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ABSTRACT

An examination of the reasons for the gap between academic and vocational courses of study in secondary schools showed problems in the basic competencies of vocational completers and proposed strategies for improving them. The following issues were identified: (1) presently, there is no such thing as a vocational program of studies in the average U.S. high school; (2) vocational students experience different academic course content and lower expectations are held for them than for other students; (3) legislated minimum competencies tend to become maximum goals for vocational students; (4) the purposes of vocational education are too narrowly defined; (5) the policy structure for vocational education is weak at the local level; and (6) closing the gap between academic and vocational education will require considerable staff development. Strategies for improving the basic competencies of vocational completers include the following: (1) stressing basic competencies in vocational classrooms; (2) encouraging and requiring students pursuing vocational studies to complete higher-level academic courses; (3) raising expectations for vocational completers; (4) revising state and local policies for secondary vocational education; (5) providing students access to new academic courses; (6) using a program of study approach to connect vocational and academic studies; and (7) providing preservice and inservice preparation and certification of vocational and nonvocational teachers. State policy initiatives are needed to give leadership and direction to vocational education. (KC)

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CLOSING THE GAP BETWEEN VOCATIONAL AND ACADEMIC EDUCATION

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I. Introduction

This paper examines reasons for the gap between academic and vocational courses of study in secondary schools and describes promising strategies that have been developed to close that gap. Successfully closing the gap means combining academic and vocational content and instructional methods in a way that improves students' proficiency and maximizes their potential for future learning and advancement. In examining ways to close the vocational-academic gap for secondary students pursuing in-depth vocational studies, the following topics are discussed:

- Issues and problems in improving the basic competencies of vocational completers;[1]
- Promising strategies for improving the basic competencies of vocational completers; and
- Roles states can play and goals states can pursue in combining academic and vocational studies.

The process used to examine each topic draws heavily upon my experiences as a state educational leader seeking to establish a connection between academic and vocational education in the 1960s and 1970s, and as a national vocational education leader in the 1970s and 1980s, during which time I gained a broader perspective on successful approaches for combining vocational and academic studies into a meaningful whole. The paper has also been influenced by knowledge I gained from conducting studies on the redesign and refocus of vocational education for two states (Alabama and West Virginia) and for two large urban systems (Gwinnett County and Fulton County, both in Georgia), and from working with a consortium of 13 Southern states to improve the basic competencies of secondary vocational completers. In addition, I have drawn on the work of The National Center for Research in Vocational Education at the Ohio State University and other studies that have examined aspects of the "gap" problem.

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[1] The term vocational completer, as used in this paper, is a high school graduate who has completed at least four Carnegie units in an organized program of study for a vocational specialty such as secretarial, automotive, construction, marketing, etc.

II. Issues in Improving Basic Competencies of Secondary Vocational Completers

Issue #1: At the current time in the average American high school, there is no such thing as a vocational program of studies.

A myth exists in America that high schools allow students to choose from among three programs of study--college preparatory, general, and vocational. In practice, however, close examination reveals that students have access only to a general or college preparatory track; a true vocational program of study does not exist in most schools. Students pursuing vocational studies in the typical American high school are not required or even encouraged to take those academic courses--communication, mathematics, and science--that provide the foundation of knowledge for their vocational field.

A review of the transcripts of high school graduates from a large urban school system concluded the following for completers of the general or vocational curriculum:

> General and vocational students are floating in and out of a variety of vocational courses at random, never staying long enough to gain any in-depth intellectual, academic, or technical knowledge or competencies in any given area. The same pattern is true in their selection of academic or technical knowledge or competencies in any given area. The same pattern is true in their selection of academic courses. A planned program of study that enables vocational and general students to pursue in-depth vocational studies in a broad occupational area, along with higher-level related academic studies, is not apparent from the transcript analysis. Students classified as vocational completers took an average of over six vocational courses, while general high school completers took four-plus Carnegie units of vocational instruction. They differed only in the fact that vocational students had at least three vocational courses in a single field (Bottoms, 1988).

Thus, rather than taking a coherent sequence of academic courses that would complement their vocational studies, students are allowed to select academic courses from a lengthy list of lower-level, general track courses that contribute little to developing and advancing needed basic competencies. Furthermore, vocational courses themselves are treated as electives. Students are not required to complete a logical sequence of vocational courses within a given vocational field but instead tend to move from field to field, gaining neither the skills nor the foundation of knowledge needed to enter and advance in one broad occupational area. The result is a random education that does not provide students with an organized, sequential, and coherent program that could lead to a career as opposed to simply an entry level job.

Issue #2: Vocational students experience different academic course content and lower expectations are held for them than for other students.

The predominant high school program pattern for a majority of secondary students pursuing vocational studies is a steady diet of general language arts, mathematics, and science courses. No attempt is made to help students select mathematics and science courses that would complement their vocational studies, nor are efforts made to help students see the connection between their academic and vocational courses. Differences that exist between students pursuing vocational studies and other students are found in both the level of academic courses to which they have access and in the number of academic courses these students take. On the average, vocational students take about three fewer academic courses than do other students; more distressingly, however, fewer than one-third will take a mathematics course beyond first-year algebra, and fewer than 10 percent will take physics or chemistry (Campbell, 1981; Bottoms, 1988).

Examining the transcripts of vocational completers reveals that most enroll in academic courses with labels such as General Science; General, Basic, or Fundamental Mathematics; and General or Basic English (Bottoms, 1987). There may be different titles in different years, but one suspects that the same content is being repackaged over and over again. In fact, when questioned about the courses taken, students state that 51.9 percent of the courses at their home high schools and 36.8 percent of the courses at the vocational center repeated content that had previously been learned. Also disturbing is the perception of many vocational students that they would not be allowed to enroll in higher-level academic courses (Bottoms, 1988).

It is just common sense that unfocused repetition creates boredom, frustration, and lack of motivation in students. Why, then, are schools reluctant to at least test the proposition that a structured, organized program of academic and vocational studies would motivate students and stimulate increased student learning? It is rare to find a high school that is seeking to connect academic and vocational instruction into a truly unified program of studies aimed at preparing students for both employment and further education. Rather, the practice has been one of increasing the number of required Carnegie units in academic subjects, a reform strategy that has led to little improvement in the basic competency achievement of vocational students for the simple reason that scant attention has been paid to the type and quality of academic courses taken by students pursuing vocational courses.

Course content is also a reflection of expectations for students. In vocational students' academic courses, expectations are typically low, the instructional climate is unenthusiastic, and the instructional process requires students to be passive learners. Students are seldom provided opportunities to see the connection between the subject being studied and its utility beyond the school setting. Nor are they required to actually use their knowledge or competencies to address problems in the world beyond the school. For example, most vocational students remember being taught mathematics skills such as measurement, fractions, basic mathematics

functions, and percentages; yet they are often unable to apply these skills in their vocational courses. Vocational students have difficulty recalling examples where academic teachers relate communications, mathematics, and science competencies to the activities and problems encountered in a work setting. Needless to say, it is highly unusual to find academic and vocational teachers working in tandem to use the content and experiences of vocational courses as the means for teaching reading, writing, mathematics, science, and thinking competencies.

