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ABSTRACT

This catalog describes local programs in the eight models of academic/vocational curriculum integration on the secondary level identified by the National Center for Research in Vocational Education (NCRVE). The roster highlights models from nearly every state, representing a cross-section of rural, suburban, and urban school districts. Each model is described in both general and specific terms. The general description includes information about the target student population, the curriculum modifications, teachers involved, and any structural changes required. The specific description considers the advantages and challenges of each model as well as sample classroom activities. Finally, the growth potential of each model is discussed. Each model description is followed by a listing of examples and resources. The listing includes the name, address, telephone number, primary personnel, and other key personnel at each school and a summary of the school's integration program. The roster also includes the following: a summary table of all models; a list of examples by integration model number; a list of examples by state; a list of examples in alphabetical order; a summary of services provided by the NCRVE; a list of references and other products available from NCRVE; and an application form. The integration models described are the following: (1) vocational teachers introduce academic competencies into vocational courses; (2) vocational and academic teachers collaborate to enhance academic competencies in vocational classes; (3) academic teachers enhance the vocational relevance of the academic curriculum; (4) curriculum in both vocational and academic courses is modified and aligned; (5) senior projects; (6) the academy model; (7) occupational high schools and magnet schools; and (8) occupational clusters, career paths, and occupational majors. (KC)

National Center for Research in
Vocational Education

University of California, Berkeley

NATIONAL ROSTER OF LOCAL PRACTICES IN THE INTEGRATION OF VOCATIONAL AND ACADEMIC EDUCATION

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NATIONAL ROSTER OF LOCAL PRACTICES IN THE INTEGRATION OF VOCATIONAL AND ACADEMIC EDUCATION

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The National Roster of Local Practices in the Integration of Vocational and Academic Education represents the efforts of an extensive number of dedicated staff members from the National Center for Research in Vocational Education (NCRVE) along with all the schools that participated in the application process. The ideas contained within the document were modeled after two previous documents written with the same purpose to encourage school districts to participate in the integration reform effort.

It is essential that the National Roster be easily readable, interesting to practitioners, and have maximum utility to those interested in implementing new integration programs. The format used by the Nebraska Department of Education, Division of Educational Services booklet entitled "Enhancing Learning Environments through Curriculum Integration" was especially inspirational in NCRVE staff's efforts to develop its National Roster.

The document compiled by Margaret Isom, Lois Beeken, and B. June Schmidt from Virginia Polytechnic Institute and State University, Division of Vocational and Technical Education, entitled *Integration of Academic and Vocational Education in Secondary Schools: A Resource Guide* was used as a primary source for potential participating schools for the National Roster.

Publishing this type of a document requires considerable staff effort. Thanks go to Erika Nielsen, who assisted both in the original creation of and in editing the National Roster. We also express appreciation to Peter Seidman for his assistance during the sometimes arduous process of publishing this type of a document. Last, but certainly not least, we thank Norton Grubb, whose work *"The Cunning Hand, The Cultured Mind": Models for Integrating Vocational and Academic Education* was used as a primary resource document in the preparation of this report.

The extensive writing and communication with the school sites necessary to publish this document rested in the capable hands of Mayo Tsuzuki. The quality of this document speaks for itself and is a testament to her skills and dedication. Our sincere thanks also go to Laurie Holland for her unlimited patience and unequaled clerical skills used in the development of this document.

The National Roster would not have been developed nor have any purpose without the high quality examples of integration practices from the participating schools. Thus, this document is dedicated to them because it is they who are on the front line of this important and exciting reform effort.

TABLE OF CONTENTS

A LETTER FROM THE DIRECTOR

February 8, 1994

It is the "best of times" for the integration of vocational and academic education in the United States. Integration efforts enjoy support from every level of government, from business, from labor, and from the population at large. Why is this so? Perhaps it is because the integration movement is designed to serve all students, not just the academically oriented or those at risk. Everyone needs advanced skill levels to succeed in an increasingly competitive workplace, and every student can benefit from the integration practices presented here.

The purpose of the National Roster is primarily to highlight local programs in the eight models of integration that NCRVE has identified to date. The National Roster highlights models from nearly every state, representing a cross-section of rural, suburban, and urban school districts. This roster focuses on efforts at the secondary level; we hope that a subsequent roster will emphasize postsecondary practices.

If you are interested in more information regarding the National Roster or have any questions related to the integration of vocational and academic education, please call the Director of the National Network for Curriculum in Integration and Tech Prep at (510) 642-3824.

These are the best of times, but time is a scarce commodity. Act now and join us in creating a productive workforce for our country.

Yours truly,

Charles D. Benson

Charles Benson, Director

HOW TO USE THE NATIONAL ROSTER OF LOCAL PRACTICES IN INTEGRATION

The National Roster is designed to inspire and guide change in the way vocational and academic instruction is delivered in schools across the country. Those who are leading and participating in this movement of educational change need to know about the approaches to integration described here. Readers may include, but are not limited to, vocational and academic teachers; school, district, and state administrators; researchers; policymakers; and parents. Some will find this handbook useful in building a better understanding of the concept of integration. Others, who have been very involved in creating the programs included here as examples, will use the roster as a directory of schools working with similar models of integration. We hope all will find this handbook useful in understanding the different ways integration brings about powerful changes in schools and students.

First, a word about the use of "models." These models have been identified by observing the actual practice of integration in schools and determining the characteristics by which practices are found to be similar or different. For example, one such characteristic is the student population that is targeted to benefit from integration. Another determining characteristic is the subject areas to be involved in integration. Yet a third is the extent to which the structure of the school must be changed to implement a specific kind of integration. Because the categorization is based on real schools with local needs, it is important to keep in mind that there is no formula for the perfect implementation of any single model of integration. The description of each model is not to be taken literally, as a recipe, but rather as a set of very general guidelines. In practice, schools will need to modify these models to suit their own purposes.

In addition, many of the schools listed as examples continue to change as they develop better ways of defining students' needs and meeting them. For this reason, these models are not intended to define the way the schools included here should or will be tomorrow, but rather to provide a snapshot, a picture, of the way they look today. Schools that are interested in a particular model of integration should keep in mind that just as the examples listed here may develop, they, too, can approach change incrementally. That is, it may be easier to begin to implement integration in one classroom at a time, with one teacher at a time, even though the eventual goal is to

restructure the entire school by replacing traditional subject departments with career paths or clusters. We urge schools to consider the possibilities of a series of integration models that will allow change to occur over time instead of dwelling on the impossibilities of fitting a single model and implementing dramatic change all at once.

Readers will find each model described in both general and specific terms. The general description includes information about the target student population, the curriculum modifications, teachers involved, and any structural changes required. The specific description considers the advantages and challenges of each model as well as sample classroom activities. Finally, the growth potential, or "future promise," of each model is discussed.

Each model description is followed by a listing of examples and resources. The listing includes the name, address, phone number, and primary personnel for each school site. It also includes other key personnel, phone numbers, a checklist of what the key personnel are willing (or not willing) to do as resources to other schools, and a summary of the school's integration program. *Caveat*: Information given on schools listed as examples was gathered from written applications submitted by schools and through contacts made by phone. In addition, a reference call was made for each school. However, these schools are highlighted as sites of change. Therefore, it is to be expected that the information provided here may have changed after the publication of this roster.

To assist readers in accessing this publication's models and participating schools, the following table and lists precede the eight model descriptions and example listings:

- a summary table of all models
- a list of examples by integration model number
- a list of examples by state
- a list of examples in alphabetical order

Following the model descriptions and example listings are

- a summary of services, which include research, outreach, networking, and regional and national institute activities provided by NCRVE;

- a list of references and other products available from NCRVE; and
- an application form.

We think of this roster as a living document, one that will grow and change as we learn more about integration efforts. We would like to hear about other efforts and have included an application form at the end of this roster to encourage schools to participate in and contribute to the growing network of schools that are improving education for *all* students.

SUMMARY TABLE

MODELS OF INTEGRATING VOCATIONAL AND ACADEMIC EDUCATION

Model and Curriculum Changes	Teacher Changes	Students Targeted	Structural Change
1. Vocational teachers introduce academic competencies into vocational courses.	Vocational teachers modify curriculum, teaching methods.	Vocational students.	None.
2. Combining vocational and academic teachers to enhance academic content in vocational programs.	Academic teachers cooperate with vocational teachers to modify curriculum, teaching methods.	Vocational students.	None necessary; lack of shared planning and teaching periods or physical distance between vocational and academic classrooms may impede cooperation.
3. Making academic courses more vocationally relevant.	Academic teachers (usually) modify courses or adopt new ones.	Potentially all students; in practice, vocational and general-track students.	None.
4. Curricular alignment, horizontal and vertical. Both vocational and academic courses are modified and coordinated across courses and/or over time.	Vocational and academic teachers cooperate, coordinate curriculum modules, and modify teaching methods; numbers range from two to all.	Potentially all students; actual targets vary.	None necessary; shared planning periods and curriculum teams may foster cooperation.

Model	Curriculum Changes	Teacher Changes	Students Targeted	Structural Changes
5. Senior projects.	Seniors replace electives with a project; earlier courses may change in preparation.	None necessary; project advisors and evaluators are normally recruited, and evaluation standards must be determined; teachers may develop new courses or modify content to better prepare students.	Potentially all students; actual numbers depend on advising and evaluating capabilities.	None necessary.
6. Academy model.	Alignment among academy courses (core academics and vocational focus) *may* take place.	Vocational and academic teachers may collaborate on both curriculum and students.	Usually potential dropouts; sometimes students interested in specific occupational areas.	School-within-a-school; block rostering; smaller classes; links to employers.
7. Occupational high schools and magnet schools.	Alignment among all courses may take place, emphasizing the occupational focus.	All vocational and academic teachers assigned to an occupational school or magnet within a school; collaboration and course alignment facilitated.	Students interested in specific occupational areas.	Creation of a self-contained occupational school or magnet school.
8. Occupational clusters, career paths, and majors.	Coherent sequences of courses created; alignment may take place among courses within cluster.	Teachers belong to occupational clusters rather than (or in addition to) conventional departments; collaboration and course alignment facilitated.	All students.	Creation of occupational clusters; enhancement of career counseling; possible cluster activities.

LIST OF SCHOOLS BY INTEGRATION MODEL NUMBER

Model	School	Cross-Reference	State
1	Kentucky Tech Lee Campus	3	KY
1	Trezevant Vocational Tech Center	3	TN
2	Central Oklahoma Vo-Tech		OK
2	Columbus High School		WI
2	Gloucester County Institute of Tech		NJ
2	Muscle Shoals High School and Center for Tech.	1, 3, 4	AL
2	Phoenix Union High School District	1	AZ
2	Putnam Northern Westchester BOCES		NY
2	Rolette High School		ND
2	Salem Vocational Center		NH
2	Suitland High School		MD
2	Trigg County High School		KY
2	Wasilla High School	1	AK
3	Alamo Navajo Community School	1	NM
3	Alvirne High School Vo-Tech Center		NH
3	Apple Valley Senior High		MN
3	Appleton Area Schools	2	WI
3	Berks Career & Tech Center	1	PA
3	Central City High School	2	NE
3	Eastern Idaho Technical College		ID
3	Idaho Falls High School		ID
3	Jackson County High School	1, 2	KY
3	Lindsey Hopkins Technical Education Center		FL
3	Mansfield High School		TX
3	Northwest Technical School		MO
3	Palm Bay High School		FL
3	Pampa High School	2	TX
3	Wheeling Park High School		WV
3	Woodward High School		OK
4	Bacon Academy - Colchester Public Schools		CT
4	Cedar Bluffs High School		NE
4	Cedartown High School		GA
4	Chase County High School		NE

Model	School	Cross-Reference	State
4	Cumby High School		TX
4	Eldorado High School	2, 3	TX
4	Greenville High School		TX
4	Grisham Middle School		TX
4	Hazleton Area School District	3	PA
4	Hoke County High School	3	NC
4	Illinois Valley Central High School	3	IL
4	Lakeview High School		NE
4	Lincoln High School	2	NE
4	Montgomery County JVS		OH
4	Mt. Diablo High School	3	CA
4	New Richmond High School		WI
4	San Juan High School		CA
4	York County Area Vocational-Tech School	2	PA
5	Forest Grove High School		OR
5	Gov. John R. Rogers High School		WA
5	Onondaga-Cortland-Madison BOCES		NY
5	Paul M. Hodgson Vocational-Technical High School	2, 4	DE
5	Sitka High School	2	AK
6	Farrington High School		HI
6	Florin High School		CA
6	Hanford High School		CA
6	John C. Fremont High School		CA
6	Lafayette High School		NY
6	Socorro High School		TX
6	Woodside/Carlmont High Schools		CA
7	Waipahu High School		HI
8	Benson High School		NE
8	Bryan High School	1, 4	NE
8	Chopticon High School		MD
8	Milwaukee South Division High	2, 4	WI
8	Norfolk Public Schools		VA
8	Sussex Technical High School		DE
8	Valley High School		CA

