

COMPETENCY BASED EDUCATION IN NORTH CAROLINA'S VOCATIONAL AGRICULTURE PROGRAMS: TEN YEARS AFTER ADOPTION

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During the decade of the sixties competency based vocational education (CBVE) was introduced to many vocational education programs as a response to public dissatisfaction with schools and the public perception of teacher incompetence (Ross, 1982). Although the CBVE movement has gained popularity and emphasis since the late sixties, the underlying philosophical basis for the CBVE approach can be traced to the philosophy of experimentalism and to the work of John Dewey in the early 1900's (Klingstedt, 1972). A competency based approach was seen by some educators as providing a means for meeting the public's demand for accountability in accomplishing one of vocational education's stated goals: providing well-trained, productive workers for industry (Rockler, 1979). Some authors have suggested that CBVE assures that students are learning skills needed to become successful, productive workers (Allen, 1981; McGowan, 1981). Vincent and Cobb (1977) found that students taught tractor mechanics using a competency based approach were progressing faster than students taught by traditional methods and the CBVE students learned more subject matter. Vincent and Cobb also concluded that CBVE programs were inexpensive to implement in schools' present facilities. Positive effects of CBVE were also found in studies conducted by the Washington, D.C. Public Schools (1980), by Raphaelson, Charters, and Wachtman (1976), and by Poorman and Flickenstein (1978).

Because of the need to provide accountability in vocational education, competency based education was adopted by the Division of Vocational Education of the North Carolina Department of Public Instruction during the 1970's as the approved method of delivering instruction in vocational education programs within the state. A great deal of effort and resources were devoted to providing vocational teachers with CBVE materials and to assisting them in implementing competency based vocational education in their programs. Included in these efforts were teacher handbooks, curriculum guides, test item banks, and student competency records for each course taught in the various vocational education programs in North Carolina. Vocational teachers in North Carolina are soon to be held accountable for the implementation of the competency based curriculum approved by the Department of Public Instruction. One goal of the vocational component of North Carolina's Basic Education Program is that "by the 1990-93 school year, all completers of vocational education courses will have met prescribed levels of mastery on state-identified competencies."

A key aspect of determining the level of implementation of CBVE involves the process of adoption of change in education (Lehming and Kane, 1981). Steps involved in promoting change in education have been outlined by Corbett, Dawson, and Firestone (1984), Knoop (1987), and Shears (1987). According to these authors, the change process involves (a) diagnosis of the situation, (b) developing strategies for change, (c) implementation, (d) allowing for stabilization, and (e) evaluation. Henson (1987) suggested that change can be enhanced by involving those affected, creating a sense of ownership, and by demonstrating a commitment for change through administrative support. Olson (1985) also recommended involvement of teachers in the educational change process. In addition to the overall change process, several variables within the context of the individual school may account for the successful implementation of innovative programs (Ridley and Farrar, 1982).

Competency based vocational education exists in many forms throughout this country. Although a variety of definitions for CBVE exist, most models of the instructional approach contain the following elements: (a) performance-based, (b) responsive to individual needs, (c) provisions for immediate feedback, (d) based upon task analyses, (e) containing measurable objectives, and (f) criterion-referenced assessment (Buttram, Kershner, Rioux, & Dusewicz, 1985). The model for implementing competency based education adopted in North Carolina is shown in Figure 1.

It should be noted that, while individualized instruction is very much a part of the competency based approach used in North Carolina, the State Department of Public Instruction did not adopt a completely individualized approach to competency based education. Group instruction is an important component of the approach, as long as there is a process for providing for individual progress through the student learning activities. Essentially, the model provides for group instruction when competencies are to be taught to all students, while individualized self-paced learning activities are provided for individual student differences.