The problems of different course content, lower expectations, and a slower pace are illustrated by responses obtained during the winter of 1988 from 300 students enrolled in a part-day program at an area vocational center in a large urban school district (Bottoms, 1988). Each student carried a "full load," yet over 50 percent reported having one-half hour or less of homework each night (Table 1). Similar results were reported by over 3,000 graduating high school senior who were defined as vocational completers (Bottoms, 1988). Other data indicate that vocational students study less for tests, find their courses easier, and have higher grades than students in academic courses (Bottoms, 1985). One implication of these responses is that teachers hold lower expectations for these vocational students. In fact, students themselves seem to come to this conclusion. Among this group, 37.7 percent of the students believed that their home high school teachers did not expect or encourage them to do well in school; 31.9 percent held the same belief about their teachers at the vocational center (Bottoms, 1988).

Table 1

Time Spent Daily on Homework by Vocational Students
(percent)

1/2 hour or less of homework	53.1
1 hour	29.1
2 hours	12.2
More than 2 hours	5.7

Many nonvocational educators see vocational programs as a place for students who will not be successful in the college preparatory curriculum, or as elective courses allowing students to explore career options in a non-rigorous curriculum. When asked what will be the major challenge in improving the basic competencies of vocational students, one local school superintendent responded, "Getting academic teachers to believe vocational students can learn and expect them to learn."

The idea that vocational students are low achievers is not limited to nonvocational teachers; it is also a major problem that vocational teachers

must overcome. A recent conversation with a new vocational teacher illustrates the magnitude of the problem. In discussing options for designing a vocational course of study, the new vocational teacher rejected suggestions for creating a challenging program of studies. She said that students know that vocational courses are easy electives, and if too much is expected of them, no one will enroll in the courses next year. In too many high schools, the vocational curriculum is perceived as a way for students to escape more rigorous studies.

Guidance is a weak school function for most students pursuing a vocational studies. They do not receive in-school assistance in planning a goal-oriented and coherent four-year program of academic and vocational studies. Fifty-one percent of vocational completers reported that they had never been assisted by the guidance counselor to develop a four-year educational plan (Bottoms, 1988); in fact, their greatest assistance came from friends. Further, local vocational administrators reported that students' basic skills achievement levels are not considered when students select and are placed in a vocational program (Bottoms, 1987). In the absence of coherent vocational program guidelines and without the assistance of guidance personnel, students are left to their own devices in planning their high school programs. The implicit message they must hear is that it does not matter what you take as long as you take enough in the right categories.

In summary then, expectations for student performance are frequently tied to the perceptions that teachers--and students themselves--have of individual students and groups of students. These perceptions often dictate the amount and difficulty of assigned work, course content, and student placement. Without exception, students enrolled in vocational courses have traditionally been perceived as being less capable academically than college preparatory students. Closing the academic-vocational gap will require educators to reevaluate their perceptions and expectations of students pursuing vocational studies.

Issue #3: Legislated minimum competencies tend to become maximum goals for vocational students.

A number of states require all students to pass one or more minimum basic skills tests to be eligible for a high school diploma. Such tests are generally geared to about the eighth grade level of competence. There is evidence that these requirements have stimulated academic and vocational teachers to assist low-achieving students to advance their reading and mathematics achievement to the level needed to pass the basic skills tests. However, the tests become maximum goals and are not rigorous enough to challenge the vast numbers of general and vocational completers who have the capacity to achieve at much higher levels. Once students pass, there is little evidence that teachers try to advance the mathematics and communications competencies of vocational students to the eleventh-grade level, identified as the level necessary for success in the twenty-first century. Yet "passing" the minimum competency tests implies to students,

parents, and the public that the student is "literate" and capable of functioning in our society.

Considerable time and space in the press and elsewhere have been devoted to the need to improve the basic competencies of secondary vocational completers. Actually, little is known about the level of academic proficiency possessed by secondary vocational completers in comparison with other students. This is principally because determining the real level of achievement of vocational students has not been a priority in state or local vocational education evaluation initiatives. Practices that would better connect academic and vocational studies will not occur on a widespread basis until it becomes important to determine the achievement levels of vocational completers and the curriculum experiences that resulted in those levels of achievement. As long as the state evaluation for vocational completers fails to identify existing conditions, it is impossible to determine and implement needed improvements.

Issue #4: Generally speaking, the purposes of vocational education are too narrowly defined.

The most frequent answer to the question, "What is the purpose of vocational education?" is that it prepares students for entry-level employment. This is a narrow view that in itself lowers expectations for students pursuing vocational studies. Like the minimum competency tests, the levels of basic competencies required for many entry-level jobs are not very demanding; thus, vocational teachers are confident that they can teach students everything they need to know during vocational instructional time.

Recently, a science teacher working on a task force developing a plan to improve the basic competencies of vocational students said that in her visits with employers, she found that they were not looking for beginning employees who had taken higher-level mathematics or science courses; rather, they wanted graduates who had basic communications and mathematics skills. However, when asked about the levels of basic competencies needed for career advancement, the answer given by employers was significantly different. To advance, she was frequently told, "an employee must be able to identify, anticipate, and solve problems," competencies that can be developed through studies that allow students to use higher level academic content in solving problems encountered in work related activities. By unnecessarily limiting the purposes of vocational education to entry-level employment, we are clearly doing students a great disservice in the long term. We need to change the entry-level job mentality and replace it with a set of purposes that foster the idea of continuous education, training, and retraining throughout a working lifetime.

Certainly one new purpose for vocational education should be to clarify the relationship between vocational and academic education. A properly designed vocational curriculum provides the real-life experiences that enable many students to learn and retain advanced-level basic competencies through an applied approach. Many academic educators fail to recognize that by focusing academic studies around a student's prospective vocational

interest, the usefulness and purpose of academic knowledge at long last becomes clear. On the other hand, many vocational teachers fail to realize that students will learn more technical knowledge and skills if they are encouraged to improve their reading, mathematics, and science competencies in the context of their vocational studies. For certain young men and women, combining academic and vocational education can be done in such a way as to improve the effectiveness of both.

The point is that high school could be made a more challenging and interesting place for many students if the purposes of vocational education were more broadly conceived. Vocational education should come to be viewed as a learning system, not as a training system, by both academic and vocational educators.

Issue # 5: The policy structure for vocational education is weak at the local level.