LIST OF SCHOOLS BY STATE

Model	School	Cross-Reference	State
5	Sitka High School	2	AK
2	Wasilla High School	1	AK
2	Muscle Shoals High School and Center for Tech.	1, 3, 4	AL
2	Phoenix Union High School District	1	AZ
6	Florin High School		CA
6	Hanford High School		CA
6	John C. Fremont High School		CA
4	Mt. Diablo High School	3	CA
4	San Juan High School		CA
8	Valley High School		CA
6	Woodside/Carlmont High Schools		CA
4	Bacon Academy - Colchester Public Schools		CT
5	Paul M. Hodgson Vocational-Technical High School	2, 4	DE
8	Sussex Technical High School		DE
3	Lindsey Hopkins Technical Education Center		FL
3	Palm Bay High School		FL
4	Cedartown High School		GA
6	Farrington High School		HI
7	Waipahu High School		HI
3	Eastern Idaho Technical College		ID
3	Idaho Falls High School		ID
4	Illinois Valley Central High School	3	IL
3	Jackson County High School	1, 2	KY
1	Kentucky Tech Lee Campus	3	KY
2	Trigg County High School		KY
8	Chopticon High School		MD
2	Suitland High School		MD
3	Apple Valley Senior High		MN
3	Northwest Technical School		MO
4	Hoke County High School	3	NC
2	Rolette High School		ND
8	Benson High School		NE
8	Bryan High School	1, 4	NE

Model	School	Cross-Reference	State
3	Central City High School	2	NE
4	Chase County High School		NE
4	Lakeview High School		NE
4	Lincoln High School	2	NE
3	Alvirne High School Vo-Tech Center		NH
2	Salem Vocational Center		NH
2	Gloucester County Institute of Tech		NJ
3	Alamo Navajo Community School	1	NM
6	Lafayette High School		NY
5	Onondaga-Cortland-Madison BOCES		NY
2	Putnam Northern Westchester BOCES		NY
4	Montgomery County JVS		OH
2	Central Oklahoma Vo-Tech		OK
3	Woodward High School		OK
5	Forest Grove High School		OR
3	Berks Career & Tech Center	1	PA
4	Hazleton Area School District	3	PA
4	York County Area Vocational-Tech School	2	PA
1	Trezevant Vocational Tech Center	3	TN
4	Cooper High School		TX
4	Cumby High School		TX
4	Eldorado High School	2, 3	TX
4	Greenville High School		TX
4	Grisham Middle School		TX
3	Mansfield High School		TX
3	Pampa High School	2	TX
6	Socorro High School		TX
8	Norfolk Public Schools		VA
5	Gov. John R. Rogers High School		WA
3	Appleton Area Schools	2	WI
2	Columbus High School		WI
8	Milwaukee South Division High	2, 4	WI
4	New Richmond High School		WI
3	Wheeling Park High School		WV

LIST OF SCHOOLS IN ALPHABETICAL ORDER

Model	School	Cross-Reference	State
3	Alamo Navajo Community School	1	NM
3	Alvirne High School Vo-Tech Center		NH
3	Apple Valley Senior High		MN
3	Appleton Area Schools	2	WI
4	Bacon Academy - Colchester Public Schools		CT
8	Benson High School		NE
3	Berks Career & Tech Center	1	PA
8	Bryan High School	1, 4	NE
4	Cedar Bluffs High School		NE
4	Cedartown High School		GA
3	Central City High School	2	NE
2	Central Oklahoma Vo-Tech		OK
4	Chase County High School		NE
8	Chopticon High School		MD
2	Columbus High School		WI
4	Cooper High School		TX
4	Cumby High School		TX
3	Eastern Idaho Technical College		ID
4	Eldorado High School	2, 3	TX
6	Farrington High School		HI
6	Florin High School		CA
5	Forest Grove High School		OR
2	Gloucester County Institute of Tech		NJ
5	Gov. John R. Rogers High School		WA
4	Greenville High School		TX
4	Grisham Middle School		TX
6	Hanford High School		CA
4	Hazleton Area School District	3	PA
4	Hoke County High School	3	NC
3	Idaho Falls High School		ID
4	Illinois Valley Central High School	3	IL
3	Jackson County High School	1, 2	KY
6	John C. Fremont High School		CA
1	Kentucky Tech Lee Campus	3	KY

Model	School	Cross-Reference	State
4	Lakeview High School		NE
4	Lincoln High School	2	NE
3	Lindsey Hopkins Technical Education Center		FL
3	Mansfield High School		TX
8	Milwaukee South Division High	2, 4	WI
4	Montgomery County JVS		OH
4	Mt. Diablo High School	3	CA
2	Muscle Shoals High School and Center for Tech.	1, 3, 4	AL
4	New Richmond High School		WI
8	Norfolk Public Schools		VA
3	Northwest Technical School		MO
5	Onondaga-Cortland-Madison BOCES		NY
3	Palm Bay High School		FL
3	Pampa High School	2	TX
5	Paul M. Hodgson Vocational-Technical High School	2, 4	DE
2	Phoenix Union High School District	1	AZ
2	Putnam Northern Westchester BOCES		NY
2	Rolette High School		ND
2	Salem Vocational Center		NH
4	San Juan High School		CA
5	Sitka High School	2	AK
6	Socorro High School		TX
2	Suitland High School		MD
8	Sussex Technical High School		DE
1	Trezevant Vocational Tech Center	3	TN
2	Trigg County High School		KY
8	Valley High School		CA
7	Waipahu High School		HI
2	Wasilla High School	1	AK
3	Wheeling Park High School		WV
6	Woodside/Carlmont High Schools		CA
3	Woodward High School		OK
4	York County Area Vocational-Tech School	2	PA

MODEL ONE
VOCATIONAL TEACHERS INTRODUCE ACADEMIC COMPETENCIES INTO VOCATIONAL COURSES

The form of integration most easily and quickly achieved is the inclusion of academic content within regular vocational classes. The vocational teacher utilizes applied learning strategies to improve the academic success and basic skills of students who may have traditionally associated academic content with frustration and failure. The rigor of the academic content that is added to the vocational curriculum depends on the vocational teacher's comfort level with academic content, openness to change, and creativity. Therefore, this model of integration sometimes meets resistance from vocational teachers who prefer the familiarity of the status quo rather than the challenge of change.

Advantages

- Easily implemented by one teacher in single or multiple units within one or more classes.
- Provides strong basis and motivation for more formal collaboration between vocational and academic teachers.
- Provides academic content to students who have not mastered basic reading, writing, and math skills.
- Encourages teacher innovation.
- Increases academic content of vocational classes.

Challenges

- Does not address the problem of teacher burnout due to teacher isolation.
- Does not address the traditional split between vocational and academic teachers and students and, therefore, may not address tracking issues.
- Academic skills tend to be low level or remedial and, therefore, may not prepare students for high-skill, entry-level jobs.

Classroom Activities

Vocational education teachers may utilize the following:

- cooperative learning approaches to encourage students' acquisition of academic skills
- more writing exercises within the existing curriculum, including a variety of writing-to-learn activities—learning logs, reaction sheets, activity summaries, and comments in vocational classes
- authentic assessment practices such as writing samples, problem solving, and team problem solving to replace more traditional assessment methods
- prepared curriculum materials such as Principles of Technology, applied physics, Applied Communications, Applied Mathematics, applied biology, applied chemistry, and applied basic skills
- job search activities to reinforce language skills such as the preparation of letters of application, résumés and application forms, or crossword activities and word games using job-related vocabularies
- analytical activities to reinforce math and science skills such as using scientific measuring devices; reading; interpreting and creating graphs, charts, tables, recipes, and math story problems

Future Promise

It is important to emphasize that basic academic skills are absolutely essential in developing higher order competencies. Therefore, all vocational teachers should be encouraged to use this model of integration in addition to, and not to the exclusion of, other integration efforts.

Beyond the level of individual teachers in isolated classrooms, however, a more formal approach seeks to develop model vocational curricula and program frameworks for use in single school districts or school district consortia. This process requires the input and agreement of many vocational teachers and the testing of trial models. The curriculum frameworks are specific to single vocational areas and identify core academic and job-related competencies. This method identifies what occupations require in terms of academic skills and, with the support of local industry, teachers develop exercises and teaching methods to provide meaning-centered experiences to the students' education.

Examples and Resources

Kentucky Tech Lee Campus
P.O. Box B
Beattyville, KY 41311
(606) 464-5018
Frank Kincaid

Other key personnel: (606) 464-5018

Jerry Hollon	Counseling/Integration
John Cook	Industrial Electricity
Phyllis Hoskins	Math/Communications
Richard Kazsuk	Auto Technology
Rebecca Mullins	Office Technology

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Writing and math portfolios are used in vocational classes to improve academic skills.
- Higher level academic classes currently taught at the comprehensive high school such as physics and chemistry have collaboratively taught units with industrial electricity, welding, and auto technology.
- "Real world" experiences through field trips to work sites and industries provide practical applications of math concepts.

Trezevant Vocational Technical Center
3224 Rangeline Road
Memphis, TN 38127
(901) 357-3805
Ms. Jo Gateley

Other key personnel

Joyce Condron	App. Communications (901) 357-3814
James Walker	Principles of Tech. (901) 357-3833
Dorothy Bizzell	Guidance (901) 357-3809
Beverly Casey	App. Bio./Chem. (901) 357-3818

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Vocational teachers received training and incorporated basic academic skills instruction in reading, math, and science.
- Science teacher acted as a consultant to vocational teachers to help provide instruction in basic science skills.
- Collaboration with academic teachers helped identify academic competencies in vocational curricula.
- Academic teachers at seven feeder high schools received training from vocational teachers to teach applied academics courses.

See also:

Alamo Navajo Community School
Model Three
P.O. Box 907
Magdalena, NM 87825
(505) 854-2635
Gail Campbell

Berks Career & Technology Center
Model Three
R.D. #1, Box 1370
Leesport, PA 19533
(215) 378-4884
Robert A. Runkle

Bryan High School
Model Eight
4700 Giles Road
Omaha, NE 68157
(402) 978-7200
Tom O'Hara

Jackson County High School
Model Three
107 KY Hwy. 290
McKee, KY 40447
(606) 287-3121
Betty Bond

Muscle Shoals High School and
Center for Technology
Model Two
P.O. Box 2730
Muscle Shoals, AL 35661
(205) 389-2675
Sharon Rue

Phoenix Union High School District
Model Two
1900 W. Thomas Road
Phoenix, AZ 85015
(602) 271-3287
Joyce J. Prchal

Wasilla High School
Model Two
701 Bogard Road
Wasilla, AK 99654
(907) 376-5341
Pat Gakin

MODEL TWO
VOCATIONAL AND ACADEMIC TEACHERS COLLABORATE TO ENHANCE ACADEMIC COMPETENCIES IN VOCATIONAL CLASSES

Vocational students benefit from this form of integration that bridges the gap between vocational and academic teachers through collaboration. Often in response to state-required competency tests and increasingly strict graduation requirements, teams of vocational and academic teachers plan and implement an integrated curriculum for vocational classes. Academic material and skills are explicitly taught and tested in units that are often team-taught. Teacher teams have expectations of high level and complex skill development in both vocational and academic subjects.

Advantages

- Reduces teacher isolation of both vocational and academic instructors through the mutual expansion of knowledge in the other's discipline through content and pedagogy collaboration.
- Emphasizes relevant applications of academic content for vocational students.
- Develops high-level academic skills of vocational students to provide tools for postsecondary success, whether in further education or career choice.
- Encourages teacher innovation and collaboration.
- Can be implemented by one or multiple vocational-academic teacher teams.
- Makes use of vocational classroom's laboratory materials and equipment for academic exercises.

Challenges

- Only the vocational curriculum changes and only vocational students benefit. Traditional academic curriculum and teachers who are not involved may dismiss reform efforts as "vocational track" only.
- Academic skills tend to be specialized for a single vocational area and may not be viewed as transferable or comparable to those taught in traditional academic classes by teachers who are not involved.
- Requires the commitment and close coordination of at least two teachers.
- Requires flexibility of curriculum standards.
- Requires flexibility in master schedule to allow teacher collaboration for planning and teaching.

Classroom Activities

Academic teachers may help vocational teachers do the following:

- Teach individual lessons or modules within vocational classes that utilize extensive hands-on, laboratory exercises related to a particular vocational area.
- Develop hands-on exercises to develop explicitly academic skills.
- Work with individual students for intensive academic tutoring.
- Teach an applied academic subject that allows vocational students to receive credit toward academic graduation requirements.
- Provide real-life reasons for learning academic content and more collaborative, student-centered forms of learning.

Teams of vocational and academic teachers may

- develop curriculum materials for an applied academic subject that may or may not be team-taught;
- teach an entire applied academic subject or single academic units and modules with curriculum materials that may or may not be team-developed;
- demonstrate and provide practice of applications of higher math skills in industrial trades. For example, algebra can be emphasized in electronics with the use of Ohm's Law, and trigonometry can be taught in connection with machining by using sine bars;
- demonstrate and provide practice of English skill applications. A printing class can include daily newspaper reading. The principle of idea organization can be taught with flowcharts and other symbolic diagrams used in many vocational classes;
- utilize a class project to integrate math and/or communication skills with a vocational skill. Students may form a business that manufactures and sells a product. Math concepts guide the determination of costs and the manufacturing process itself. Communication concepts guide job applications, résumés, interviews, and performance reviews as well as product marketing efforts; and
- match a community need or local business strength with a class project. Urban schools may develop a community service project in which students research and learn about health and economic issues by building or repairing shelters for the homeless. Rural schools may establish a relationship with a local farm to provide an agri-science laboratory where students use biology and chemistry concepts to investigate plant or livestock production.