Implement Classroom Instructional Program

- 1.0 Set Objectives
 - 1.1 Use competencies from curriculum guides
- 2.0 Pre-Assessment
 - 2.1 Pretest student competence
 - 2.2 Assess student learning styles
 - 2.3 Pre-assess disability/handicapping conditions
 - 2.4 Assess student prerequisite knowledge, skills (including basics)
- 3.0 Prepare Lesson Plans
 - 3.1 Use competencies
 - 3.2 Provide for classroom, laboratory, and shop experiences
 - 3.3 Secure resource materials
 - 3.4 Plan for tools needed
 - 3.5 Plan for equipment required
- 4.0 Organize and Manage Learning Environment
 - 4.1 Execute lesson plan
 - 4.2 Provide learning materials/resources/tools
 - 4.3 Obtain feedback on student progress
- 5.0 Post-Assessment
 - 5.1 Develop test blueprint
 - 5.2 Posttest student competency mastery
 - 5.3 Document and distribute student achievement results using a competency profile format.
 - 5.4 Prepare & submit summative report for LEA
- 6.0 Recycle to Plan Improvements
 - 6.1 Analyze local profiles to plan specific program improvements

Figure 1. North Carolina model for competency based vocational education.

The first CBVE curriculum materials were introduced to North Carolina vocational agriculture teachers in 1978. Ten years later, little is known about the level of adoption of competency based education in the vocational agriculture programs within the state. A need existed to examine the level of adoption of CBVE by the vocational agriculture teachers in the state in an effort to determine which components of the CBVE model teachers needed assistance in implementing.

Purpose and Objectives

The purpose was to determine the extent to which competency based vocational education (CBVE) was evident in North Carolina's vocational agriculture programs and to identify factors which contributed to adoption of CBVE in local vo-ag programs. A secondary purpose of the study was to compare the level of implementation of CBVE in vocational agriculture programs with other vocational education programs within the state.

The specific objectives were stated as research questions:

1. To what extent has competency based vocational education been adopted in vocational agriculture programs in local education agencies in North Carolina?
2. What factors influenced vocational agriculture teachers to adopt competency based vocational education in their local programs?
3. How does the level of adoption of CBVE in vocational agriculture programs in North Carolina Compare with the level of adoption of CBVE in other vocational education programs in the state?

Procedures

The research design utilized in this study was descriptive survey. The population for this study consisted of all high school vocational education teachers in North Carolina providing instruction in any of the seven vocational program areas who were employed during the 1987-88 academic year ($N = 4,146$). A list of teachers in each program area provided by the Division of Vocational Education, State Department of Public Instruction in the form of mailing labels was used to provide the frame for this study. For the purpose of analyzing the data, vocational teachers were divided into two groups: (a) vocational agriculture teachers ($N = 344$) and (b) other vocational education teachers ($N = 3,802$). A random sample of vocational agriculture teachers and a stratified random sample of teachers from the population of "other vocational teachers" were selected to provide data for this study. According to Krejcie and Morgan (1970), at a 95% confidence level sample sizes of 182 vocational agriculture teachers and 349 "other vocational teachers" were needed to adequately represent the population.

A two-part questionnaire was developed by the researcher and used to collect data for this study. Part I of the instrument was developed using the model for competency based vocational education adopted by the Division of Vocational Education. It consisted of 24 items assigned to five basic components associated with the competency based education model. A complete list of items included in Part I of the instrument is presented in the tables in the Results section. Content validity of the items included in Part I of the instrument was established by a panel of experts consisting of vocational teachers, teacher educators, and vocational administrators. Part II of the instrument examined the factors which influenced the adoption of competency based education by teachers and was adapted from an instrument used in a similar study in Pennsylvania (Buttram et al. 1985).

The instrument was pilot tested for clarity and to determine reliability with a sample of 50 vocational teachers not initially selected to participate in the study. The instrument was sent to the teachers twice, at one week intervals using a test-retest procedure, and a coefficient of stability was calculated as a measure of reliability of the instrument. The coefficient of stability calculated for Part I of the instrument was .85 and .87 for Part II of the instrument.

Data were collected near the end of the 1987-88 school year. Questionnaires were mailed to vocational teachers during the first week in May. Responses were received from 235 teachers following the first mailing. Teachers who had not responded by the third week in May received a follow-up letter urging them to complete the questionnaire. This procedure resulted in an additional 69 responses, for a total of 304 responses (57% of the sample). According to Miller and Smith (1983), late respondents have been found to be very similar to nonrespondents. Based upon this finding, data from late respondents (those who responded after receiving the follow-up letter) were statistically compared to data from early respondents. Since t-tests indicated no significant differences between early and late respondents, the data sample was assumed to be representative of the population; and the data from early and late respondents was combined for analysis.