A major barrier to improving the basic competencies of vocational completers is the absence of a defined policy structure for vocational education by local school boards. Most local school boards do not have a clear statement of goals and means to obtain these goals that provide guidance and direction for improving the basic competencies of students pursuing vocational studies. First, if a local school board policy statement exists for vocational education, the statement of purpose usually does not establish basic competencies as a priority. In the absence of a clearly defined policy that emphasizes raising students' academic skills within the context of vocational programs, vocational and nonvocational educators are not required to collaborate in making their courses more meaningful and effective for all students.

Second, most local school boards have neither defined the requirements students must meet to be considered a secondary vocational completer nor developed a system for recognizing students who meet higher expectations. Where local school boards have stated requirements, they are limited to the number of Carnegie units of vocational study required to be designated a vocational completer. Policies are not in place that specify the related mathematics and science courses that must be taken or the levels of performance in the basic competencies that must be achieved. Certainly most local school boards do not send a clear signal to vocational and nonvocational teachers that both groups of educators are responsible for the improvement of the academic skills of vocational completers.

For example, the process of planning and updating vocational programs rarely includes an examination of needed related academic studies. State and local advisory committees and councils (which mostly consist of employers, specialists from the occupation, vocational teachers, and administrators) are widely used in program review, yet few councils have members representing the academic disciplines most related to the vocational field. In most instances, planning a vocational program at the secondary level consists of seeking advice on what occupational skills the vocational teacher should teach and what type of equipment will be needed. As long as

the planning of vocational programs is strictly limited to what vocational teachers teach rather than considering the entire school curriculum, and as long as academic teachers are not involved in the planning process, the likelihood of a major movement to improve the connection between vocational and academic studies seems remote.

Issue #6: Closing the gap between academic and vocational education will require considerable staff development.

Establishing a local policy structure and defining new purposes for vocational education will still not be enough to reduce the academic-vocational gap. Many vocational teachers lack the necessary preparation in academic skills and instructional methods to explicitly reinforce the higher-level communication, mathematics, and science concepts that underlie their vocational teaching field. In fact, most vocational teachers do not see a connection between the types of academic courses taken and being well prepared in a vocational field of study; only 2 percent of 3,000-plus vocational completers reported that their vocational teachers exerted the most influence on the type of mathematics and science courses they took (Bottoms, 1988).

Similarly, many academic teachers do not know how academic concepts are utilized in the workplace and, therefore, are unable to apply the academic competencies they teach to real-world problems in broad occupational fields. Training in such applied and functional approaches would enable both vocational and nonvocational teachers to make their subject matter "real" to students, thus increasing students' ability to retain what was taught. Many vocational and nonvocational teachers see that they need to change their instruction in order to improve the basic competencies of vocational students; yet they express frustration with their own inadequacies.

Examination of the content and competencies addressed in the preparation of trade and technical teachers from eight major colleges of education revealed that only two programs made any specific efforts to improve the academic preparation of vocational teachers and prepare vocational teachers to connect the teaching of academic competencies with those of their occupational field (Bottoms, 1987). One institution required trade and industrial teachers to master competencies dealing with teaching and reinforcing reading comprehension skills by using the technical content of their occupational fields. Another institution required trade and industrial, technical, and industrial arts teachers to take science, mathematics, and social science courses related to their teaching field.

Not all vocational programs require instructors to hold a college degree. Teachers falling in this category may have a particular problem in teaching and reinforcing the higher level basic competencies that underlie their vocational teaching field. On the other hand, the experiences of most nonvocational teachers have been limited to an educational setting. Therefore, they do not have the broad base of experience necessary to teach their discipline through a functional process that is related to a real-world setting.

Specific changes can be made in the preparation of vocational teachers that would strengthen their academic foundation and their skills for reinforcing basic competencies through vocational instruction. Among the possible changes that vocational teacher preparation programs could pursue are (1) being more prescriptive in candidates' choice of electives and general study courses to assure selection of mathematics, communication, and science courses that underlie their vocational teaching field; (2) redesigning and refocusing professional education courses at the bachelor and master level so that adequate attention is given to preparation of vocational teachers to teach and reinforce basic and academic skills through the vocational curriculum; (3) establishing selection criteria for enrollment in vocational teacher preparation programs that emphasize the capacity to do college-level academic studies; and (4) improving the technical and academic foundation of vocational teachers by reducing professional education courses to no more than 25 percent of their total preparation program.

III. Promising Strategies for Improving the Basic Competencies of Vocational Completers

Not all the news is bleak in addressing the issues and problems just described. This section describes serious efforts of a few states and local school systems to improve the basic competencies of vocational completers. The range of strategies being pursued collectively offers promise for forging a new relationship between academic and vocational studies at the secondary level.

Stressing Basic Competencies in Vocational Classrooms

In 1986, under the auspices of the Southern Regional Education Board (SREB), state vocational education leaders in 13 southern states formed a consortium to assist and encourage vocational teachers to reinforce basic communication, mathematics, and science competencies as a part of their vocational instruction. Stressing basic skills through vocational education became increasingly important as more and more southern states began to require that students pass a minimum basic skills test in order to be eligible to graduate from high school. To assist vocational teachers, state leaders have provided teaching resource materials and awareness workshops.

In one state, West Virginia, a course in teaching reading at the secondary level has been added to the certification requirements for vocational teachers. The intent is not to prepare vocational teachers as remedial reading teachers but rather to provide teachers with teaching methods for assisting vocational students to read, comprehend, and use technical materials. Also, West Virginia is requiring all non-degreed vocational teachers to take a technical mathematics course during the 1988-89 school year.

During the spring of 1988, the National Assessment of Educational Progress (NAEP) tests in reading, mathematics, and science was administered to almost 3,100 high school seniors designated as vocational completers from 33 secondary schools selected as pilot sites in the 13 member states of SREB-State Vocational Education Consortium.[2] It appears from the results of this assessment that many vocational teachers in the 33 selected pilot sites are already stressing basic competencies in some disciplines as they teach vocational courses. Based on student self reports, approximately 56 percent of the students taking the NAEP tests reported that their vocational teachers often stressed mathematics; however, only 27 percent reported that teachers are stressing science. Students who reported that their vocational teachers often stressed the importance of reading, mathematics, and science skills had higher scores on all three NAEP tests than did students who reported that their vocational teachers never stressed basic competencies (Table 2). In mathematics, this score difference reflects approximately the same amount of increase as when students took one extra mathematics course.