Future Promise

Teams do not have to be restricted to two teachers. For example, a school may start with a team of one math teacher and one vocational teacher. The school may choose to develop into an academy model (Model 6) or school-within-a-school, with a particular occupational focus. Additional academic teachers such as English, science, and social studies teachers can then be added to the team to address other academic competencies within that single occupational area. One applied academics course can serve all vocational students, but over time, a school may decide that is insufficient. For example, if the school develops ties to local business and industry and moves to an occupational cluster model (Model 8) in which several vocational areas are offered to students, then collaboration may create new teamings between one academic department and each of the occupational clusters.

Generally, the most difficult aspect of this model of integration is forging a sense of collaboration between teachers who have never before had to communicate let alone concern themselves with the same group of students. A second large barrier is the administrative one of finding time and money to enable two (or more) teachers to coordinate daily schedules. Once the first team overcomes the hurdles of communication, planning, and teaching coordination, however, the collaborators are unlikely to want to return to the isolation of the old lecture routine they used to follow. Therefore, the growth potential benefiting both teachers and students in this model is enormous. The important factor is increasing the number of bridges that connect teachers with other teachers, students with high-level vocational and academic skills, academic content with vocational relevance, and schools with the outside world.

Examples and Resources

Central Oklahoma Vo-Tech
3 CT Circle
Drumright, OK 74030
(918) 352-2552 ext. 214
Joe Ann Vermillion

Other key personnel: (918) 352-2552

Nancy Miller	Science
Janet Foster	Communication
Robin Carney	Principles of Tech.
Roscoe Neal	Math Interpreter

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Students in 29 vocational/technical programs receive additional academic instruction in one or two of the following programs:
  - Technical Related Skills Lab, which is team-taught by a science and a communications teacher and focuses on instruction of scientific principles and English skills.
  - Technical Related Math, in which a math teacher works with the vocational teacher in the Diesel, Electronics, Robotics, Auto Mechanics II, and Air Conditioning/Refrigeration classes.
  - Principles of Technology, for students in Electronics, Motorcycle Mechanics, Robotics, and Auto Mechanics I.
- Central Oklahoma Vo-Tech serves students from 17 feeder high schools as well as an adult student population.

Columbus High School
1164 Farnham Street
Columbus, WI 53925
(414) 623-5956
Tom Antioho
Richard Brouillard

Other key personnel: (414) 623-5956

Sue Johnson	Math/Science
Diane Weiner	Communications
Tom Allen	Tech Education

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- The Applied Academic Program is a pilot project to provide alternative methods of academic instruction to 10th through 12th graders who will be entering the workforce or attending a vocational/technical postsecondary institution.
- Team planning and teaching are emphasized.
- Academic instruction uses actual work experience, class projects, and community service.
- Subject areas included are math, science, social studies, English, environmental education, business education, and technology education.

Gloucester County Institute of Technology
P.O. Box 800
Tanyard Road
Sewell, NJ 08080
(609) 468-1445 ext. 2322
Beverly Davis

Other key personnel: (609) 468-1445

K. Gottwald	Mathematics
J. Peterson	Mathematics
E. Reese	Communications
E. Griffin	Communications

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs within 100 miles
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Academic teachers team-teach applied math and applied communications with vocational teachers in vocational classes.
- Curriculum is developed by vocational and academic teacher teams to stress cooperative learning and problem solving using trade-specific and workplace applications.
- Students receive high school credit toward graduation for completing applied academics classes.

Muscle Shoals High School and Center for Technology
P.O. Box 2730
Muscle Shoals, AL 35661
(205) 389-2675
Sharon Rue

Will do the following:

- Answer telephone questions
- Accept visitations

Program summary

- Collaboration occurs between
  - Vocational/Math
  - Vocational/Science
- Vocational and academic teachers work together to incorporate academic skills and concepts in vocational classes.

Phoenix Union High School District
1900 W. Thomas Road
Phoenix, AZ 85015
(602) 271-3287
Joyce J. Prchal

Other key personnel

Sheryl Filliater	Math (602) 271-2698
Shirley Lowe	English (602) 271-2985
Judy Barrett	Program Manager, Carl Perkins (602) 271-3288

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Four academic teachers (two English and two math) have been hired as consultants to help vocational teachers integrate math and writing skills into their classes.
- Consultant teachers receive inservice training sessions and model teaching strategies in vocational classrooms.
- Posttest scores reveal positive impact on students' basic and advanced math and writing skills.

Putnam Northern Westchester BOCES
200 BOCES Drive
Yorktown Heights, NY 10598
(914) 245-2700
Rosemary Longo

Other key personnel: (914) 245-1700

Irene Snow	Math/Voc. Ed. ext. 290
George McCabe	Science/Urban Forestry ext. 432
Mary Jo Kramer	Eng./Voc. Ed./Spec. Ed. ext. 290
Vito Rinaldo	Social Studies/Voc. Ed. ext. 443
Irene Gilchrist	Cosmetology ext. 441

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Consultant teachers work alongside vocational teachers to enhance reading, math, and communication skills.
- Consultant and vocational teacher plan one hour per week and work with students and vocational teachers in the classroom three hours per week.
- Each consultant teacher works with a maximum of four vocational teachers.

Rolette High School P.O. Box 97 Rolette, ND 58366 (701) 246-3596 Cliff Orgaard	*Program summary* • Incorporate applied math units in agricultural education program. • Students are able to see benefits and uses of math concepts that were previously presented only as theory. • Home economics and English teachers collaborate to provide applied communications units. • Agricultural Education and Home Economics programs require similar public speaking assignments in front of students, parents, and civic organizations.
Other key personnel: (701) 246-3596 Marilyn Orgaard Home Economics Marilyn Walsh English	
Will do the following: • Answer telephone questions • Accept visitations • Speak at conferences • Participate on panels	

Salem Vocational Center 44 Geremonty Drive Salem, NH 03079 (603) 893-7073 Marshall Derry	*Program summary* • Four academic teachers in math/science and humanities collaborate with vocational faculty in ten programs to identify academic content in the vocational curriculum and academic skills necessary for success in each career path. • Specific teaching techniques and supplemental materials have been jointly developed to improve student academic achievement. • Pursuing restructuring efforts to align curriculum offerings for applied courses in mathematics and science.
Other key personnel: (603) 893-7073 Lena Vitagliano Academic/Vocational Tom Aiello Academic/Tech Ed. Richard Langlois Social Studies (603) 893-7069	
Will do the following: • Answer telephone questions • Accept visitations • Visit other programs • Speak at conferences • Participate on panels • Participate in a conference	

Suitland High School
5200 Silver Hill Road
District Heights, MD 20747
(301) 568-7770
Cecile Kahan

Other key personnel

W. Lester	Occupational Skills (301) 568-2505
D. Fleming	Business (301) 568-7770
R. Ferguson	Art (301) 568-2505

Will do the following:

- Answer telephone questions
- Accept visitations
- Participate in a conference

Program summary

- Suitland is composed of a magnet school (University High School), a Visual and Performing Arts School, a Vocational Technology School, and a comprehensive high school.
- To develop the integration of math and vocational/occupational classes, a team of four math teachers, four occupational skills teachers, a business teacher, an art teacher, a home economics teacher, and a special education teacher was created.
- In addition to remedial math skills and students with special needs, integration of algebra, geometry, and trigonometry with electronics, drafting, and carpentry were also addressed.

Trigg County High School
203 E. Main Street
Cadiz, KY 42211
(502) 522-2215
Joyce S. Bozarth

Other key personnel

Brenda Southwick	Home Economics (502) 522-2215
Clayton Burgess	Integration Sup'r (502) 753-4470

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Collaboration occurs in
  - Science/Agriculture
  - Science/Health
  - Math/Home Economics
  - Math/Retailing
  - Math/Technical Education
- Teachers meet after school to plan and develop curriculum.
- Students are sometimes brought together in one classroom for team-taught projects; teachers sometimes exchange classes for specific units.

<table>
<tr>
<td>Wasilla High School
701 Bogard Road
Wasilla, AK 99654
(907) 376-5341
Pat Gakin</td>
<td rowspan="3">Program summary
• "A Personal Transition Plan for Applied Communications" is a six-week unit that is team-taught for all students by the business teacher and academic counselor designed to help students answer the question, "What will help me get ready for life after high school?"

• Students investigate career options, create a résumé, write job application or postsecondary admission letters, and demonstrate job search and interview skills.

• Other collaborations to occur in
  • Business/Economics and Social Studies
  • Graphics/Art</td>
</tr>
<tr>
<td>Other key personnel: (907) 376-5341
Kathy Frost Business/Co-op Coord.</td>
</tr>
<tr>
<td>Will do the following:
• Answer telephone questions
• Accept visitations
• Visit other programs
• Speak at conferences
• Participate on panels
• Participate in a conference</td>
</tr>
</table>

See also:

Appleton East/West High Schools
Model Three
120 E. Harris Street
Appleton, WI 54913
(414) 832-6145
Gari Spagnoletti

Central City High School
Model Three
1804 14th Avenue
Central City, NE 68826
(308) 946-3086
Ray Huggett

Eldorado High School
Model Four
P. O. Box W
Eldorado, TX 76936
(915) 853-2549
Kenneth L. Newman

Jackson County High School
Model Three
107 KY Hwy. 290
McKee, KY 40447
(606) 287-3121
Brian Thomas

Lincoln High School
Model Four
2229 J Street
Lincoln, NE 68510
(402) 436-1301
Sanford Nelson

Milwaukee South Division High
Model Eight
1515 W. Lapham Blvd.
Milwaukee, WI 53204
(414) 384-9900
David Heinbuch

Pampa High School
Model Three
111 E. Harvester
Pampa, TX 79065
(806) 669-4800
Daniel Coward

Paul M. Hodgson Vocational-Technical High School
Model Five
2575 Summit Bridge Road
Newark, DE 19702
(302) 834-0100
Dr. Steven H. Godowsky

York County Area Vocational-Technical School
Model Four
2179 S. Queen Street
York, PA 17402
(717) 741-0820
Ron Arnold

MODEL THREE
ACADEMIC TEACHERS ENHANCE THE VOCATIONAL RELEVANCE OF THE ACADEMIC CURRICULUM

Integration occurs within academic rather than vocational classes in this model. These classes may be used as substitutes for traditional academic subjects or as complements to them with particular vocational relevance. In the latter case, academic teachers refer to many vocational areas, highlighting the relevance of academic principles to the future working worlds of students. As substitutes for traditional academic classes, the new courses, typically labeled "applied" academics, receive the equivalent academic credit toward graduation requirements. Such courses are described as providing extensive hands-on, laboratory experience to practice using the academic material. Curriculum materials can either be developed by teachers individually or in teams, purchased "off-the-shelf," or developed with the input of representatives from local business and industry who want to emphasize particular skills and training for future employees. Often, the help of local business is also sought to provide equipment or reading materials for use in lab sessions that an academic classroom may not have. Applied academics may be targeted to all students, not just those in a vocational track.

Advantages

- May be used to address the needs of all students, not just those in a vocational track.
- Can be implemented by individual teachers in single or multiple units.
- Encourages teacher innovation.
- Uses the best of vocational teaching strategies in the academic classroom; hands-on experimentation and applications of theory make academic content a more relevant focus for the student's future.
- Can provide a strong basis and motivation for formal collaboration between vocational and academic teachers.

- Provides the basis for formal relationships between schools and local business and industry to benefit both students and future employers.

Challenges

- May not address teacher burnout due to isolation from other teachers.
- Requires that academic teachers learn the vocational relevance of abstract academic content and adopt new pedagogical techniques to replace traditional lecture-drill methods.
- May not address the traditional split between vocational and academic teachers.
- In some instances, hands-on experiences may require monetary and/or in-kind resources.
- "Off-the-shelf" courses require teachers to adapt the curriculum to local conditions. Without this kind of custom tailoring, these courses do not encourage teacher collaboration or innovation, or adaptation to local employment conditions.
- Applied academics courses may become remedial rather than innovative.

Classroom Activities

Academic teachers may

- develop specialized curriculum materials to focus on local business or individual student's career interests.
- modify packaged, "off-the-shelf" curriculum materials either for single modules or for entire courses.
- incorporate frequent vocational applications such as literature that describes individuals at work or job-related writing exercises in English classes, job-related examples from carpentry, machining, electronics and other areas for math classes, examinations of the implications of biology for health workers, electricity for electronics and computer occupations, or physics for the design of machines.

- develop new courses or teacher "off-the-shelf" courses individually or in teams with vocational teachers that receive academic credit. The most common examples are Principles of Technology, an applied physics course, Applied Mathematics, or Applied Communications.

- use lab experiments that provide real situations in which both instructors and students do not know the outcomes and, therefore, successes and failures are not predetermined.

