent Variables

	Attitude[a]			Use[b]		
Independent variable	n	Mean / S.D.	t / p	n	Mean / S.D.	t / p
Major area of responsibility:						
Teacher education	101	10.33 / 1.00	0.16 / .871	101	9.61 / 0.92	-0.25 / .808
Non-teacher education	23	10.29 / 0.86		22	9.67 / 1.22	
Major level of teaching responsibility:						
Undergraduate	88	10.17 / 0.84	-2.38 / .020	87	9.51 / 0.94	-1.89 / .062
Graduate	46	10.64 / 1.20		46	9.84 / 1.04	
Time budgeted for administration:						
No administration	80	10.37 / 0.95	0.27 / .786	80	9.57 / 1.09	-1.38 / .169
Some administration	50	10.31 / 1.11		50	9.79 / 0.80	
Nature of enrollees:						
Homogeneous	37	10.26 / 1.00	-0.51 / .609	36	9.73 / 1.04	0.64 / .523
Heterogeneous	101	10.36 / 0.99		101	9.60 / 0.97	

[a]Transformed attitude scale: 0=extremely non-cognitive; 16=extremely cognitive. [b]Transformed use scale: 0=rarely uses cognitive techniques; 16=extensively uses cognitive techniques.

Using t-tests, further analyses of the attitude and use composite scores were made by grouping professors according to 14 areas of specialization variables and 14 courses taught variables. The dependent variables for measuring both specialization areas and courses taught were: (a) introduction to agricultural education; (b) teaching methods; (c) philosophy; (d) Future Farmers of America; (e) supervised occupational experience program; (f) leadership; (g) guidance; (h) microcomputers; (i) instructional media; (j) program planning; (k) supervision and administration; (l) evaluation; (m) curriculum; and (n) other.

Only one significant mean difference was detected when professors' attitude composite scores were grouped according to areas of specialization and courses taught. Professors with a specialization in supervision and administration had a significantly higher attitude composite score ($\overline{x}$=10.60) than did professors without that specialty ($\overline{x}$=10.23).

Using the frequency of use composite score as the dependent variable and the specialization areas and courses taught as independent variables, several significant mean differences were detected. Agricultural education professors who had specialized in teaching methods had a significantly higher use composite score ($\overline{x}$=9.79) than did professors without that specialization ($\overline{x}$=9.45). Faculty who taught a methods course also had significantly higher use composite scores ($\overline{x}$=9.78) than did professors who did not teach a methods course ($\overline{x}$=9.47).

Three other courses taught variables helped explained the frequency of use variable. Those who taught a guidance course were found to have a higher use composite score ($\overline{x}$=10.23) than did those who did not teach a guidance course ($\overline{x}$=9.59). Significantly higher means were observed for professors who taught program planning ($\overline{x}$=9.84) than for those who did not ($\overline{x}$=9.50). Finally, those who taught a curriculum course had a significantly higher use composite score ($\overline{x}$=9.84) than those who did not teach a curriculum course ($\overline{x}$=9.54).

Test results for single classification of analysis of variance at the .10 level revealed that no significant differences existed in either the learning theories attitude composite scores of professors or the frequency of use composite scores when grouped by: (a) percentage of officially budgeted time for teaching, research and other; (b) professional rank; (c) years of college teaching; (d) years of high school teaching; and (e) average class size.

As revealed in Table 2, positive, significant relationships were found between the attitude composite score and two variables, the frequency of use composite score and the societal needs goal source. The Pearson product-moment coefficient revealed that a moderate, positive relationship existed between the attitude composite score and the frequency of use composite score (r=.63) with 40% of the variance explained. The low, positive relationship between the attitude composite score and the societal needs goal source (r=16; r^2=.03) was too low to be of practical significance (Hinkle, Wirsma, & Jurs, 1979). Also, the significant relationship between the use composite score and budgeted research time (r=.16; r^2=.03) was of no practical significance.

Implications and Recommendations

Although agricultural education professors held a positive attitude toward cognitive skill development and frequently used cognitive skill development techniques in their classrooms, the average attitude score ($\overline{x}$=10.34) and the average use score ($\overline{x}$=9.64) were lower than might have been expected considering agricultural education's historical commitment to problem solving. Agricultural education professors appeared to be using a myriad of cognitive skill development techniques, including those believed to promote low-order thinking.

Table 2

Pearson Product-Moment Correlations Between Both the Attitude and Use Composite Scores With Selected Independent Variables

Independent Variable	Attitude Coefficient p	Use Coefficient p
Learning theories attitude composite score	1.00 / .001	.63 / .001
Frequency of use composite score	.63 / .001	1.00 / .001
Subject matter goal source	-.13 / .146	-.03 / .745
Technical competencies/skills goal source	-.11 / .206	-.08 / .362
Teaching-learning process/human relations goal source	.05 / .535	.08 / .383
Societal needs goal source	.16 / .073	.12 / .182
Learner needs and interests goal source	-.03 / .771	-.14 / .124
Percentage of time budgeted for teaching	-.07 / .442	-.08 / .344
Percentage of time budgeted for research	.14 / .121	.16 / .069
Percentage of time budgeted for administration	-.02 / .786	.11 / .199
Percentage of time budgeted for other	-.05 / .604	.03 / .728
Average class size taught	.01 / .933	.00 / .993
Years of college teaching experience	.10 / .232	.04 / .630
Years of high school teaching experience	.08 / .349	.13 / .115

A consistency existed between professors' beliefs and their practices with regard to cognitive skill development as indicated by the positive, moderate relationship found between the attitude and use variables. Such a consistency does not always occur in education (Saylor, Alexander, & Lewis, 1981).

Few significant differences were found when professors who had a certain specialization and/or were teaching a certain course were compared with those who did not have that particular specialization or were not teaching that particular course. In some cases, those specializing or teaching in areas where cognitive processes such as decision making might be more prevalent, attitude and use scores were significantly higher. Noticeably absent from the list of significant differences were those professors who possessed a specialty in or who were teaching a course in evaluation, leadership, microcomputers and philosophy. These areas would readily lend themselves to the use of cognitive skill development techniques. For example, entire thinking skills courses have been developed around philosophy (Lipman, 1984).

Significant differences in both attitude and use scores between professors teaching primarily at the graduate level and those at the undergraduate level warrant further investigation. It could be that those who taught graduate-level courses believed that higher-order thinking was most appropriate at the graduate level. It is also possible that those teaching at the undergraduate level had more content and skill concerns to address which lowered their attitude and use scores.

Recommendations for further study include:

1. Investigating more thoroughly the attitudes toward and use of cognitive skill development between professors teaching primarily at the graduate level and those primarily teaching at the undergraduate level to determine the reasons for the significant differences found in this study.

2. Investigating further the extent of cognitive skill development use within agricultural education at the college level and include classroom observation, content analysis and student feedback as part of the research methodology in order to further illuminate the study's findings.

3. Initiating empirical studies to determine whether certain cognitive skill development techniques and/or programs are more useful and effective than other techniques when used in college-level agricultural education programs.

References

Crunkilton, J. R., & Hemp, P. E. (1982). The curriculum: Professional education. In A. L. Berkey (Ed.), Teacher education in agriculture (2nd ed.)(pp. 135-160). Danville, IL: Interstate.

Despain, K. (1983). Information society challenges education (Issuegram 17). Denver, CO: Education Commission of the States. (ERIC Document Reproduction Service No. ED 235 799)

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (1979). Applied statistics for behavioral sciences. Boston: Houghton Mifflin.

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