Table 2

Percent of Students Indicating the Extent to Which Vocational Teachers Stressed the Importance of Reading, Mathematics, and Science Skills and Corresponding Average Scores of Vocational Completers

	Reading		Mathematics		Science	
	Percent	Score	Percent	Score	Percent	Score
Never	23.8	51.7	17.17	287.1	42.2	264.6
Often	46.6	54.8	56.2	296.1	26.6	270.9

Source: NAEP Assessment of SREB States

[2] The SREB-State Vocational Education Consortium is made up of 13 southern states that have joined in a common pursuit to raise the basic competencies of secondary vocational completers from 36 pilot sites during the next five years. For the NAEP assessment in reading, mathematics, and science, the participating pilot sites were instructed to identify and test all high school seniors who had completed four or more Carnegie units in a vocational concentration. At the schools' discretion, the following groups of students may have been excluded from the tests: (a) the student is unable to read English; (b) the student is physically unable to take the test due to a severe disability; and (c) the student is classified by psychological testing as educable mentally retarded (EMR) and has an individualized educational plan (IEP) on file that recommends that the student not be tested.

The NAEP results suggest that state leaders should continue a strategy designed to assist and encourage vocational teachers to use teaching methods that causes students to use basic competencies in their vocational studies. It appears that students' skills in reading, mathematics, and science can be enhanced if they are encouraged to use these skills and concepts in the context of an occupational field of study. Designing instructional strategies for vocational courses that encourage vocational students to use writing, reading, mathematics, and thinking skills will advance both their academic knowledge and their use of technical materials while further developing their ability to acquire knowledge.

Encouraging and Requiring Students Pursuing Vocational Studies to Complete Higher-Level Academic Courses

Most southern states have raised the number of mathematics and science courses required for high school graduation. In addition, some schools are encouraging students pursuing vocational studies to take higher-level academic courses that are closely related to their vocational studies. This push for vocational students to take higher level academic courses has occurred as a result of articulation agreements between secondary and postsecondary institutions, local school boards expanding the purpose of secondary vocational studies to include preparation for postsecondary education, and educators recognizing that a higher level of basic competencies are required for success and advancement in the workplace.

Math. The amount and level of mathematics courses taken by vocational completers in the 33 selected SREB pilot high schools seem to affect their mathematics achievement (Tables 3 and 4). Information contained in Table 3 reveals that SREB pilot site schools have encouraged vocational students to take, on the average, three units in mathematics and more higher level mathematics courses. For example, approximately 35 and 44 percent had completed algebra II and geometry respectively, in contrast with 18 and 29 percent for vocational students nationally. Results from the Southern Regional Education Board NAEP assessment indicate that for each mathematics course taken, the mathematics achievement of vocational completers increased 10 points (Table 4). However, the type of mathematics courses taken seems to be far more important than the number. The average achievement scores were significantly higher for students who reported completing courses other than those labeled "general." For example, a regression analysis revealed that enrollment in a general mathematics course resulted in a gain of less than three points while those selecting a pre-algebra course gained 9, algebra I gained 12, and geometry gained 13.

Re-examining the mathematics skills needed for further learning in either a work or educational setting has led some high schools to upgrade the sequence and quality of mathematics instruction provided for vocational students. Several SREB pilot sites have reported that these changes have included identifying students in grades seven and eight who need extra help to master basic mathematics skills and using applied instructional approaches for teaching and assisting students to retain mathematics skills. In some high schools, these changes have included replacing general

Table 3

Percent of Students Indicating That They Have or Have Not Taken Specified Mathematics Courses and Corresponding Average Mathematics Scores

(SREB Completers, Nation/Vocational, and Nation/Total)

	Have taken		Have not taken	
	Percent of students	Math score	Percent of students	Math score
General business or consumer math				
SREB completers	70.3	289.9	29.7	301.2
Nation/vocational	57.8	284.6	42.2	281.7
Nation/total	51.0	297.5	49.0	306.5
Applied or technical math				
SREB completers	10.6	291.6	89.4	293.6
Nation/vocational	NA	NA	NA	NA
Nation/total	NA	NA	NA	NA
First-year algebra				
SREB completers	69.1	302.1	30.9	274.1
Nation/vocational	60.2	292.9	39.8	270.0
Nation/total	77.8	311.3	22.2	271.2
Geometry				
SREB completers	43.6	308.9	56.4	281.7
Nation/vocational	28.6	300.3	71 4	277.2
Nation/total	57.0	319.7	43.0	280.2
Second-year algebra				
SREB completers	34.7	311.4	65.3	284.0
Nation/vocational	17.8	302.3	82.2	279.8
Nation/total	44.5	323.1	55.5	286.1

Source: National Assessment of Educational Progress Testing of SREB Vocational Completers.

mathematics with an applied technical mathematics course at the ninth or tenth grade, and following that course with Algebra I and at least one other appropriate higher-level mathematics course. These promising approaches appear to be successful in advancing the mathematics achievement of students pursuing vocational studies, especially if taught by mathematics teachers who can relate mathematic concepts to the vocational content students are studying.

Table 4

Comparison of Mathematics Scores of Vocational Completers Based on the Number of Mathematics Courses Taken

Number of Courses	Percent	Scores
2	25.2	283.7
3	45.4	293.0
4	28.3	303.4

Science. As with mathematics, the type of science course chosen may have more to do with science achievement than does the number of courses taken. For example, a regression analysis showed an average of approximately 10 points gain in science scores for students who chose science courses labeled "general science," while students taking chemistry showed 27 points gain in science achievement. Data from the NAEP assessment of vocational completers from SREB pilot sites suggest that science achievement is also linked to both the type and number of science courses taken (Tables 5 and 6). Over half of the almost 3,100 vocational completers had taken only two science courses. These results indicate that by requiring one additional science course, it is possible that achievement would increase from 10 to 15 points (Table 6).

Science achievement is extremely low for students who take only general science courses and the data show that a large proportion of vocational completers fall in this category. It appears that few vocational students are provided a lab science course, which is ironic since these students seem to learn best through a "hands-on" approach. About one-third of the vocational completers reported that they had taken either chemistry or physics. Approximately 4 percent had taken a course entitled "Principles of Technology," an applied physics course; these students did as well on the NAEP science test as did students who had taken an academic physics course (Table 5).

The NAEP mathematics and science results contain preliminary information which support the idea that higher-level academic content in mathematics and science can be organized and taught through an applied

Table 5

Percent of Students Indicating That They Have or Have Not Taken Specified Science Courses and Corresponding Average Science Scores

(SREB Completers, Nation/Vocational, and Nation/Total)

	Have taken		Have not taken	
	Percent of students	Science score	Percent of students	Science score
General science				
SREB completers	90.3	267.8	9.7	268.2
Nation/vocational	82.9	270.9	17.1	260.6
Nation/total	80.5	289.4	19.5	288.7
General biology				
SREB completers	90.8	270.2	9.2	243.9
Nation/vocational	71.0	272.7	29.0	260.1
Nation/total	85.2	294.2	14.8	262.9
Chemistry				
SREB completers	27.1	288.3	72.9	260.4
Nation/vocational	11.2	278.4	88.8	268.3
Nation/total	35.8	316.4	64.2	
275.1				
Physics				
SREB completers	10.8	276.5	89.2	266.8
Nation/vocational	10.3	262.5	89.7	270.1
Nation/total	11.4	306.6	88.6	287.1
Principles of technology (applied physics)				
SREB completers	3.6	276.2	96.4	267.6
Nation/vocational	NA	NA	NA	NA
Nation/total	NA	NA	NA	NA

Source: National Assessment of Education Progress Testing of SREB Vocational Completers.

process and that vocational students learn more through higher-level applied courses than through general mathematics and science courses. To enable students to take the additional academic courses while pursuing a vocational concentration, some schools are extending the school day. In some cases, students arrive one hour earlier or stay one hour later at the vocational center for a related academic class. Some comprehensive high schools with excellent vocational programs are finding ways to schedule a seven-period day. These strategies or others that local districts may develop should be encouraged by state educational leaders.