Future Promise

In order to address the lack of student motivation and answer the question of the vocational relevance to students of academic subjects, academic teachers must change the way they see their role in the classroom. Two places to look for some answers are the vocational classrooms and the local business community and job market. Like Model Two, this third model provides the basis for open communication between schools and business, and between teachers in two different kinds of classrooms. Once the academic teacher makes the connection between the worlds of academics and workplace, the potential resources available to help students make the connection are impressive. For example, academic teachers may discover that vocational teachers have extensive laboratory setups, and the equipment and machinery to provide wonderfully creative hands-on practice for students in academic classes. This can then lead to fully team-developed curricula and team-taught courses.

Academic teachers may find that local business professionals are eager to cooperate with schools to raise the academic performance expectations of all students, particularly those who will enter the local job market in less than four years. From informal conversations to the arrangement of paid cooperative job experiences, relationships with business and industry must be viewed from a long-term perspective and nurtured carefully. Businesses cannot be viewed just as sources of free handouts but as partners in an extensive school reform effort. Over time, a school-business partnership can develop an array of opportunities for students to explore career options that may include guest speakers, tutors, mentors, job shadowing, cooperative job experiences, or apprenticeships. The shared goal of schools and businesses is a better educated, better trained young population.

Examples and Resources

Alamo Navajo Community School
P.O. Box 907
Magdalena, NM 87825
(505) 854-2635
Gail Campbell

Other key personnel

Steve Mills	Business Owner (505) 854-2717
Sandy Kuznia	Business Education (505) 854-2635

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs beyond 100 miles
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- All students are ESL–Navajo Indian.
- Program shows students how to recognize vocational situations in academic classes, particularly agricultural applications in language arts and science classes.
- Helps overcome the problems of transferring information and concepts to other disciplines.
- All students who meet academic graduation requirements must receive on-the-job training.

Alvirne High School Vocational-Technical Center
Derry Road
Hudson, NH 03051
(603) 886-1260 ext. 34
Wilbur H. Palmer

Will do the following:

- Accept telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Created integrated Agribiology and Agrimath courses for students in its nationally recognized model agricultural science program.
- Math for Life Sciences and Technical Math have been added for students in Health Occupations and Building Trades programs.
- There is an emphasis on real-life experiences to reinforce the relevance of academic skill development. An adult daycare program, full-service bank, greenhouse, retail florist shop, school store, and restaurant operate at the school.

Appleton East/West High Schools
120 E. Harris Street
Appleton, WI 54913
(414) 832-6154
Gari Spagnoletti

Other key personnel: (414) 832-6154

Chuck Phillip	Science
Ray Rudzinski	Math
John Price	English

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Technical academic courses offered for academic credit are
  - Science/Technical Education
  - Technical Math
  - Technical English
- At each high school, 10-12 technical and academic teachers collaborate to develop academic competencies and activities.
- Youth apprenticeship in printing industries provides 11th graders with three days of work combined with two days of school per week.

Apple Valley Senior High School
14450 Hayes Road
Apple Valley, MN 55124
(612) 431-8244
Sharon Mitchell

Other key personnel: (612) 431-8244

Chris Lee	Science

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Food Science is team-taught and satisfies a science course credit.
- Integrates concepts and theories studied in science class with the analytical and production processes found in home economics classes.
- Uses equipment and facilities from both science and home economics and provides students the opportunity to apply theory into practice.

Berks Career & Technology Center
R.D. #1, Box 1370
Leesport, PA 19533
(215) 378-4884
Robert A. Runkle

Other key personnel

John M. DeVere	Project Administration (215) 372-4721
Dale A. Cullin	Project Administration (215) 378-4884
K. Robert Hohl	Project Administration (215) 987-8403
Paul R. Roedel	Project Administration (215) 208-3044

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs within 100 miles
- Speak at conferences
- Participate on panels
- Participate in a conference

Program Summary

- Center serves 16 feeder high schools.
- Goal is to significantly improve academic achievement levels of non-college preparatory graduates in math, science, communications, and analytical skills.
- Core groups of math, science, and English teachers from each of the feeder high schools meet with vocational teachers at the center to identify vocational applications to enhance applied academics instruction as well as academic competencies emphasized in vocational classes.
- Meetings between vocational and academic teachers (1) build awareness of integration, (2) encourage resource sharing, and (3) lead to teacher teaming.

Central City High School
1804 14th Avenue
Central City, NE 68826
(308) 946-3086
Ray Huggett

Other key personnel: (308) 946-3086

Judy Williams	Science
Gene Boeka	Social Science
Deb Hankinson	English
Dave Jorgensen	Art
Gary Maresh	Agriculture

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Projects in science classes raise students' interest and success rate in science.
- A remodeled faculty lounge with an Integration Board, an integration file, and a system of classroom visitations help staff share and collaborate.
- Example: Groundwater problem project
  - Measured nitrate level in water samples
  - Developed strategies for community to combat problem
  - Examined interaction of environmental factors, scientific process, and agricultural community

Eastern Idaho Technical College
1600 S. 2500 E
Idaho Falls, ID 83404
(208) 524-3000 ext. 329
Carol Lowe

Other key personnel: (208) 524-3000

Val Chambers	Mechanical Trades
Kyle Kofford	Welding

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Mechanical Trades and Welding instructors teamed with an English instructor to develop an applied communications course.
- The team-taught course provided one hour per day for eight weeks during the Mechanical Trades and Welding classes.
- All communications competencies were taught within the context of what would be needed by the students in their occupational fields.
- Work on computers, résumés, interviewing skills, and job-seeking skills was included in the modified English curriculum.

Idaho Falls High School
601 S. Holmes Avenue
Idaho Falls, ID 83401
(208) 525-7740
Miles Carroll

Other key personnel: (208) 525-7740

Jack Schwieder	Math, Science
Mary Farner	Math

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- A Principles of Technology teacher and a math/science teacher team-taught science competencies within the context of the Principles of Technology curriculum.
- Academic content was significantly modified to fit the applied curriculum.
- Student performance improved dramatically.
- Plans for 1993-1994 school year include a team-developed and taught applied Algebra course for students who have not been successful in traditional Algebra.

Jackson County High School
107 KY Hwy. 290
McKee, KY 40447
(606) 287-7155
Betty Bond

Other key personnel: (606) 287-7155

Brian Thomas	Physics
Mike Gabbard	Industrial Arts
Diana Miller	Home Economics
Janine Turner	Science/Biology
Doug Wilson	Vo. Agriculture
James Followell	Vo. Agriculture
Michael Witt	Biology

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit limited number of other programs within 100 miles
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Traditional physics, biology, and chemistry have been replaced by team-taught physics, nutritional chemistry, and agribiology.
- Industrial Arts and Physics teachers provide 5% lecture, 20% demonstration, and 75% hands-on activity to make physics accessible to all students.
- Nutritional Chemistry is designed for students who would have difficulty in a traditional chemistry class. Students receive science course credit.
- Agribiology uses two biology and two agriculture teachers in a nine-week rotation of classes for students in 9th and 10th grades. Practical application is achieved through soil science and management, agronomy, large animal production, and selected agricultural genetics.
- Traditional science scores have increased and student interest in science is greater.

Lindsey Hopkins Technical Education Center
750 N.W. 20th Street
Miami, FL 33127
(305) 324-6070 ext. 4031
Lourdes Oroza

Other key personnel: (305) 324-6070

Richard Firsten	General VESOL
Monica Oliva	Business VESOL
Eloise Cooke	H.O. VESOL
Renee Klosz	ESOL
James Parker	Surgical Tech.

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program Summary

- *English for Speakers of Other Languages* (ESOL) is a general English language course offered at Lindsey Hopkins for adults.
- The general ESOL curriculum has been modified and integrated with several vocational cluster courses at Lindsey Hopkins. A general VESOL class emphasizes the language needed to find and keep a job.
- Integrated VESOL classes teach specialized vocabulary and communication skills. They include
  - Business VESOL
  - Health Occupations VESOL
  - Industrial VESOL

Mansfield Independent Schools
605 E. Broad
Mansfield, TX 76063
(817) 473-5682
Jerry Knight

Other key personnel: (817) 473-5660

Melissa McClure	Math
Judy Joriano	Language Arts
Gordon Hoffman	Science
Janie Washburn	Home Economics

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Four teams of math/vocational teachers have collaborated to develop the curriculum and lab activities for Integrated Algebra I. Vocational areas are
  - Home Economics
  - Horticulture
  - General Mechanics
  - Computer Education
- Integrated Algebra provides teaching strategies and learning activities to make traditional math concepts more accessible and meaningful to students.
- Integrated courses in physical science and language arts are targeted to be developed next.

Northwest Technical School
1515 S. Mann
Maryville, MO 64468
(816) 562-3022
Paul Coffman

Other key personnel: (816) 562-3511

Elaine Nichols	Applied Math
Mike Cosgrove	Applied Physics
Lori Worthington	Applied Biology/ Chemistry
Davis Throctmortin	Applied Communications
David Duvall	Electronics (816) 562-3022
Lee Miller	Basic Skills (816) 562-3022

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Applied academics courses have been integrated into the vocational programs by using basic skills instruction to teach math and communications.
- Applied Math I and II are offered to 9th and 10th graders as a prevocational math class to improve problem-solving skills.
- Applied Physics is offered both as a stand-alone course to all students and as an integrated course for trade and technical classes.
- Applied Biology/Chemistry and Applied Communications are offered to 9th and 10th graders as a preparatory class prior to enrolling in technical programs at the high school level.

Palm Bay High School
1 Pirates Lane
Melbourne, FL 32901
(407) 952-5900
Matt Conroy

Other key personnel: (407) 633-1000

Ginger Davis	Science
Lee Bailey	Math
Irene Ramarine	Social Studies
Matt Conroy	Industrial & Tech Ed (407) 952-5900
Jim Cahill	Tech Prep Director (407) 632-1111

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- A technology education center concentrating on applied technology will open in September 1993.
- The center will house individualized learning centers for Technology Learning Activities to enhance applied academic courses in English, mathematics, and science.
- As part of the school's complete reform efforts, several occupational clusters have been identified and are continually being developed, updated, and modified based on discussions with business. Among these are
  - Public Service
  - Business Technologies
  - Engineering
  - Health Occupations
  - Building Trades
  - Communication Technologies
  - Biotechnologies

Pampa High School
111 E. Harvester
Pampa, TX 79065
(806) 669-4800
Daniel Coward

Other key personnel: (806) 669-4800

Mary Sturgeon	English
Gaylene Skaggs	Home Economics
Katie McDonald	Home Economics
Nancy Coffee	English
Donna Crow	Marketing

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in a conference

Program summary

- Vocational teachers team teach with traditional English I teachers and also
  - guest lecture and
  - provide lab demonstrations.
- The approach was so popular in two pilot classes that parents requested that it continue. Program will expand to entire English I curriculum as well as to English II pilot classes in 1993-1994, involving more than 300 students, seven vocational teachers, and five English teachers.

Wheeling Park High School
Park View Road
Wheeling, WV 26003
(304) 243-0413
Christine N. Carder

Other key personnel: (304) 243-0413

Larry Lamb	Applied Math
Sandy Mauck	Applied Communications

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Vocational-technical programs have been restructured into semester and yearlong courses to provide more time-on-task and integrate applied academics courses into the regular curriculum.
- Newly added integrated academics courses include Applied Math, Applied Communications, and Principles of Technology.
- All vocational-technical programs have a planned program of study; two and three-hour vocational block classes in the comprehensive high school setting have been eliminated.

Woodward High School
1023 Tenth Street
Woodward, OK 73801
(405) 256-6063
Mike McClaren

Other key personnel: (405) 256-5329

Tom Fisher	Math
Greg Johnson	Applied Physics
Joan Gaston	Research (405) 256-6063

Will do the following:

- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Program is a pilot project and joint venture between High Plains Area Vocational and Technical Schools and four feeder high schools, including Woodward High School
- Applied curriculum in physics, math, and biology/chemistry integrates real-world applications into content areas traditionally considered theory-based.
- Teaming between vocational-technical instructors and academic teachers modified course delivery in order to create successful conditions for students who previously have not been successful in traditional settings.
- Data reflects significant growth in science scores and led to expansion of the pilot project to 20 additional sites throughout Oklahoma.

See also:

Eldorado High School
Model Four
P.O. Box W
Eldorado, TX 76936
(915) 853-2549
Kenneth L. Newman

Hazleton Area High School
Model Four
101 S. Church Street
Hazleton, PA 18201
(717) 459-3111 ext. 3125
Dr. Edward S. Lyba

Illinois Valley Central High School
Model Two
1300 W. Sycamore
Chillicothe, IL 61523
(309) 274-5418
Susan Goodale

Hoke County High School
Model Two
310 Wooley Street, P.O. Box 370
Raeford, NC 28376
(919) 875-4106
Jeffrey C. Moss

Kentucky Tech Lee Campus
Model One
P.O. Box B
Beattyville, KY 41311
(606) 464-5018
Frank Kincaid

Mt. Diablo High School
Model Four
2450 Grant Street
Concord, CA 04520-2297
(510) 682-4030
Judy Moon

Muscle Shoals High School and Center for Technology
Model Two
P.O. Box 2730
Muscle Shoals, AL 35661
(205) 389-2675
Sharon Rue

Trezevant Vocational Technical Center
Model One
3224 Rangeline Road
Memphis, TN 38127
(901) 357-3805
Ms. Jo Gateley

MODEL FOUR
CURRICULUM IN BOTH VOCATIONAL AND ACADEMIC COURSES IS MODIFIED AND ALIGNED

This model of integration is one effective way of transforming secondary education to benefit all students and, therefore, teachers, parents, and employers. No longer following the decades-old tradition of unrelated bits and pieces of abstract knowledge, the student's high school experience becomes cohesive and fully integrated across the entire vocational and academic curriculum. It acknowledges and creates connections between the work done in classrooms and the work done outside them.