Descriptive statistics such as frequencies, percentages, measure of central tendency, and measures of variance were used to describe the data; and t-tests were used to examine differences between vocational agriculture teachers and other vocational teachers. An alpha level of .05 was established a priori.

Results

Extent of Implementation of CBVE: Teachers were asked to report the level to which each component of the North Carolina model of competency based vocational education had been implemented into their local program. For each of the five major components of the model, specific items were identified providing indicators of the implementation of that component. For each item on this part of the instrument, teachers were asked to indicate whether the item was: (a) not yet implemented, (b) minimally implemented, (c) moderately implemented, or (d) fully implemented. For the purpose of interpretation of the data, the following interpretation ranges for mean scores were established: (a) 1.00 to 1.75 = not yet implemented, (b) 1.76 to 2.75 = minimally implemented, (c) 2.76 to 3.75 = moderately implemented, and (d) 3.76 to 4.00 = fully implemented. A point well above the midpoint between response choices was selected as a conservative means of interpreting the data. The level of implementation for each component of the competency based approach is shown in Table 1.

Table 1
Mean Level of Implementation of CBVE Components by North Carolina Vocational Teachers

CBVE Component	Vo-Ag Teachers (<i>n</i> = 120)		Other Voc. Teachers (<i>n</i> = 184)		<i>t</i>
	Mean	<u>SD</u>	Mean	<u>SD</u>	
Establishing objectives	2.91	0.78	2.97	0.84	0.87
Pre-assessment	2.92	0.82	2.78	0.95	2.93*
Lesson planning	3.29	0.71	3.34	0.76	1.27
Organizing and managing the learning environment	3.02	0.78	3.16	0.82	3.29*
Post-assessment	2.51	1.00	2.56	1.12	1.04
Overall implementation	2.89	0.89	2.93	0.98	1.75

Note. 1 = Note Yet Implemented; 2 = Minimally Implemented; 3 = Moderately Implemented; 4 = Full Implemented.

**p* < .05.

As shown in Table 1, the component, **Establishing Objectives**, was considered moderately implemented by North Carolina vocational agriculture teachers. Further examination of the data showed that approximately 80% of the respondents indicated that student performance objectives were established for classes using competencies identified in state curriculum guides. Approximately 65% of the teachers reported that performance objectives from other sources were identified and utilized. The difference in the mean level of implementation of this component between the vocational agriculture teachers and other vocational teachers was not statistically significant.

The overall implementation by the vocational agriculture teachers for the second component of the competency based education model, **Pre-Assessment**, was also found to be at the moderate level. Significantly higher levels of implementation for this component were reported by the vocational agriculture teachers than by the other vocational teachers in this study (*t* = 2.93, *p* < .05),

The **Lesson Planning** component of the CBVE model was the component with the highest overall level of implementation by North Carolina vocational agriculture teachers. As the five items listed in this subscale were examined, each item included in the lesson planning component was reported by the teachers to be at least moderately implemented. Over 80% of the teachers indicated that they had either moderately implemented for fully implemented each of the items included in the lesson planning component. There was no significant difference in the level of implementation of this component between vocational agriculture teachers and other vocational teachers.

The fourth component of the North Carolina model for competency based vocational education was **Organizing and Managing the Learning Environment**. Moderate levels of implementation were reported by the vocational agriculture teachers for four of the five items included in this component. Self-paced student instruction remained at the minimally implemented level. The vocational agriculture teachers reported significantly lower levels of implementation (*t* = 3.29, *p* < .05) for this component than did the other vocational teachers in the study.

The vocational agriculture teachers reported the lowest level of implementation for the **Post-Assessment** component of the CBVE model. Seven items were included in this component. There was no significant difference in the level of implementation of this component between vocational agriculture teachers and other vocational teachers.