Table 6

Comparison of Science Scores of Vocational Completers
Based on the Number of Science Courses Taken

Number of Courses	Percent	Scores
1	4.0	244.9
2	49.9	261.3
3	34.0	272.5

Raising Expectations for Vocational Completers

Certainly the establishment of minimum high school tests for graduation have allowed teachers and administrators to realize that low achieving students taking vocational and general courses can achieve at higher levels. Encouraging students pursuing vocational studies to take more higher-level mathematics and science courses rather than choosing general courses is one example, but some high schools are using other approaches as well. More vocational and academic teachers have started making homework an integral part of their studies and expecting vocational students to complete their assignments. Certainly the establishment of minimum high school tests for graduation has allowed teachers and administrators to realize that students taking vocational and general courses can achieve at higher levels.

The NAEP assessment of vocational students in the southern states offers concrete evidence that expectations are related to outcomes. Vocational completers from SREB pilot sites who reported that their schools and teachers established a climate of encouragement and higher expectations for them scored higher on the NAEP reading, mathematics, and science tests than did completers who reported that their schools and teachers set low expectations for them (Table 7). These results offer one bit of evidence that when vocational and nonvocational teachers demonstrate personal concern for and interest in their students, encourage and expect students to pursue tough courses and achieve high standards, and provide them with the needed

Table 7

Average NAEP Test Results As a Function of Vocational Completers' Perceptions of Expectations for Them

	Percent	Reading score	Math score	Science score
Most teachers did not care about their subject				
- agree	11.0	49.8	283.6	254.0
- disagree	89.0	54.2	294.5	269.6
I was encouraged to take more math and science courses				
- agree	45.4	54.8	298.4	274.8
- disagree	54.6	52.8	289.0	262.1
I was not allowed to take more difficult math and science courses				
- agree	13.6	49.6	280.1	251.0
- disagree	86.4	54.4	295.4	270.5
Most teachers didn't expect me to do well				
- agree	13.3	50.4	284.9	251.0
- disagree	86.4	54.2	294.6	270.5
How much time each day is spent on homework				
- none	26.4	52.0	289.0	262.1
- 1 hour or more	42.1	55.2	294.7	270.0
How often did you do mathematics homework				
- never	11.4	---	282.9	---
- often	62.6	---	297.3	---

extra help, students will learn more than those students who do not have teachers with high expectations.

Revising State and Local Policies for Secondary Vocational Education

After extensive studies involving business, community, and educational leaders, some states and local systems are redefining secondary vocational education to serve a double purpose: To prepare youth for immediate employment and to encourage and prepare them for continued learning in either a work or educational setting. By refocusing the purpose of vocational education beyond skills training for entry-level jobs, these states and local school systems have begun the process of creating a purpose for vocational studies that can be shared by both vocational and nonvocational educators. A local school superintendent from western Oklahoma recently said to me, "The more academic and vocational teachers meet together, the more they have come to see that they share a common goal. They have begun to realize that through better communication and understanding, they can make progress in closing the gap between vocational and academic instruction with the result being the enhancement of students' educational development."

A few southern states--Alabama, Georgia, Florida, Virginia, and West Virginia--and a few local systems are moving even further by attempting to refine the definition of a vocational completer. Two items are being emphasized in this redefinition. First, students are still required to complete a specified number of Carnegie units in a vocational and related field of study. Most states are considering requiring students to complete four units in a vocational field and two units in related vocational studies. In addition, state and local communities are considering requiring students to complete two to four specified higher-level communication, mathematics, and science courses that underlie their vocational field of study in order to be a vocational completer.

Second, two states--West Virginia and North Carolina--have proposed that vocational completers be required to pass end-of-course tests that measure whether or not they are able to apply the basic academic competencies in their vocational field of study at the level needed for continued learning on the job. This represents an attempt to raise the basic competencies expectations to the new literacy level of the workplace, now recognized to be between the tenth and eleventh grade level. Many of the tests currently used for high school graduation represent an outdated literacy level rather than the higher literacy levels in reading and mathematics that have emerged in this decade.

These redefined state and local policies are sending a signal to students, teachers, and parents that more must be expected of all students, including those pursuing vocational studies. With higher expectations comes a new message: vocational education is not a way for students to escape from academic studies. Rather, vocational education represents a different way for students to learn and master basic competencies by pursuing a structured, sequential, challenging, and goal-oriented program of vocational and academic studies. Another result of these redefined policies has been

increased communication and cooperation between academic and vocational teachers as they work together toward the shared goal and responsibility of preparing youth for employment and further learning. It is through these changes in policies that state and local educational leaders see ways to institutionalize educational practices for closing the gap between vocational and academic studies.

Providing Students Access to New Academic Courses

To increase the academic skills of vocational completers, vocational and academic leaders in many state and local communities have worked together to develop and implement new types of academic courses--applied communication, applied mathematics, and principles of technology. These courses are designed to achieve the following:

- Teach the content found in college preparatory courses through a "functional context approach" that applies academic concepts to the workplace;
- Raise the quality of instruction and the level of learning in those academic concepts most critical for success and further learning in the workplace or in postsecondary education; and
- Assure that students pursuing vocational studies have access to courses reflecting college preparatory content that are taught with higher expectations, in an applied manner, and in coordination with students' vocational studies.

Two such courses have been adopted in several southern states: applied mathematics and Principles of Technology. The applied mathematics course is designed to teach mathematics concepts from arithmetic, geometry, algebra, and trigonometry; Principles of Technology covers those principles of physics associated with understanding today's technology. These courses represent efforts to offer students pursuing vocational studies an alternative to "watered-down" general academic courses. During the 1988-89 school year, eight southern states report that a total of 208 high schools will offer Principles of Technology, and five states report that 51 high schools will offer an applied or technical mathematics course. Providing students access to these courses represents one way states and local communities are striving to offer vocational completers some of the content taught in a college preparatory curriculum using an applied instructional strategy. The basic premise of the applied courses is to increase the basic competencies achievement of vocational completers through increased exposure to higher-level academic content taught in a manner that makes sense to them.