In vocational classrooms, teachers include more academic rigor and content (as in Model One). In academic classrooms, teachers make frequent and consistent use of good vocational pedagogy (as in Model Three)—hands-on practice, real-life applications of content and skills, and an understanding of the occupational relevance of academic competencies. In its basic form, pairs of vocational and academic teachers collaborate (as in Model Two) to find common themes and practical applications, but teaching does not have to occur in teams. Alignment occurs when students are frequently working on the same hands-on project or learning the same academic principles in a vocational and an academic subject simultaneously. This kind of alignment across subject matter is often referred to as "horizontal alignment" and is characterized by consistent and mutually reinforced learning experiences for all students.

Advantages

- Can address student tracking issues by benefiting all students.
- Reduces teacher isolation by building bridges of communication and respect between vocational and academic teachers.
- Emphasizes real-life applications of academic content and increases academic rigor of vocational classes.
- Encourages teacher innovation and collaboration.

- Does not require master schedule coordination for team teaching because vocational and academic content are still taught in separate classes.

Challenges

- Requires that students enroll in aligned vocational and academic courses in order to benefit fully from mutual content reinforcement.
- Requires the commitment and coordination of at least two teachers to plan aligned curriculum.
- Requires master schedule coordination for joint planning time.
- Requires flexibility of curriculum standards.
- Cannot rely on "off-the-shelf" curriculum materials.
- Requires that vocational teachers adopt more rigorous academic standards and academic teachers adopt more vocationally relevant pedagogical techniques and exercises.

Classroom Activities

In horizontally aligned classes, vocational and academic teachers may

- regularly present students with problems to be solved in the vocational class, teach the general competencies for successful solutions in the academic class, and develop solutions in the vocational class.
- develop assignments that bridge vocational areas and academic content as is the strategy underlying Senior Projects (Model Five). For example, a career research assignment can culminate in a research paper that receives credit in both a required career exploration course and a freshman English class. Students learn to use the library's resources to investigate and answer questions that are discussed in the vocational class while learning how to write in the style appropriate to a formal paper in English class.

- attract new populations of students to either vocational or academic classes. For example, more vocational track students can be introduced to geometry or physics by enrolling in aligned drafting or electronics courses. On the flip side, traditional college-track students can benefit from the practical applications and career exploration that are presented in aligned vocational classes.

- develop a unit or project with a theme that links a vocational and academic subject. A foreign language and computer class can be aligned to develop a computer game that tests language knowledge. A journalism and English class can be aligned to help students produce a magazine or newspaper issue.

Additionally, the activities listed under Model Two are also appropriate here.

Future Promise

There are two ways to think about growth in this integration model: quantitatively and qualitatively. In terms of the first, growth can be achieved by adding more teachers and/or more aligned classes. This kind of growth is almost unavoidable because more teachers want to participate in and benefit from the creative exchange and rejuvenation that characterizes successful collaborative reform efforts. The connections between vocational and academic materials are easy to find once their identification is a priority. Teachers in both areas often find that the other teacher has a surprising amount to contribute and, with a focus on improving instruction for students rather than protecting one's turf, curriculum alignment can be exciting and substantive.

Quantitative growth can also be the result of identifying larger numbers of students who will benefit from this integration approach. As a school develops into any of the larger models of integration (Models Six, Seven, or Eight), more students' needs are met by more horizontally aligned classes. New categories such as career clusters replace the traditional track system and develop all students' future-oriented thinking whether they are college-bound or not. The underlying assumption is that no one is harmed by curriculum alignment, and everyone can benefit.

Qualitatively, growth takes shape in new and different forms of alignment. Teacher teams need not be limited to vocational-academic pairs. Two academic or two

vocational teachers may work together to align units, assignments, or full courses. For example, an English and social studies team may develop units to investigate social and political issues that are of local concern. The course alignment allows students twice the class time to cover topics. When this type of alignment is considered, however, keep in mind that only the students enrolled in the aligned courses will benefit. If vocational students are the target population, course alignment must match vocational student enrollment.

A second type of qualitative growth involves the development of coherent sequences of courses that students follow over the course of their high school education. This vertical alignment is often introduced when a school wants to encourage career exploration and choice, and provide specific career clusters as in Models Seven or Eight. Students entering high school indicate a career preference. Based on that preference, a sequence of vocational and academic courses is selected to enable the student to reach the appropriate level of occupational skill and academic preparation by graduation four years later.

Examples and Resources

Bacon Academy - Colchester Public Schools
611 Norwich Avenue
Colchester, CT 06415
(203) 537-2378
Everett Herden

Other key personnel: (203) 537-2378

Everett Herden	Science
Linda Dadona	Math
Joseph Valentini	Tech. Ed.
Nikki Gullickson	Environmental/Social
Bob Houle	Project Evaluator/ Research Data

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs beyond 100 miles
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Aligned courses:
  - Biology
  - Geometry
  - Technical Education
- Course is taught in one, three-period (135 minutes) block course built around one general environmental theme and eight specific topics around which units of instruction and learning activities are designed.
- Three teachers team-teach the course for sophomores in the middle 50% achievement range with uncertain motivation.
- Problem solving, cooperative learning, hands-on learning experiences, and performance/portfolio/exhibition assessment are featured.

Cedar Bluffs High School
110 E. Main Street
Box 66
Cedar Bluffs, NE 68015
(402) 628-2080
Myron Ocander

Other key personnel: (402) 628-2080

Janelle Stansbury	Business Education
Lynn Bowder	Art
Greg Brousek	Social Science
Robin Dalton	English

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Aligned subject areas:
  - Science, Art, Business
  - Art, Music, Social Science, English
  - Art, Music, English
  - Media, Business, Social Science
  - Others in development
- Example:
  - Explanation of the circulatory system
  - Physiology class works with Advanced Art class to design graphic illustrations
  - Advanced Information Processing class creates a multimedia folder
  - Students work in five-member teams consisting of two art students, two physiology students, and one information processing student.

Cedartown High School 167 Frank Lott Drive Cedartown, GA 30125 (404) 748-0499 Radford Talley	*Program summary* • Math, language arts, and science curricula and teaching strategies were modified to present abstract principles through classroom activities that are consistent, relevant, and mutually reinforcing. • Academic principles are reinforced in vocational classes. • Vocational and academic teachers work as a team to coordinate lesson plans.
Other key personnel: (404) 748-0490 Doug Elliot Vocational Judy Puckett English Kathy Hunt Math Daisy Waldrep Science	
Will do the following: • Answer telephone questions • Accept visitations • Visit other programs • Speak at conferences • Participate on panels • Participate in a conference	

Chase County High School P.O. Box 577 Imperial, NE 69033 (308) 882-4304 Randy Vlasin	*Program summary* • Science principles are integrated into agriculture and agricultural applications are used to demonstrate scientific concepts at both the junior high and high school levels. • Examples of projects include "Bottle Biology," "Wisconsin Fast Plants," and projects on groundwater quality. • Students recently worked with *National Geographic* on a water quality video to be made available to schools across the country.
Other key personnel: (308) 882-4304 Marla Smith Life Science	
Will do the following: • Answer telephone questions • Accept visitations • Visit other programs • Speak at conferences • Participate on panels • Participate in a conference	

Cooper High School
3639 Koontree
Abilene, TX 79605
(915) 691-1000 ext 172
Ron McQueen

Other key personnel: (915) 691-1000

Kathy Dacy	Math
Bob Evans	Principles of Tech.
Lori Beale	Business Comm.
Nathan Nease	Science
Sallye Ortiz	Comp. Appl.

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Cooper Integration Team has chosen "Campus Beautification" as a project around which to align different subject areas.
- Aligned subjects:
  - Manufacturing Graphics
  - Environmental Science
  - Sociology
- A team of six teachers is to continue planning additional activities for other subject areas to become involved.

Cumby ISD
Route 2, Box 254
Cumby, TX 75433
(903) 994-2260
Ronnie Stanley

Other key personnel: (903) 994-2260

Pam Taber	Math

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Aligned subjects:
  - Algebra
  - Agriculture
  - Home Economics
- Two Algebra and two vocational teachers use a common conference period to plan an aligned curriculum.
- The vocational teachers team-teach in the algebra classes. Math principles are also reinforced in the agriculture and home economics classes.
- A science and a language arts teacher have participated in the curriculum planning team, and these subjects are targeted for alignment in 1994 and 1995, respectively.

Eldorado High School
P.O. Box W
Eldorado, TX 76936
(915) 853-2549
Kenneth L. Newman

Other key personnel

Paige Ragsdale	English (915) 387-2378
Maureen Hodges	Counselor (915) 853-2408
Chris McCravey	Voc. Home Economics (915) 853-2078

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- The production of a dinner theater for the public in spring of 1994 is the theme for curriculum alignment.
- Aligned subjects:
  - English
  - Computers
  - Drafting
  - Accounting
  - Agricultural Science
  - Art
  - Home Economics
  - Resource
- Students select an American play in English class related to the theme of "community." All aspects of the dinner theater production and presentation are coordinated in all classes.
- Eldorado was selected as a pilot school for integration.

Greenville High School
3515 Lion's Lair
Greenville, TX 75401
(903) 457-2597
Paula Ballew

Other key personnel

Vanessa Pope	English
Don Money	Tech. Systems (903) 457-2608
Jan Rosenbalm	Math (903) 457-2590
Marsha Fincher	Counseling (903) 457-2569

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- A full-year elective for freshmen and sophomores combines technical and academic curricula with hands-on learning activities.
- English, home economics, math, technical systems, chemistry, and automotive technology are combined in rotating six-week segments to demonstrate how each subject complements and is relevant to the others and to society's needs.
- Three teachers are actively involved in teaching the class; other faculty members are used as consultants.

Grisham Middle School
10805 School House Lane
Austin, TX 78750
(512) 258-6667
Clifton Wendel

Other key personnel: (512) 258-6667

Susan Schwausch	Language Arts
David Hailes	Science
Karen Kamenzind	Social Studies
Kay Zunker	Math

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Technology is the theme that aligns curriculum across four academic subjects: science, math, language arts, and history.
- Example: Hot-Air Balloons
  - Principles of Physics
  - Square Footage, Mass, Volume
  - Interviews and Journalistic Writing
  - Civil War Use
- Teachers share a common planning period to develop projects.
- Scores on standardized tests have increased.

Hazleton Area High School
101 S. Church Street
Hazleton, PA 18201
(717) 459-3111 ext. 3125
Dr. Edward S. Lyba

Other key personnel: (717) 459-3221

Karen Jackson	Communications
Cathy Hauze	Communications
Steve Hametz	Communications

Career Center: (717) 459-3172

Sam Morolo	Masonry
Mary Makuta	Health
Nancy Tkatch	Foods

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Alignment occurs between academic subjects offered at the comprehensive high school and vocational subjects offered at the Career Center across the street.
- Aligned subjects:
  - English with apparel, carpentry, plumbing, cabinet making, masonry, welding, auto body, and machine shop
  - Science with health and social services
- Applied Math, Physiology, Principles of Technology, and Environmental Science also fulfill math and science requirements.
- Career paths include
  - Manufacturing
  - Building/Construction
  - Health/Human Service
  - Power/Energy
  - Office/Business/Clerical
  - Marketing
  - Cosmetology

Hoke County High School
310 Wooley Street
P.O. Box 370
Raeford, NC 28376
(919) 875-4106
Jeffrey C. Moss

Other key personnel: (919) 875-2156

Dan McGougan	Agriscience
Delia McNeill	Math
Gary Brigman	Integrated Teaching
Eleanor Gentry	Academic Plans (919) 875-2292

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Teacher teams occur in the following subject pairs:
  - Foods/Chemistry
  - Math/Health Occupations
  - Science/Agriculture
  - Math/English
- Master scheduling allows teachers to meet to develop and plan curriculum and team-teach.
- Approximately 75% of teachers are involved in teaming.
- Students in both vocational and academic classes benefit.
- Teachers meet in summer to compare and align subject competencies, goals, and teaching strategies across vocational and academic subjects.

Illinois Valley Central High School
1300 W. Sycamore
Chillicothe, IL 61523
(309) 274-5418
Susan Goodale

Other key personnel: (309) 274-5418

Larry Williams	Superintendent
Dave Kinney	Curriculum Director

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- A Block 8 schedule accommodates integration. Teachers are given complete freedom to collaborate.
- Collaboration takes the form of projects and thematic units that cut across several classes.
- Goal is to develop one team-developed and taught project per course per semester.
- To date, teaming has occurred in math, science, industrial arts, business, and English classes.
- Focus is on a competency-based curriculum, which has been verified by business and industry.