Factors Influencing Adoption of Competency Based Education: A number of factors have been identified in the literature as being linked to either the successful or unsuccessful adoption of innovative programs. Vocational agriculture teachers were asked to indicate which factors influenced their level of adoption of competency based vocational education. Nine factors were identified, and teachers were asked to rate each factor on a Likert-type scale which ranged from (1) "Very Negatively Influenced" to (5) "Very Positively Influenced". The results are presented in Table 2.

Table 2

Mean Scores for Factors Reported by Vocational Agriculture Teachers Which Influenced Their Adoption of CBVE

Factor	Mean	SD
State Department of Public Instruction support for CBVE	3.99	0.78
Perceived importance of CBVE in meeting educational program needs	3.92	0.71
Administrative support for CBVE	3.74	0.74
Practicality and/or utility of CBVE in the classroom	3.66	0.89
Faculty support of CBVE	3.45	0.70
Opportunity for faculty input and freedom in the implementation of CBVE	3.45	0.83
Faculty orientation, training, and technical assistance required	3.35	0.78
Availability of necessary resources	3.27	1.06
Faculty planning and preparation time needed before actual implementation of CBVE	3.24	0.91

Note. 1 = Very negatively influenced; 2 = Negatively influenced; 3 = Did not influence; 4 = Positively influenced; 5 = Very positively influenced.

Over 80% of the vocational agriculture teachers indicated that State Department of Public Instruction support for competency based education either positively or very positively influenced their level of adoption of the competency based approach. The teachers' perceptions that competency based education was important in meeting their program needs was the second highest rated factor, with approximately 80% of the teachers indicating that they were either positively or very positively influenced by this factor. Administrative support for CBVE was reported by the teachers as the third highest factor influencing their level of adoption. Over 60% of the vocational agriculture teachers reported that administrative support positively influenced their level of adoption of a competency based approach to vocational education. The two factors which were rated lowest by the teachers in influencing their level of adoption of CBVE involved faculty planning and preparation time needed before implementation of CBVE and availability of resources necessary for implementing the CBVE programs. However, only slightly more than 20% of the vocational agriculture teachers indicated that they were negatively influenced by the amount of faculty planning and preparation time needed before implementation of competency based education. Almost 25% of the teachers reported that they were negatively influenced by the availability of necessary resources for implementation of CBVE.

Conclusions and Recommendations

Because of the relatively low response rate, the reader should be cautious in generalizing the findings beyond the respondents in this study. The overall level of implementation of the competency based vocational education model adopted in North Carolina is described by vocational agriculture teachers as "moderate". However, for several of the key elements which characterize education as competency based, teachers reported less than moderate levels of implementation. Therefore, improvement is needed in the level of implementation for many of the key components of the competency based approach to vocational education in North Carolina.

The State Department of Public Instruction's and local administrators' support for CBVE have been important factors in influencing vocational agriculture teachers to implement competency based education in their local programs. Teachers have also implemented CBVE because they perceive the approach as meeting the needs of their program. Vocational agriculture teachers have emphasized different components of the CBVE model than other vocational teachers as they implemented a competency based approach. They tend to place more emphasis on implementing the pre-assessment component and less emphasis on the organizing and managing the learning environment component than the other vocational teachers.

In an effort to provide for higher levels of implementation of entry-level skill assessment and self-paced instruction, future curriculum development efforts should center around development of pre-assessment instruments and individualized learning activity packages for competencies included in the

various curriculum guides. Methods of providing additional clerical assistance, possibly in the form of computerized recordkeeping, should be developed in local schools to assist teachers with recording student achievement and updating class progress charts for the post-assessment component of CBVE.

Agricultural education program area consultants from the Division of Vocational Education should continue to stress the importance of implementing a competency based approach to vocational education. However, in order to increase the level of implementation of CBVE, efforts should be made to increase the resources required for competency based instruction and to decrease the preparation time needed prior to implementing CBVE.

Since vocational agriculture teachers tend to adopt CBVE if they perceive that the approach meets their program needs, studies should be conducted to determine the effectiveness of a competency based approach in increasing student achievement and/or competency in performing specific skills.

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