Using a Program of Study Approach to Connect Vocational and Academic Studies

Some local school systems are using a "program of study" approach to close the gap between vocational and academic instruction. A typical

program of study defines a four year sequence of academic and vocational courses required for either a specific vocational field or for broad vocational areas. For example, some programs of study are organized around an occupationally specific program, such as automotive mechanics or electronics, while others are organized around broader occupational fields such as business, human services, or technology. Different factors have given rise to the development of programs of study linking vocational and academic study. In some instances, the initiative grew out of a desire by officials from two-year postsecondary institutions and local school systems to inspire more students to prepare themselves for advanced-level technical and occupational studies at postsecondary institutions. These programs are often referred to as "Tech Prep" or "2 + 2" programs.

Other local school systems with high numbers of at-risk youth have coupled programs of vocational and academic study with interdisciplinary instructional planning as a means to motivate students to stay in school while, at the same time, providing a rich and different approach to learning. These programs have many names. In Georgia and some other states, the program is titled, "Coordinated Vocational and Academic Education" (CVAE). In California in the early 1960s, a similar program was referred to as the Richmond Plan. Today, in Philadelphia these programs are called "academies."

Many of today's so-called "magnet" programs also involve a team of academic and vocational teachers working together to connect academic studies around a vocational or occupational theme. Most of the career-based magnet programs have been carefully designed to avoid the traditional assumption that students pursuing vocational studies do not need further education. Magnet programs have resulted in advanced academic achievement, improved attendance, and lower dropout rates.

Some large comprehensive high schools are now beginning to use a program of vocational and academic study as a means to provide needed focus and structure to maximize the preparation of students for employment and continued learning. Gwinnett County, Georgia, is one urban system using the program of study approach as a means to alleviate the steady diet of low-level academic courses taken by vocational students.

As these examples of approaches to implementing a vocational program of study indicate, there is no single "right" way to go about it. However, most have a number of common characteristics. First, all have as a common goal a rigorous and coherent program of academic and vocational studies that will result in fully developing the potential of each participating student.

Second, all of the programs have sufficient flexibility for students to move into other curriculum tracks in high school if they so desire. This is accomplished in a variety of ways. In some settings, the ninth and tenth grade students are encouraged to become familiar with the several occupational options and delay the choice of a concentration until eleventh or twelfth grade. In other setting, students begin an occupational focus as early as the ninth grade but are allowed to move to other areas if they choose.

Third, all of the programs provide eighth and ninth grade students and their families a great deal of information and assistance to plan and choose a suitable four-year program of study. In some schools the counselor provides the assistance, while other schools operate a teacher advisor system where the same teacher follows the student through high school. The state of Florida is implementing a "Teachers as Advisors Program." The goal is to increase the amount of academic and career advisement available to students. In selected schools, the state of Georgia is implementing a program at the eighth grade level where counselor or teacher spends nine class sessions with eighth grade students to help them develop a four-year high school plan.

Fourth, all the programs seek to increase the communication and planning among academic and vocational teachers. However, the degree of interdisciplinary planning and instructional coordination is greater in the magnet programs and programs designed for at-risk students than in other approaches. In some settings, one teacher has at least two periods to serve as the team leader to assure that teachers receive the materials, staff development, and joint planning time necessary to connect academic and vocational studies.

Fifth, all programs have increased the number of mathematics and science courses required of vocational completers and all seek to raise the level of courses students take. Some programs provide students with flexibility--students may choose a college-prep and employment option, an employment and postsecondary option, or an employment option. Finally, all of the programs use an occupational or career focus as the vehicle for providing students with an active and goal-centered curriculum.

A program currently in operation in Virginia illustrates how a more rigorous academic and vocational program of study is emerging at the secondary level. The Virginia Master Technician Program was developed by local education agencies in the Virginia peninsula in partnership with area industry. Local educational agencies consist of a community college and five local school districts. The major innovation of the Master Technician Program was to create a mix of required academic and vocational courses (Table 8) that would provide students with a variety of educational and career options, including access to a two-year program in electronics/electromechanical technology leading to an Associate in Science degree.

Pre-service and In-service Preparation and Certification of Vocational and Nonvocational Teachers

New programs and approaches require new and different things of teachers. Numerous activities are underway involving representatives from state department of education and institutions of higher education to close the gap between academic and vocational education through pre-service and in-service preparation of teachers and revised certification standards. Federal funds allocated to vocational education are being invested in in-

service activities to upgrade the academic foundation of vocational teachers and to develop their skills in teaching basic competencies as part of their occupational instruction.

Table 8

Required Program of Study for High School Students
in the Virginia Master Technical Program

Required courses	Carnegie units
English	4
Health/physical education	2
Social studies	3
Mathematics	3
Algebra I	
Geometry	
Algebra II	
Lab science	4
Principles of Technology (2 units)	
Chemistry	
Science elective	
Electronics	4
Materials and processes	1
Mechanical drawing	1
Power and transportation	1
Elective	1
TOTAL	24

Some southern states (Arkansas, Florida, Maryland, and West Virginia) do currently or will shortly require all vocational teachers to pass a basic skills test. Other states (Alabama, Georgia, and West Virginia) are conducting feasibility studies for raising the educational level of beginning vocational teachers who do not have a degree.

All the southern states have provided short-term in-service activities to increase the awareness of vocational teachers concerning the need to integrate academics into their vocational curriculum. Several states--Georgia, West Virginia, Oklahoma, North Carolina, and South Carolina--in cooperation with higher education institutions are providing specific courses designed to upgrade teaching methods and content in reading, writing, mathematics, and science competencies of vocational teachers.

Another major in-service effort has focused on providing joint staff development programs for academic and vocational teachers. These have ranged from a few hours, to two to three weeks, and, in some instances, have continued for several months. These activities often begin by helping teachers understand the curriculum and goals of other teachers and how they can work together to help each other advance the basic competencies of their students. A number of systems provide special workshops designed to improve

the teaching of reading through content courses, to assist teachers in utilizing applied instructional approaches, and to orient teachers to applied science and mathematics courses. Over 30 local school systems have increased their financial investment in joint staff development activities that are planned by and for vocational and academic teachers who are seeking to improve the basic competencies of secondary vocational completers. It is estimated that the 36 secondary schools in the 13 member states of the SREB-State Vocational Education Consortium will invest more than $500,000 during the 1988-89 school year for staff development of academic and vocational teachers.

At the teacher preparation and certification level of the educational enterprise, the State Board of Regents for Higher Education in North Carolina now requires all prospective vocational education teachers to complete a second major in one of the basic academic disciplines or in an interdisciplinary major. The Virginia State Board of Vocational Education directed that vocational teacher educational programs be restructured to increase emphasis on the arts and sciences to an equivalent of a subject matter major, and to limit professional education courses to a maximum of 18 semester hours excluding student teaching. Vocational education departments in higher education institutions participating in the Holmes Group are involved in designing a five-year vocational teacher education program that may ultimately be adopted by a large number of universities.