Lakeview High School
RR 3, Box 170
Columbus, NE 68601
(402) 564-8519
Dean Folkers

Other key personnel: (402) 564-8519

Robert Lake	Science

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Aligned subject areas:
  - Biology, Agriculture
- Objectives:
  - Integrate agriculture and science education.
  - Develop a working knowledge of the research process using the AgriScience institute and Outreach Program teaching materials.
  - Develop a closer working relationship with fellow science and agriculture teachers.
  - Teach specific agriscience laboratories and assist students in preparing their own laboratory experiments.

Lincoln High School
2229 J Street
Lincoln, NE 68510
(402) 436-1301
Sanford Nelson

Other key personnel: (402) 436-1301

Laurie Logsdon	Business
Judy Strand	English
Mark Scheer	Principles of Tech.
Lindal Risenhoover	Industrial Tech.
Nancy Beck	Math

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Principles of Technology, Business Communications, Applied Math, and Applied Physics courses are team-taught.
- Students receive English credit for the Business Communications class, math credit for the Applied Math class, and science credit for the Principles of Technology and Applied Physics classes.
- Teacher teams have revised curriculum material.
- Teacher teams are provided one common planning period per day.
- English and social studies teachers team-teach a course called American Experience.

Montgomery County JVS
6800 Hoke Road
Clayton, OH 45315
(513) 837-7781
Carol A. Gellner

Other key personnel: (513) 837-7781

M. Ditmer	Math
C. Gellner	Administration
J. Carter	English

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Vocational teachers and correlated academics teachers plan and work as a team.
- Academic teachers observe lab experiences to develop lessons directly applied to a specific occupational area.
- Skills in communications, mathematics, and science are seen by the students as tools to solve real-world problems. Conversely, real-world work becomes the methodology to teach math, communications, and science.

Mt. Diablo High School
2450 Grant Street
Concord, CA 94520-2297
(510) 682-4030
Judy Moon

Other key personnel: (510) 682-4030

Artie Johnson	Home Economics
Linda Pearson	Home Economics
Cynthia White	Soc. Sci./English
Nikki Boren	Soc. Sci./English

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Aligned subjects:
  - Home Economics, English, Social Science
- Project theme: Introduction to the career of international host/chef/hotel manager.
- Activities:
  - Introduction to the cultures of the Middle East, including religion, family, and food.
  - Menu preparation representing ten different countries.
  - Explanations of food, art, and money exchange systems unique to each country.
  - Final buffet prepared by students.
- "Discovery," a 9th grade course, provides an introduction to strategies for success at the school. Local business provides guest speakers who emphasize the occupational relevance of English and math skills.

New Richmond High School
New Richmond, WI 54017
(715) 243-7458
Tom Wells

Other key personnel

Kerry Kittle	Social Science (715) 243-7411
Sue Selbin	Vocational Dept. Chair (715) 243-7452
Steve Wojan	Principal (715) 243-7453

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Participate in a conference

Program summary

- Aligned subject areas:
  - English/Business Education
  - Computers/all subjects
  - Environmental Science/Agriculture
  - English/Library/Special Ed./Reading/Computers
- Example:
  A follow-up to the play *The Miracle Worker* requires students to research a wide variety of topics related to handicaps and disabilities. Findings are published as articles in magazines written by teams of three to five students.
- Teachers submit proposals for curriculum alignment and integration for minigrants.

San Juan High School
7551 Greenback Lane
Citrus Heights, CA 95610
(916) 971-5142
Sharlene Cossairt

Other key personnel: (916) 971-5112

Bill Wilson	English
Don Crowl	Science
Grant McMicken	Math
Sally Edwards	Home Economics (916) 971-5129

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Aligned subjects:
  - Home Economics, Math, Science
- "Life, Education and You" is a 9th-grade course that targets at-risk students who show an interest in home economics careers based on COPS test results.
- Enrolled students take math, science, and home economics classes together and projects cut across all subjects.
- Examples:
  - Students learned about geometric shapes and concepts in math and constructed quilts in home economics.
  - Students applied concepts about bacteria growth and sanitation learned in life science to foods and public safety in home economics.

York County Area Vocational-Technical School
2179 S. Queen Street
York, PA 17402
(717) 741-0820
Ron Arnold

Other key personnel

Tom Shelley	Metal Machining, Project Design and Emp. Coord. (717) 235-0662
Jane Schenck	English/Communications (717) 757-4757
Carl Criswell	Science (717) 244-7456

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Aligned subjects areas:
  - Math, Science, English, Metalworking
- Operates as youth apprenticeship program in metal machining technology.
- Students operate in teams within both vocational projects and academic classes.
- Problem solving is stressed through team projects, which are an ongoing and integral part of the program.
- Industry is involved as advisors, student employers, and as part of the training program.

See also:

Bryan High School
Model Eight
4700 Giles Road
Omaha, NE 68157
(402) 978-7200
Tom O'Hara

Milwaukee South Division High
Model Eight
1515 W. Lapham Blvd.
Milwaukee, WI 53204
(414) 384-9900
David Heinbuch

Muscle Shoals High School and Center for Technology
Model Two
P.O. Box 2730
Muscle Shoals, AL 35661
(205) 389-2675
Sharon Rue

Paul M. Hodgson Vocational-Technical High School
Model Five
2575 Summit Bridge Road
Newark, DE 19702
(302) 834-0100
Dr. Steven H. Godowsky

Sitka High School
Model Five
1000 Lake Street
Sitka, AK 99835
(907) 747-3263
Gayle Hammons

MODEL FIVE
SENIOR PROJECTS

Self-directed exploration and problem-solving skills are the emphasis of senior projects, which can be viewed either as an important step in students' career path selection or an in-depth research experience. In most cases, the senior project replaces electives and requires the application of vocational and academic skills and knowledge gained throughout the high school experience. Since it relies on independent work capacities such as research and experimentation techniques, along with written and oral presentation skills, schools must reshape the entire curriculum to give students adequate preparation. Topics can vary widely and are selected by the student but must be substantial enough to sustain the student's interest over a fairly long period of time. Final presentations can vary, but often take the form of a physical product, a written report, and an oral presentation, providing the student the opportunity to develop different capacities.

One teacher or teacher team takes responsibility for overseeing a student's progress on the project to ensure that the work meets the criteria for receiving graduation credit. Projects usually involve an investment of time outside of school hours, whether in the form of job site experience, research in a library or laboratory, or the production of some kind of physical product. Teachers, business persons, community members, or other adult mentors generally serve as advisors and final presentation evaluators.

Advantages

- Addresses tracking issues by benefiting all students.
- Develops independent thinking, experimentation, and problem-solving and presentation skills.
- Can address teacher isolation by encouraging teacher collaboration and innovation.
- Provides maximum flexibility for students to investigate individual interests and use particular strengths and skills.

Challenges

- Requires flexibility in graduation requirements to allow students to receive graduation credit for senior project completion.
- Requires standards and criteria for topic selection and final evaluation.
- May require curriculum changes in grades 9-11 to develop the independent problem-solving and research skills required to successfully complete a senior project.
- Requires master schedule flexibility to allow individual teachers or teacher teams to serve as advisor(s)/evaluator(s) for students.
- Requires the commitment of teacher advisor(s)/evaluator(s).

Activities

The very nature of senior projects precludes the use of the word "classroom" in this section. The focus is not what a teacher or teacher team determines for a large number of students, but, rather, what individual students determine for themselves, whether in an occupational or academic area of interest. Senior projects may

- integrate vocational and academic content and skills by providing job-site experience in one of several career clusters.* Instruction and credit are provided by certified learning coordinators at the job site. For example, English, social studies, and justice system professions are integrated in one school district's senior projects, and students are placed at the county Sheriff's Department.
- develop independent research and public speaking skills on a student-selected topic that does not necessarily represent a career focus. Formal paper research and writing fulfills one semester of senior English credit. Oral presentations are made before a panel of faculty and community members. Independent work is completed outside of school hours.

* Career or occupational clusters include several related occupations. For example, a health occupations cluster might include careers in all specializations of medicine, nursing, medical technology, and physical rehabilitation or therapy.

Often, teachers recognize that students need more specific preparation before their senior year to develop the type of independent learning skills that a senior project requires. Therefore, the curriculum in grades 9 through 11 may be changed to

- introduce students to different ways of analyzing and solving problems;
- provide experience in the use of each of the sophisticated labs and equipment that students may need for a senior project; and
- teach research, experimentation, and problem-solving techniques.

Future Promise

The aspect of the senior projects model that is its biggest asset is also its most difficult—its flexibility. Since there is very little formal structure involved, a senior project can be successfully completed by almost any student; but without proper preparation and supervision, the experience can be as meaningless and superficial as the worst of traditional high school experiences. Similarly, the lack of prescribed curriculum frees both teachers and students to be experimental and creative, but without sufficient assessment criteria, the final evaluation can become an administrative nightmare. Given these extremes, it is important to avoid the mistake of equating the lack of structure with a laissez-faire attitude toward planning. Growth in this model is best managed by clarifying the target student population and desired student outcomes rather than following a particular plan for the perfect senior project.

The senior project is not a simple place to begin making substantial changes for students. For this reason, schools may want to start small and expand slowly as logistical difficulties are overcome. Starting small can mean involving only one teacher or teacher team and a small pilot group of seniors who all work on one project topic as the final assignment in one class, or involving only one or two students who have the independent learning skills the project requires and whose projects are well-defined. Develop a committed team of educators to think about tough questions such as

- the kind of skills the senior project will develop,

- the kind of skills that must be developed *prior to* the senior project experience, and
- which students will benefit from the senior project and why.

The answers to these questions will then provide guidelines for discussing the following issues:

- the objectives of the project (career exploration, academic research, and so on)
- the physical and/or monetary resources required and potential sources both in the school and community
- the kind of final product that will be evaluated
- the evaluation process—the time frame and people it requires

As with Model Four, growth within this model can be looked at both quantitatively and qualitatively. If addressing tracking is a priority, more students, regardless of their postsecondary plans, can be required to complete senior projects, and more teachers can be enlisted to serve as advisors/evaluators. If the future employment needs of local business and industry are a focus, more types of projects can be considered to develop the skills future entry-level employees will need. As school-business ties develop and as other resources—monetary, physical, and human—become available, senior projects can involve job apprenticeship experiences, research in professional lab sites, and local business people who serve as project advisors/evaluators.

Examples and Resources

Forest Grove High School
1401 Nichols Lane
Forest Grove, OR 97116
(503) 359-2432
Jerry Fitzpatrick

Other key personnel: (503) 359-2432

Al Rogers	Vocational Education
Phil Valett	English
Ginger Arnold	Business
Bob Beisell	Social Studies
Don Singer	Computers

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Project focus: Application of computer skills
- Requires:
  - A topic to be researched, using interviews and site visits.
  - A "product" demonstrating mastery of the topic.
  - An 8- to 10-page documented "I-search" paper.
  - An 8- to 10-minute speech followed by a five-minute question period before a board of experts in the field to defend one's work.
- Preparation: Computer Instruction
  - Grade 9: keyboarding and graphing
  - Grade 10: word processing
  - Grade 11: data processing

Gov. John R. Rogers High School
12801 86th Avenue East
Puyallup, WA 98373
(206) 841-8722
Fred Mertlich

Other key personnel

Carlene Houghton Communications Chair
(206) 841-8717

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Project focus: Post-high school plans
- Requires:
  - A research paper on a personally chosen topic.
  - At least 15 hours of out-of-school work on a "product."
  - Oral report to a group of adults with expertise in the area of the chosen topic.
- Replaces second semester of 12th-grade English.

Onondaga-Cortland-Madison BOCES
307 Easterly Terrace
Dewitt, NY 13214
(315) 433-2604
Dr. Steven Grossman

Other key personnel

Mrs. B. Lenta	Health Professions (315) 476-7461 ext. 2653
Mr. C. Wilson	Justice Professions (315) 435-2961

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Project focus: Inside view of one of three broad professional fields:
  - Justice System Professions
  - Allied Health Professions
  - Aviation Professions
- Requires:
  - In-depth speaking and writing about the connections between schoolwork and the workplace.
  - Demonstration of socialization in the workplace.
  - Application of previously learned academic knowledge and skills to professional tasks and problems.
- Provides:
  - Experiential learning at one of three sites: (1) Onondaga County Sheriff's Department, (2) Veteran's Administration Medical Center, or (3) Hancock International Airport.
  - A learning coordinator certified to teach in the occupational field at each site.
  - Two consultants, one certified in English and one certified in social studies, to work with the learning coordinators.

Paul M. Hodgson Vocational-Technical High School
2575 Summit Bridge Road
Newark, DE 19702
(302) 834-0100
Dr. Steven H. Godowsky

Other key personnel: (302) 834-0990

Carolyn Steinwedel	Special Ed./English
Mary An Scarbrough	English
David Lutz	Cabinetmaking
	(302) 834-0900

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Project focus: Titled "An Exhibition of Achievement," the senior project is required of all 12th graders and integrates the vocational and academic components of their education.
- Requires:
  - A faculty advisor and committee members selected by the student to coach the student throughout the senior project process.
  - A research paper that is incorporated into the senior English class.
  - A tangible product related to the student's vocational program, and designed and constructed by the student.
  - A formal, oral presentation to the student's committee of no less than 15 minutes.
- Surveys of senior project completers since 1990 reveal that seniors spend more time and energy on classwork and homework, and that they feel strongly challenged by the senior project process. Faculty uses more collaborative approaches to curriculum and teaching methods.

