

# Integrating Microcomputer Instruction In Vocational Agriculture Through Programmatic Research and Development

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## ABSTRACT

The purpose of this study was to assist in the successful integration of computer related instruction into regular vocational agriculture programs in Texas by determining the types of computer hardware and software which were available for use by vocational agriculture students and teachers, to ascertain additional software needs, and to develop software packages to meet high priority needs of vocational agriculture teachers and students. In addition, the inservice needs of vocational agriculture teachers regarding computer instruction were determined.

Radio Shack TRS-80 and Apple computer brands were most prevalent in public schools of Texas. Software packages were developed based on the utilization of high priority needs as identified by vocational agriculture teachers. Radio Shack and Apple versions of a supervised occupational experience record book program and Radio Shack programs for vocational agriculture equipment/supply inventories and carpentry were developed.

Microcomputers are beginning to be accepted and utilized in vocational agriculture programs in Texas. Increased usage will parallel the acquisition of hardware and appropriate software by vocational agriculture teachers who do not currently have access to computers, the additional development and availability of appropriate instructional software packages, and the upgrading of vocational agriculture teacher skills as provided by inservice workshops at universities, by private industry and individual study.

## INTRODUCTION

Technology is changing the world daily. Educators, especially vocational educators, must stay abreast of the technological changes to be effective in teaching students a marketable skill. One area vocational educators should be particularly attuned to is computer education.

The need for computer related instruction and the impact of high technology on our society has been expressed through numerous sources and by various leaders in industry and education. The Texas Advisory Council for Technical-Vocational Education and the Texas Education Agency explored this impact through a **State-wide Conference on High Technology** (1982). Conference presentations addressed the need for educators to provide students the opportunity to develop skills which can be utilized in future employment. It was pointed out that curriculum models should be developed to teach certain skills in connection with an occupational objective rather than in abstract form.

A report by the Texas Advisory Council for Technical-Vocational Education (1982) supports the need for vocational programs to expand the curriculum to include computer instruction. The report indicated that computers are frequently used in many school districts for instructional purposes, but the extent of these resources and how effectively they are

being used is not currently known. The report made the following two recommendations for the State Board for Vocational Education:

1. Conduct a statewide computer resource, utilization and needs survey of secondary and post-secondary institutions as it relates to instruction; and
2. Develop a plan of action for developing computer literacy among vocational personnel and students, and expand current microcomputer technology in the vocational education curricula.

## NEED FOR THE STUDY

Computer literacy is especially important for students in vocational agriculture programs since computers are used throughout the agricultural sector, from small family farms to international agricultural corporations. Computer literacy is important not only for those students seeking vocational careers, but also for those students planning a college education. Most agricultural college curriculums, regardless of major, include at least one computer course. The student who learned the basics of computer operation in high school will have the advantage of approaching college classes with introductory level computer skills.

A recent legislative mandate in Texas requires the inclusion of computer related instruction in regular vocational programs to provide a well balanced curriculum. The need is further addressed in the proceedings of the USDA Joint Council which states, "Everything possible must be done to ensure that students in agriculture-related curriculums have computer skills" (Kramer, 1982).

Several limiting factors exist which hinder the use of microcomputers in vocational agriculture classrooms (Rodenstein, 1983). One major drawback has been the limited availability of microcomputers to vocational agriculture programs. Another problem has been the lack of applicable, high quality software packages which have been available for use in vocational agriculture courses. A third factor has been the vocational agriculture teachers' lack of knowledge concerning the use of microcomputers in their classrooms.

As vocational agriculture teachers begin to accept computers as a beneficial instructional aid and begin to request microcomputers for use in their programs, the problem of computer availability should be reduced. However, only when teachers become computer literate and begin to assist others in the development of software especially designed for use in vocational agriculture will the problem of limited software availability be overcome.

## OBJECTIVES OF THE STUDY

1. Identify existing types of computer software which are adaptable for use by vocational agriculture students and teachers.
2. Ascertain additional software needs for use by vocational agriculture students and teachers.
3. Develop software packages to meet high priority needs of vocational agriculture teachers and students.
4. Determine inservice needs of vocational agriculture teachers regarding computer instruction.
5. Determine what computer hardware and software is accessible to vocational agriculture teachers.

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6. Project future computer equipment needs in Texas public schools.

7. Recommend procedures needed to incorporate computer instruction in the regular vocational agriculture programs in Texas.

## METHODS AND PROCEDURES

This project was conducted simultaneously in two phases. Phase I included an extensive review of literature, a descriptive survey of vocational agriculture programs, and a survey of teacher education programs in Texas. Phase II consisted of feasibility studies of existing software and the development of additional software packages as determined by the vocational agriculture program survey.

All Texas vocational agriculture departments (922) were included in the program survey and one follow-up mailing was made. Of the 465 returned questionnaires (50.4 percent), 446 usable questionnaires were included in data tabulation. All nine agricultural education departments were included in the study. A telephone call preceded a single mailing which yielded a 100 percent return.

Results of the vocational agriculture departmental survey were tabulated by geographical area, size of school, and number of students enrolled in vocational agriculture programs. Number counts, percentages, medians, and weighted means were used in tabulation. Factors such as microcomputer uses in the school, as well as in vocational agriculture classes were analyzed. The location, number, and makes of microcomputers used for student instruction were also tabulated. Chi-square and ANOVA were computed to determine differences by geographical area and school size; however, no statistical differences were found at the .05 level of significance. Analyses of the data provided by the Agricultural Education Department survey were grouped by frequencies regarding past and projected microcomputer inservice training provided (or to be provided) vocational agriculture teachers.