Three states (Alabama, Oklahoma, and West Virginia) in cooperation with higher education institutions have special studies underway to determine what changes are needed to improve the ability of vocational teachers to reinforce and integrate related basic competencies to their vocational teaching field.

Providing Special Basic Skills Instruction for Low-Achieving Students Enrolled in Vocational Studies

A wide range of practices have been initiated by vocational educators to address the basic skills deficiencies of students enrolled in vocational programs. One of the major strategies involves identifying those with deficiencies and releasing them from vocational instruction for about three hours each week so that they can receive individualized reading or mathematics instruction through a resource learning center or related basic skills class. Another popular approach provides an aide or related basic skills teacher to assist students for a few hours each week with related basic skills instruction in the context of their vocational laboratory. Less frequently used but equally effective approaches include special summer programs, extended day programs, and tutors. Usually these programs are distinguished from the traditional remedial instruction approach by their efforts to use more applied and functional instructional strategies and materials. States and local systems report that these methods do help in advancing the basic skills of academically at-risk students

IV. Long and Short Term Goals for States in Combining Academic and Vocational Studies

It should be clear from the preceding descriptions of state and local activities that interest in improving the relationship between academic & vocational studies is escalating. While states have been instrumental in some cases, many initiatives have local origins. At this point, state policy initiatives are needed to institutionalize valid practices rather than a continuation of a series of unconnected projects. State leaders need to become familiar with and seek to utilize those strategies and practices that have proved to be successful in furthering the integration of vocational and academic studies. In this final section, I suggest a series of long and short term goals for states that would lend some leadership and direction to a new vision for vocational education.

Goal #1: Redesign and Refocus the State Policy Structure for Secondary Vocational Education

A ten-year goal of state boards of vocational education should be to establish a comprehensive state policy structure to institutionalize a new generation of secondary vocational education programs. The immediate goal should be to design a strategy for broad-based involvement of local educators and business and community leaders in a study to improve the relationship between academic and vocational education. Such a study would document current policies, practices, and basic competency achievement of vocational completers and describe existing strengths and weaknesses in the approach to vocational education. Findings and major recommendations from the study would be widely distributed at regional hearings and through written reports. As a result of widespread local review, study recommendations would be formulated into policy initiatives with timelines and implementation strategies. This approach to a redesigned policy structure would show how the knowledge gained from the several short-term project goals has been used to shape a state policy structure to institutionalize practices for a new relationship between academic and vocational studies.

Goal #2: Revise the Purpose of Secondary Vocational Education

State leaders need to send a clear signal to the public that the purpose of secondary vocational education is not training for a job, but education for employment and for further learning in either a work or educational setting. Revising both the purpose and nature of vocational education must be accompanied by measurable and accountable objectives designed to measure progress toward desired changes.

As a short term goal, state leaders should pursue the development of new indicators that could be used to determine whether or not the purpose and nature of secondary programs are shifting toward an educational focus as opposed to a training focus. Examples of new indicators for secondary

vocational education were set forth in a recent Southern Regional Education Board report entitled, "Goals for Education: CHALLENGE 2000." Among the indicators suggested were the following:

- Raising significantly over a five-year period the basic reading, mathematics, and science competencies of students who complete secondary vocational education programs, as measured by programs such as the National Assessment of Educational Progress;

- Increasing the percentage of vocational completers who continue their education within one year after high school graduation;

- Doubling the percentage of vocational students who take one or more college preparatory mathematics and science courses or courses designed to teach similar content through an applied process;

- Increasing by 50 percent the number of vocational completers who report that their vocational teachers often stressed mathematics, reading, writing, and science concepts; and

- Evaluating and revising the ways that vocational education teachers are prepared, licensed, and updated with the emphasis on improving their academic competencies and their skills for reinforcing them.

Another short-term goal should be the development of competency tests to determine whether vocational completers have developed the capacity to use the reading, writing, mathematics, and science skills essential for employment and further learning. The passing level for the basic competency tests should be based on the current levels of literacy required in the workplace and the levels of basic competencies needed for continued learning in postsecondary education.

Goal #3: Focus Federal Funds on Vocational Programs that Connect Academic and Vocational Studies

States should implement policies that direct the use of federal funds to those vocational programs designed to provide students with a rigorous and coordinated program of vocational and academic studies in grades nine through twelve. Such policies would require the redefinition of a vocational program to include vocational courses, related vocational courses, and the language arts, mathematics, and science courses necessary for students to maximize their full potential in an occupational field. Limiting the use of federal funds to programs that combine vocational and academic studies has the potential to restructure the relationship between vocational and academic education by truly binding them together in the common pursuit of strategies that will realize the maximum potential of each student. Programs of vocational and academic studies should be developed with sufficient flexibility and extra help provisions to serve students with varying abilities, interests, and limitations.

A program of study approach to vocational funding would allow the entire school to become involved in identifying and retaining at-risk youth as early as the eighth or ninth grade, in contrast with the fragmented, isolated, and disconnected approach that now exists. Recently, upon entering the office of a director of a half-day secondary area vocational center, I was asked, "How can I spend my disadvantaged funds?" During the course of my tour through his center, I discovered that one-third of his students were failing one or more academic courses back at the home high school and, therefore, were not able to attend the vocational center the second year because they were repeating courses failed. My suggestion was for him to meet with officials from the feeder high schools and offer them disadvantaged funds to provide extra help for eligible students so that they could pass their regular mathematics, science, and language arts courses.

As a short-term goal, state leaders should set aside an amount of federal improvement funds to be used as grants to support a new generation of secondary vocational programs designed to prepare youth for employment and further education. Recipients of these grants would be required to demonstrate how a challenging program of academic and vocational studies will be combined into a redesigned program of vocational education. Programs funded should be carefully evaluated to see that desired practices and results are achieved. The long-term goal of state policymakers should be to restructure the funding policies for secondary vocational education so that support is limited to those programs that have closed the gap between academic and vocational studies. The new federal vocational education legislation should contain a provision for encouraging states to use their federal vocational funds to create a new generation of secondary vocational educational programs.

Goal #4: Provide Students Access to Higher-Level Academic Courses that are Taught through an Applied Approach

Many more students can master higher-level academic content if they are allowed to do so through different instructional approaches. States should develop policies that require local school systems to provide students access to higher-level mathematics, science, and technical writing courses designed to teach academic content through a applied process. Such courses should be both rigorous and interesting and should be designed to discourage vocational students from enrolling in low-level general academic courses. Such a policy would also communicate to local school systems that there are ways to provide more students with a common core curriculum by changing the way the content is organized and taught.