Sitka High School
1000 Lake Street
Sitka, AK 99835
(907) 747-3263
Gayle Hammons

Other key personnel: (907) 747-3263

Randy Hughey	Vocational
Lee Demmert	Principal
Orienne Denslow	Asst. Superintendent
Sarah Jones	Librarian

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Project focus: A graduation requirement that students demonstrate knowledge of a career or vocational skill.
- Requires:
  - A research paper required in senior English classes.
  - A tangible product in which research is applied to manufacture a product that the student has never before attempted.
  - A speech presented to a board of teachers and community members followed by a question-and-answer period.
- Teachers throughout the school make the Senior Projects part of their curriculum, providing guidance on key elements of the project.
- In addition to the Senior Project, integration occurs in the form of integrated units developed by vocational/academic teacher teams. Examples include
  - Fisheries and computers
  - Alaska history and entrepreneurship
  - Alaska geography and tourism
  - Wood shop and algebra

MODEL SIX
THE ACADEMY MODEL

Operating as schools-within-schools, academies provide the following three unique components: (1) *block rostering*, which allows each entering class of students to take core subjects together with the same teachers; (2) *long-term relationships* with core teachers, who teach the required core subjects for all academy students every year; and (3) *formal business ties*, which provide the real-world basis for the occupational focus of the academy as well as sources of mentors, internship experiences, and potential postsecondary employment opportunities. There are usually four core teachers who are responsible for teaching English, math, science, and the occupational area. Examples of occupational areas for existing academies are electronics, automotive and mechanical sciences, health, media, agriculture, business, and computers. Students take other subjects with non-academy students in the regular high school. Because of the block rostering, these teachers are regularly able to plan and implement curriculum in collaboration with each other—that is, they make frequent use of the horizontal alignment strategy described in Model Four. Block rostering also results in shared planning periods that are built into the academy structure, a feature that facilitates frequent and consistent teacher communication about student progress and problems or pedagogical ideas. Therefore, academies are also particularly well-suited to working with underachieving students or those at risk of dropping out. Core teachers feel a collective responsibility to address the special needs of these students.

Advantages

- Addresses problem of teacher isolation by providing common planning periods and encouraging frequent and consistent horizontal alignment.
- Addresses needs of many underachieving or at-risk students by providing a "family" structure in which core subjects are taught by the same core teachers every year, and class sizes are smaller.
- Provides formal ties between business and schools to benefit both students and future employers.

- Horizontal alignment between all subjects, not just one vocational and one academic subject, is easily accomplished and benefits all academy students.

Challenges

- Cost: smaller classes, release time for teacher planning and collaboration, and developing and maintaining ties with business can add an additional $1,000 per student to the amount already being spent.
- May reinforce tracking of students if target population is potential dropouts because the academy formally establishes differences between its students and those in the regular high school.
- Requires flexibility of master schedule to accommodate coordination of block rostering and core teacher planning periods.
- Requires high levels of sustained commitment, coordination, and communication from core teachers.
- Small class sizes mean that only a small number of students can benefit.

Classroom Activities

All of the strategies discussed under Models One through Four can and do take place in academy classrooms. Senior projects (Model Five) can also be incorporated into an academy model. Academy teachers may

- easily integrate vocational relevance into academic classes and academic competencies into vocational classes. For example, the English teacher can present vocabulary and reading assignments related to the academy's occupational area; math and science teachers can coordinate the order and pace of their classes to match that of the vocational class; and the vocational teacher can expect certain academic principles to have already been covered.
- develop special projects or themes that cut across all core subjects. For example, students in a media academy read Shakespeare's *Julius Caesar* in English, learn

about Roman civilization in World Cultures class, study Roman technological contributions in Science, and write news stories about the death of Caesar in Journalism class.

Academies may

- target at-risk student populations or middle to high-middle populations depending on its objectives. For academies that try to help at-risk students, there has been substantial evidence that the academy model reduces dropout rates and increases postsecondary education enrollment. For academies that aim at the second population, this type of model meets the needs of students who respond to a less abstract instructional format than a traditional college track provides.
- work closely with a major local employer to provide mentors, tours of facilities, summer internships, and other regular contact with role models outside of the school.

Future Promise

A useful way to think about growth in this model is in terms of the following two questions:

1. How are we serving the students we already have?
2. How do we reach the students we don't have?

Usually, the first must be addressed when assessing an academy's performance in its early years. At this point in its development, the barriers that academies face are often related to the difficulties of team building and instituting change. Successful academies rely on teacher collaboration and horizontal alignment. These are wonderful mechanisms for creating positive change for both teachers and students when teachers and administrators are committed. However, they rely on *consensus*, something that discussions of educational reform do not naturally build. Strong leaders who can bring disagreements away from turf wars or control issues and back to the objective of benefiting the target student population as well as investing in staff development programs that address consensus and team building are essential.

Addressing the second question, academies generally considered successful at what they are doing for the students they serve often seek to enlarge their enrollment or add other teachers and academic subjects to the core group. To a certain extent, this kind of growth may be undesirable because one academy is limited by its single occupational focus and the number of vocational teachers available to participate. In addition, increases in student enrollment may lead to larger class sizes, an outcome that decreases the unique ability of an academy to serve its students well. Therefore, schools may find that their success with an academy leads them to develop into a magnet school (Model Seven) or a school with several occupational clusters,* each of which acts like an academy (Model Eight).

* Occupational clusters include several related occupations. For example, a health occupations cluster might include careers in all fields of medicine, nursing, medical technology, and physical rehabilitation or therapy.

Examples and Resources

Farrington High School
1564 N. King Street
Honolulu, HI 96817
(808) 848-0846
Mary Ann Ishikane

Other key personnel: (808) 848-0846

Lillian Chang	English
Bryan Yamashita	Social Studies
Carol Fujita	Science
Mary Ann Ishikane	Health Occupations
Bernard Williams	Principal
Lauri Wong	Deputy Dist. Sup't. (808) 737-9993

Will do the following:

- Accept telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Academy focus: Health Occupations
- Core academics:
  - English
  - Science
  - Social Studies
- Vocational subject: Health Science
- Students receive real-world work experience at local major medical and health providers.

Florin High School
Career-Vocational Education
8820 Elk Grove Blvd.
Elk Grove, CA 95624
(916) 686-7726
Christy Moustris

Other key personnel: (916) 689-8600

Judi Brown	Business
Mark Macres	Social Studies
Spider Thomas	Math
Bakari Chavanu	English

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Academy focus: Business, Education, and Technology (BET)
- Core academics:
  - Social Studies
  - English
  - Math
- Occupational subject:
  - Business Technology, which includes computers, word processing, and marketing
- Internships, job shadowing, and a Regional Occupational Program provide on-site work experiences at
  - Elk Grove School District
  - Pepsi-Cola
  - Allstate Insurance
  - California Internal Revenue Service

Hanford High School
120 E. Grangeville Boulevard
Hanford, CA 93230
(209) 582-4407
Gale Cluff

Other key personnel: (209) 582-4407

Leonard DeRuiter	Ag. Science
Dr. J. C. Taylor	Chemistry
Susan Moran	Biology
Rod Althouse	Social Science
Ashley Cross	English

Will do the following:

- Answer telephone questions
- Accept visitations
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Five academies:
  - Communication Arts
  - Engineering Science and Technology
  - Agricultural Science/Business Technology
  - Liberal Arts
  - Entrepreneurial Business
- Smaller student groups stay longer with common teachers in a "family" structure, which allows the building of bonds.
- An interdisciplinary academic core, common to all academies, builds the foundation for a meaning-centered curriculum.

John C. Fremont High School
Media Academy
4610 Foothill Road
Oakland, CA 94601
(510) 534-4381
Michael Jackson

Other key personnel: (510) 261-3240

Steve O'Donoghue	Journalism
Aura Garcia	Science
Gwen Black	Social Studies
Sandy Collins	Broadcasting

Will do the following:

- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Academy focus: Media/Telecommunications
- Core academics:
  - English
  - Social Studies
  - Science
- Vocational subjects:
  - Newspaper
  - Magazine
  - Broadcasting
- Students produce award-winning newspaper, magazine, and television features using desktop publishing and television studio equipment.
- Students are placed in summer internships in media-related fields.
- College and career-preparatory program for at-risk students.

Lafayette High School
Health & Medical Technology Institute
2630 Benson Avenue
Brooklyn, NY 11214
(718) 372-3480 ext. 2400
Marjorie Goldberg, R.N.

Other key personnel: (718) 372-3480

M. Wade	English
D. Weiser	Social Studies
E. Moshel	Mathematics
M. Bernstein	Asst. Principal, Science

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs within 100 miles
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Academy focus: Health Occupations
- Core academics:
  - English
  - Social Studies
  - Math
- Vocational subject: two-year Health Occupations Core Course
- All students are required to complete 108 hours of hands-on, clinical experience in a local healthcare agency.
- Graduating students are prepared for Nursing Assistant and/or Emergency Medical Service certification.

Socorro High School
12300 E. Lake
El Paso, TX 79927
(915) 860-3440
Carl Cooper

Other key personnel: (915) 860-3440

Jan Kehoe	Health Occupations
Nancy Sochat	Health Occupations

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- Academy focus: Health Occupations
- Core academics:
  - English
  - Math
  - Science
  - History
- Vocational subject: Health Occupations, which includes a 9th grade healthcare science course, a 10th grade lab/career explorations course, an 11th grade two-hour clinical rotation class at a local hospital, and a 12th grade co-op work experience at a local hospital.
- The academy program is articulated with the local community college and provides nine hours of credit.

Woodside and Carlmont High Schools
Sequoia Union High School District
480 James Avenue
Redwood City, CA 94062-1098
(415) 369-1411 ext. 327
Marilyn Raby

Other key personnel: (415) 364-3902

Ben Stein	Business Technology
Kathleen Dolle	English
Suzanne Rehmus	Social Studies

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Academy focus: Business Technology
- Core academics:
  - English
  - Math
  - Science
  - Social Studies
- Vocational subject: Business
- Students have frequent contact with industry through field trips, invited speakers, and individual mentors.
- Summer job opportunities are made available to students on track for graduation after the 11th and 12th grades.
- Evaluation reveals a statistically significant positive impact on attendance, grades, units of credit earned, graduation rate, and enrollment in postsecondary education.

MODEL SEVEN
OCCUPATIONAL HIGH SCHOOLS AND MAGNET SCHOOLS

These schools are much like an expanded academy model (Model Six) except that the focus, generally but not necessarily an occupational cluster,* incorporates the entire school rather than just a subset of it. Because the school's theme is explicit, all kinds of crossdisciplinary connections can be made. These include connections between specific careers that fall within the larger occupational theme of the school as well as those between all vocational and academic subjects. Occupational high schools represent an older generation of schoolwide specialization. Magnet schools, a more recent variation originally intended to be a mechanism for ensuring racial desegregation, do not necessarily have an occupational focus, although many of them do, like computer magnets, business magnets, or electronics magnets. Other possibilities of this type include arts and science magnets, schools centered around environmental issues, or other issues-based schools. While both occupational and magnet schools provide the institutional organization that allows a great deal of integration to occur, neither can force integration to exist where individuals are not committed to it.

Advantages

- Schools have clear focus and mission, which can build bridges across traditional divisions between vocational and academic subjects, teachers and students, and schools and the communities they serve.
- Provides structural support for extensive teacher collaboration and communication to increase integration between vocational and academic subjects.
- Occupational focus emphasizes strong vocational and academic skill training for successful school-to-work transition.
- Non-occupational magnet schools address tracking issues by benefiting all students regardless of postsecondary plans.

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* Occupational clusters include several related occupations. For example, a health occupations cluster might include careers in all fields of medicine, nursing, medical technology, and physical rehabilitation or therapy.

- Course selection and scheduling can be greatly simplified by using organized sequences of courses related to specific career paths or issues.

Challenges

- Requires a large school district (five to ten secondary schools) that can provide adequate student choice between magnet/occupational school programs or between magnet and comprehensive school programs.
- Requires a faculty and staff committed to collaboration and communication between vocational and academic departments.
- Non-occupational magnet schools may not incorporate integration of vocational and academic subjects.
- Occupational focus requires academic teachers to adopt good vocational pedagogical techniques.
- Can appear to reduce postsecondary options for students due to the particular occupational or issue focus of the school but not if the focus is broad enough (e.g., "Manufacturing Technology" vs. "Welding").

Classroom Activities

Students who are entering an occupational or magnet school may need preparation before making the choice of a particular secondary school. Therefore, many districts require students in grades K-8 to

- take short courses or modules related to all occupational specialties offered in secondary schools in grades six and seven (sometimes earlier), then a more intensive form of career exploration in grade eight.
- take standardized career interest or aptitude and personality profile tests in grade eight that are evaluated by a trained career counselor.

Secondary teachers may

- use master curriculum plans to increase opportunities for informal collaboration. These are displayed in a common area such as the teachers' lounge so that all teachers can see what any teacher is covering at any one time.
- incorporate career goals and related applications in all academic classes in an occupationally focused school.

In addition, all activities listed under Models One through Five can be used.