From the vocational agriculture department survey, priority areas for software development within the curriculum areas listed in the **Texas Basic Curriculum Guide for Vocational Agriculture** was determined. Existing software packages available within determined priority areas were ordered for review. Software was reviewed in relation to cost, adaptability to Texas vocational agriculture programs, suitability of instruction for intended students, and the quality of the program in regard to interaction and graphics.

## RESULTS

Through a review of existing literature and feasibility studies, it was determined that numerous sources were available for agriculturally-oriented software packages for use in secondary vocational agriculture programs. There was, however, a critical shortage of practical and economical computer programs.

To ascertain additional software needs for use by vocational agriculture students and teachers, open-ended responses were tabulated by curriculum areas as listed in the **Texas Basic Curriculum Guide for Vocational Agriculture**. In the area of Animal Science, "feed rations and conversion analyses" was requested by 128 respondents. Software packages involving "production records" were requested by 41 respondents. In the area of Soil Science, software packages for "soil analysis" (44 respondents) and "land evaluation" (38 respondents) were most requested (50 and 28 requests respectively) in the area of Plant Science. In the area of Agricultural Mechanics, a software package involving figuring a "bill of materials" was requested by 46 respondents followed by 32 respondents re-

questing software for "small gasoline engine" instruction. Teachers needing software for Agricultural Management most requested the area of "farm records" (39 respondents) followed by "depreciation" and "income tax" requested by 30 respondents each. The most requested software program in the survey was in the area of Supervised Occupational Experience, were 201 respondents requested a software package enabling students to keep "record books" on the microcomputer. "Parliamentary procedure problems" was the most requested area in Leadership Instruction (118 respondents) and "careers in agriculture" was the most requested software (60 respondents) in the curriculum area entitled Opportunities in Agriculture. Requests for software packages other than specific curriculum areas (but relating to the vocational agriculture program) were software packages for a vocational agriculture equipment/supplies inventory, for which 158 requests were received.

Teachers from 241 schools (54 percent) reported that microcomputers were used for administrative purposes in their school system. Three hundred forty-six schools (78 percent) reported that microcomputers were currently being used for teaching purposes in their school system. Computers were available for student and teacher use in 189 (42 percent) of the vocational agriculture departments surveyed. Only eight percent (34 schools) had computers located in the vocational agriculture department.

The brands of microcomputers available in secondary schools were determined through the teachers' survey. The following information was revealed.

	TRS-80	Apple Commodore	TI	IBM	Others
Total Number of Schools	146	137	62	24	20

Less than one-half (45 percent) of the schools having computers available utilized commercially produced software and only 25 percent utilized school system or personally developed software. There were no statistical differences concerning hardware and software availability and use between size of school, number of students enrolled in vocational agriculture and geographical areas of the state.

Only 18 percent of the schools surveyed indicated they had no plan to integrate computer related instruction in their vocational agriculture programs within the next five years.

Through tabulation of the open-ended question in the vo-ag department survey, "What instruction do you need to help integrate computer instruction in your vo-ag program?", 88 percent of the respondents indicated that inservice workshops were needed to develop basic computer skills. Several indicated that two or three-day workshops would not give enough time to remove deficiencies in this area. Only 10 percent of the teachers who had access to computers available for instruction in vocational agriculture were presently capable of writing programs for their own use.

The survey of Agricultural Education Departments revealed that universities currently providing or planning to provide computer inservice workshops utilized or will utilize instructors primarily from within their own university system. Over 50 percent of the computers used in university inservice workshops were Radio Shack models. There was general agreement that beginning, intermediate, and advanced levels of instruction would be used in future inservice educational workshops for vocational agriculture teachers.

To assist in the successful integration of computer related instruction in vocational agriculture in Texas vocational agriculture programs, four software programs were developed for use by vocational agriculture teachers and students. Radio Shack and Apple versions of a program enabling students to keep records of their supervised occupational experience programs were completed. As noted by the vocational agriculture program survey, this was the highest priority area identified, coupled with the predominant access to available hardware. Two additional software packages (based on priority and availability) were developed for use on Radio Shack hardware. These were in vocational agriculture equipment/supplies inventories and carpentry program to determine a bill of material.

### CONCLUSIONS AND RECOMMENDATIONS

1. Some vocational agriculture teachers need to work with their administrators in obtaining access to computers located in the school or make plans for purchase of computers for use in their departments.
2. The compatibility of hardware and the availability of appropriate software should be a careful consideration in future equipment purchases by school districts. Future trends should be considered.
3. Additional specialized software will be in demand for further development of computer related instruction in vocational agriculture.
4. Priorities have been determined for needed software; however, the priority needs should be reevaluated as teachers and students become more proficient in the use of microcomputers.

5. Vocational agriculture teachers are generally interested in integrating computer related instruction in their vocational agriculture program but need additional training in the use of computers. Universities should provide inservice workshops at beginning, intermediate and advanced levels. Additional workshops should be made available at district, area and state levels. Teacher education programs should incorporate pre-service education concerning microcomputers if they are currently not required for graduation.

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