As a short-term goal, state leaders should provide incentive grants to local school systems that are willing to reorganize and redesign the content and teaching methods of higher-level academic courses for vocational students. The grants would allow schools to take from college preparatory mathematics and science courses those concepts most needed for advancement in employment and further learning and reorganize those concepts into new

courses designed to use vocational labs and the context of the work setting as the means for teaching vocational students higher-level academic content.

Plans for this type of curricular reorganization must include evaluation studies that follow the progress of experimental and control groups in order to rigorously assess student achievement from higher-level applied academic courses as contrasted with student achievement from general academic courses. By collecting solid evidence that applied courses offer potential for raising the basic competencies of vocational completers, state leaders should be able to pursue their long-term goal of requiring all schools to provide access to such courses.

Part of the long-term strategy would include significant investment in curriculum development and participation in the selection of textbooks to be placed on the state-adopted textbook list. Long-term implementation of this policy requires that local systems be permitted to purchase mathematics and science equipment, textbooks, and materials that have been prepared for applied instruction. A major issue in using the applied approach to improve academic competencies of students is the availability and cost of quality instructional materials and equipment.

Goal #5: Raise Expectations for Students Pursuing Vocational Studies

State leaders need to find ways to encourage local school board members, educators, parents, and students to raise the academic and vocational achievement levels expected of students pursuing vocational studies. A direct approach would be for state policymakers to redefine the requirements for vocational completers and increase the recognition given high school graduates who meet higher expectations. Part of the redefinition could include establishing a core of higher-level, related academic courses that vocational completers must take in addition to courses in their vocational field. Another part could require vocational completers to pass basic competency tests to measure whether or not they have mastered the basic literacy skills needed for today's workplace.

Establishing higher expectations for vocational completers does not mean a de-emphasis on serving those students who will never achieve at the tenth or eleventh grade level. The handicapped and at-risk students will be better served in a school climate where the focus is on helping each student achieve to his or her maximum capacity. This means that standards in vocational classrooms must be set at a level that challenges the 80 to 90 percent of enrolled students who can achieve far more than we typically ask of them. Achievement goals can then be adapted and individualized as necessary to meet particular students' academic needs.

State leaders should provide incentive funds for state-sponsored demonstration projects to a few local school systems that are willing to test a range of strategies to increase the level of expectations established for students enrolled in a vocational program of study. The long-term goal of state leaders should be to use the state's high school graduation requirements as the vehicle for raising the requirements and levels of

performance expected of secondary vocational completers. High school graduation requirements can also be used to give proper recognition to high school graduates who have completed the requirements for a combined program of academic and vocational studies.

Goal #6: Revise the Preparation and Certification Requirements for New Vocational Teachers and Encourage Current Teachers to Continue Their Education

Vocational teachers of the future must have mastery of both the technical competencies in their vocational discipline and the academic competencies that underlie their specialty field. In addition, they must master teaching methods that enable them to connect the teaching of needed academic competencies with related technical knowledge and skills. This will require the revision of teacher education programs so that greater emphasis is placed on using electives in their general studies to increase the academic base for their vocational teaching field. Changes will also be required in professional education courses in order to give greater emphasis to integrating the teaching of related reading, writing, mathematics, and science competencies with natural ties to a vocational field. To achieve these changes will require cooperation with higher education institutions and state certification offices.

As a short-term goal, state and teacher education leaders should establish a process to determine the changes needed in teacher preparation and certification in order to achieve a new generation of secondary vocational programs. States that continue the practice of employing vocational teachers who do not have a college degree should set a long-term goal to certify only those who demonstrate the ability to do college-level academic work. State Boards of Vocational Education should do what many states did during the 1950s in regard to elementary teachers and establish as a long-term goal that all vocational teachers have a college degree by a designated date. Such a goal must be coupled with the development of new approaches for recruitment, financial aid, and preparation of teachers for those fields that have been filled by non-degreed persons.

State vocational leaders cannot limit their concerns to new vocational teachers. They must also increase their support of staff development activities designed to assist current teachers in upgrading their academic knowledge and their ability to utilize teaching methods that integrate academic and vocational studies. One of the criteria for approving a vocational program should be evidence that vocational and academic teachers have participated in staff development activities to upgrade their knowledge and skills for improving the basic competencies of vocational completers. All teachers--academic and vocational--need help with ways of developing students' reading comprehension skills in the content fields.

Goal #7: Staff Organization and Leadership for Improving the Relationship Between Vocational and Academic Studies

State leaders need to explore different approaches for encouraging closer relationships between academic and vocational teachers in comprehensive high schools and between the home high school and the area vocational center. Coordination will take time and effective leadership skills if anything is to change. Who at the school level will take the leadership in working with academic and vocational teachers to redesign curriculum and instruction that better connects academic and vocational instruction? Who will plan staff development sessions in which vocational and academic teachers can share information and ideas? Who will plan meetings among vocational and academic teachers to determine how best to work with at-risk students? How will such individuals be selected, and what renumeration will be necessary to get them to do the extra work that will be required? States need to encourage local schools to be creative in experimenting with leadership approaches for an effective program of vocational and academic studies. The concept of lead teachers or a career ladder should be among the approaches examined.

Goal #8: Conduct Large-Scale Evaluations

State leaders should focus attention on those practices that increase the basic competencies of vocational completers. State leaders can do this best by designing and conducting a biannual evaluation to determine whether vocational completers throughout the state have the acquired basic competencies needed for continued learning on the job or in further education. Further, the evaluation would collect information on practices that seem to be successful in improving the basic competencies of vocational completers. For example, the evaluation should seek to determine the extent to which the following practices are linked to improving the basic competencies of vocational completers: the amount and level of academic courses taken; the amount and quality of emphasis given by vocational teachers in reinforcing basic competencies that underlie their occupational field; the level of expectations established by vocational and nonvocational educators for students pursuing vocational studies; and the extent to which vocational and nonvocational teachers worked together to provide students with a coordinated program of vocational and academic studies.

State leaders with information on current practices and levels of learning will be in a position to provide leadership for making needed changes and improvements and documenting the results of those changes. Little will happen to improve the quality of the secondary school experience for many vocational students until state leaders are willing to document the inadequacies of both vocational and academic studies and point to specific changes in practice that will improve the situation.

Summary

In summary, three challenges face state leaders in closing the gap between academic and vocational education in such a way as to enhance the value of both. The first challenge is to convince policymakers and secondary educators--both academic and vocational--that most youth pursuing vocational studies can be prepared for both employment and postsecondary education. The second challenge is to demonstrate to policymakers and educators the techniques for organizing a challenging and goal-oriented program of study that combines academic and vocational instruction. The third challenge is to convince academic and vocational educators that integrating vocational experiences and content into academic courses and integrating academic content and experiences into vocational courses will increase the levels of academic and technical knowledge and skills students acquire and enhance their ability for further learning in either a work or educational setting.

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