Future Promise

At a school district level, growth within this model is accommodated by developing additional magnet schools that focus on other occupational clusters or issues. Because all teachers and course offerings in any one magnet or occupational school must be united around an explicit theme, this kind of expansion should be undertaken only after careful consideration of the student outcomes that are sought. If preparation for entry-level occupations is a priority, potential occupational clusters must be developed with an eye toward future job market needs in the local economy and expected shifts. If tracking and student diversity issues are to be addressed, teachers and administration must build consensus around this goal as well as the methods by which the goal is to be attained. Regardless of the desired student outcomes, the success of schools within this model depends on the level of commitment among faculty and staff to the school's stated focus and its implementation. While there can be much encouragement of collaboration and integration between vocational and academic teachers and curricula, there is not much room for conflict or disagreement at the level of a school's purpose or objectives.

Examples and Resources

Waipahu High School
94-1211 Farrington Highway
Waipahu, HI 96797
(808) 677-0101
Jean Miyahira

Other key personnel

Milton Shishido	Bus./Educ. Partnership (808) 677-0741
Lillian Yonamine	Career Planning (808) 671-0538
Elena Bumanglag	Articulation (808) 455-0296

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Occupational focus: Business careers
- Partnerships with business provide real-world learning experiences in the following programs and courses:
  - Travel Industry Practicum
  - Telecommunications
  - Accounting/Banking Investment Management
  - Entrepreneurship
- Teachers develop and implement these integrated courses.
- Articulation agreements with Leeward Community College allow high school students the opportunity to receive postsecondary course credits.

MODEL EIGHT
OCCUPATIONAL CLUSTERS,* CAREER PATHS, AND OCCUPATIONAL MAJORS

Occupational clusters, career paths, and occupational majors can be found in both comprehensive high schools with substantial vocational course offerings and specialized vocational schools. This model can facilitate the extensive integration of vocational and academic subjects in many ways. In some schools, traditional vocational and academic departments are eliminated and replaced by occupational departments, each with a structure similar to that used in the academy model (Model Six). Each department has assigned to it vocational teachers, who represent the particular occupational cluster's focus, as well as English and math teachers, plus some combination of science and social studies teachers. This structure reduces conventional boundaries between vocational and academic teachers and greatly improves collaboration and alignment efforts.

In schools that retain conventional vocational and academic departments, integration can be more easily achieved through the use of "matrix structures." In this case, occupational "paths" cut across departments, and students select a path that determines a particular matrix of courses upon entering the school. Teachers are both members of a conventional vocational or academic department and of an occupational path. They meet regularly in these paths as well as in their conventional departments, providing an important place for crossdiscipline discussion.

Whether or not conventional departments exist, two essential components of this model are student choice and career counseling. Students choose an occupational department (or cluster, path, or major) with the help of standardized career aptitude tests and career counselors upon entering the school. Examples of such departments or paths include business and marketing; agriculture; social, human, and governmental services; construction; health sciences; art and communication; transportation; and industrial technologies and engineering.

* Occupational clusters include several related occupations. For example, a health occupations cluster might include careers in all fields of medicine, nursing, medical technology, and physical rehabilitation or therapy.

Ideally, career exploration begins in elementary school and continues in middle school to help students begin the process of thinking about postsecondary options and plans. The secondary student's choice prescribes a sequence of courses that fulfills both entry-level vocational job skill needs and academic graduation requirements. This prescriptive approach to course selection accomplishes the following two innovative goals: (1) course scheduling is greatly simplified, reducing this part of the traditional guidance counselor's job, and freeing counselors to spend more time on career and crisis counseling instead; and (2) provides coherent sequences of related courses for students, who are required to consider seriously their postsecondary options and plans throughout their high school careers. The student's cluster or path choice is by no means irreversible, and students are not locked in to only one choice. However, changing occupational clusters becomes more difficult as time goes on, and career counselors lead students through discussions designed to make any change an informed decision.

Advantages

- Addresses traditional barriers between vocational and academic teachers by providing a formal structure that creates bridges of communication and collaboration (Model Two) and can allow extensive curriculum alignment (Model Four).
- Addresses tracking issues by emphasizing both vocational and academic preparation for all students regardless of postsecondary plans.
- Reduces traditional course scheduling task for guidance counselors by prescribing specific course sequences based on student career path choices.
- Provides integrated and coherent sequences of courses for students to encourage focused thinking about postsecondary options.
- Provides rationale and opportunities for formal ties between secondary schools and local business and postsecondary institutions that are future employers and/or future educational sites for students.

Challenges

- Almost always leads to the use of career exploration and guidance that begins earlier than the ninth grade.
- Requires extensive guidance staff development and reduction of administrative tasks to ensure students receive adequate career counseling.
- Is unsuitable for comprehensive high schools that no longer provide any vocational courses; requires a school that provides substantial course offerings in several occupational clusters.
- Requires teacher commitment to ensure that vocational and academic collaboration and alignment take place.
- May introduce tension between vocational and academic teachers within any one occupational department or cluster regarding the proper balance of vocational skills and academic content.
- Requires academic teachers to incorporate career-related information and applications (the best of vocational pedagogy) and vocational teachers to emphasize academic competencies.

Classroom Activities

To help students select appropriate occupational paths, students are required to

- take the equivalent of a year-long Career Technology course in their first year. This can be in the form of a series of modules or rotations devoted to each of the occupational departments or paths offered at the school to expose students to the variety of specific careers that are available.
- meet with career counselors who are able to administer and evaluate standardized career aptitude and personality profile tests as well as guide students through the self-questioning process that clarifies postsecondary options, particularly when a student wishes to change departments or clusters.

- read and understand brochures describing each occupational department or path offered, the sequence of courses required for graduation in each, as well as the potential entry-, middle-, and professional-level occupations within each path and the typical college majors associated with each.

- attend regularly scheduled career path activities, which include talks given by local business and industry representatives, tours of local facilities, visits to postsecondary institutions with related programs of study, and discussions of various occupational profiles within a given cluster or path.

- develop a career portfolio, which follows their progress through a career path and contains examples of work associated with their career cluster as well as all of their major activities.

To encourage integration and alignment efforts, teachers may be required to

- meet according to occupational departments or paths rather than, or in addition to, conventional departments to facilitate crossdisciplinary discussion.

- place greater emphasis on occupational applications and skills. For example, English courses focus on workplace communication skills (résumé writing, interviewing, team building, and task division) or literature that looks at different kinds of work and workers; math teachers can be assigned as a liaison to vocational teachers to address basic skill needs and problems; social studies teachers can focus on the historical influences of work and technological advances.

- place greater emphasis on academic competencies and skill remediation in vocational classes. For example, vocational teachers may take advantage of regular meetings with English teachers to develop a *Writing Across the Curriculum* project.

In addition, senior projects (Model Five) can be required, and all activities listed under Models One through Four and under the academy model and magnet schools model (Models Six and Seven) are equally appropriate.

Future Promise

With its emphasis on career exploration, information, and choice, Model Eight is particularly appropriate for developing close ties with local business and industry as well as postsecondary educational institutions via Tech Prep. In doing so, schools that opt for this model must remain flexible to input from this group in order to continue to give students relevant preparation for postsecondary lives. Business and industry can play useful roles for schools at every step of development, from the selection of career clusters and occupational paths to be offered, to expected job market changes that will affect career counselors' discussions with students, to the development of various reward programs for students who achieve at high levels. It is important, however, that the relationship between schools and business focus on a commitment to students and their future contribution to business rather than the amount of time and resources that business can give to schools.

From the perspective of the integration of vocational and academic curricula, the use of occupational clusters or paths also provides excellent structural support for extensive communication, collaboration, and alignment. As the innovations of this model become stable and permanent, however, energy and excitement about the potential of the new program may be replaced by tension and doubt. One important source of tension to be addressed is the appropriate balance of emphasis on vocational versus academic content within each cluster. Before polarization and entrenched positions can develop, strong leadership must build consensus around the desired student outcomes and a system of required, regular opportunities for trust and communication across traditional subject divisions. Only through a shared sense of ownership in the structural changes that are designed to produce changes in student outcomes can growth in the model continue.

Examples and Resources

Benson High School
5120 Maple Street
Omaha, NE 68104
(402) 554-6600
Cheryl Hartzell

Other key personnel: (402) 554-6600

Jan Greiner	Physics/Technology
Dee Grindle	Tech Prep/Business
William Chaney	Special Education
Jim Pennington	Curric. Spec. in Voc. Ed.
Bette Norton	Guidance

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Three career paths:
  - Business/Management/ Communications
  - Arts/Human Services
  - Technology/Engineering
- Faculty and staff are represented in all career paths and meet in path groups as well as in traditional subject departments.
- 9th-graders begin career exploration in a required course, Success Strategies, which is team-taught by one English and one social studies teacher. Career paths are selected at the end of this course.
- Each path provides a list of recommended elective courses specific to each path in addition to courses required for graduation.

Bryan High School
4700 Giles Road
Omaha, NE 68157
(402) 978-7200
Tom O'Hara

Other key personnel: (402) 978-7200

Scott Kolb	Science
Jan Hess	Business
Crystal Kolb	Home Economics
Jerry Olson	Science
Sue Schrodt	Guidance

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Five career clusters:
  - Business/Information Systems
  - Health Services
  - Public/Human Services
  - Industrial/Engineering Technology
  - Art and Humanities
- Faculty are represented in all career clusters and meet in clusters as well as in traditional subject departments.
- "Write Stuff" program trains teachers in all subjects to develop assignments that integrate and improve writing skills of all students.
- Curriculum alignment team meets to develop horizontally and vertically aligned course sequences for all clusters.

Chopticon High School
Route 242
Morganza, MD 20660
(301) 475-5655
John Ryan

Other key personnel: (301) 475-5655

Joe Baker	Tech Instructor
Joe Guffey	Career Counselor
Karen Ensminger	Applied Math
Tom Barnes	Applied Science
Stephen Olczak	Tech Center Principal (301) 475-5501

Will do the following:

- Answer telephone questions
- Accept visitations during pre-approved periods only
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Four career clusters:
  - Applied Bus./Mgmt. Technologies
  - Applied Eng./Mech. Technologies
  - Applied Health/Human Services Tech.
  - Humanities/4-Yr. College & Univ.
- Each cluster offers several areas of specialization.
- Technology, math, science, and communications courses are integrated in required, sequenced courses in each career cluster.
- Recent outcome assessment reveals
  - Enrollment increase between 1989/1990 and 1993/1994 in English CP/AP and Math CP/AP of 171% and 320% respectively.
  - Highest scores in school history on state academic competency tests.
  - Decrease in dropout rate from 7.7% in 1987/1988 to 1.6% in 1992/1993.

Milwaukee South Division High
1515 W. Lapham Boulevard
Milwaukee, WI 53204
(414) 384-9900
David Heinbuch

Other key personnel: (414) 384-9900

Jerry Deleeuw	Manufact. Ind. Ed.
Rick Anderson	Math
Colette Ruzinski	English
Kathie DeVillers	Computers/Science

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Three career clusters:
  - Business
  - Family and Consumer
  - Hospitality Management
- Four subject areas are completely integrated with blocked, flexible scheduling. No bells interrupt the time block.
- Manufacturing provides the vocational focus for thematic units that are team-taught.
- Staff shares a common planning period to develop new curriculum and projects.

Norfolk Public Schools
800 E. City Hall Avenue
Norfolk, VA 23501
(804) 441-2957
Jane C. Hosay

Other key personnel: (804) 441-2957

Esther G. Bailey	Coordinator, Bus./Mktg. Careers
James R. Doyle	Coordinator, Eng./Tech. Careers
Sharalyn L. Midgett	Coordinator, Health/Human Svcs. Careers
Toni Y. Portlock	Asst. Principal B.T. Washington H.S. (804) 441-2443
Elizabeth Bortnick	Head Guidance Counselor Lake Taylor H.S. (804) 441-5650

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Four career clusters:
  - Business/Marketing
  - Engineering/Technical
  - Fine Arts
  - Health/Human Services
- All vocational faculty receive training to give instruction in reading and writing as well as in vocational area.
- Effective guidance program begins in eighth grade and includes a course called "Careers and You," standardized aptitude testing, and individual counseling with students and parents.
- Career path selection prescribes specific sequences of vocational and academic (including applied academics) courses to meet graduation requirements.
- Collaboration between vocational and academic teachers is funded by minigrants and takes place via class exchanges; week-long, team-taught projects; and entirely team-taught courses.

Sussex Technical High School
Route 9, P.O. Box 351
Georgetown, DE 19947
(302) 856-2541
Carol C. Schreffler

Other key personnel

Patrick Savini	Scheduling (302) 856-0961
George Frunzi	Conversion from Shared to Full Time (302) 856-2541

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate on panels
- Participate in a conference

Program summary

- Four career paths:
  - Automotive/Diesel Technologies
  - Business Technologies
  - Health/Human Services
  - Industrial/Engineering Technologies
- Career cluster teams include technical and academic faculty, counselors, and administrators and are responsible for integration and curriculum delivery within each cluster.
- Students select career clusters after a freshman-year Introductory Technical Programs course in which students experience sample projects in all career paths.
- Career path selection prescribes grades 10 through 12 sequences of courses, which include applied academics curricula.

Valley High School
8820 Elk Grove Boulevard
Elk Grove, CA 95624
(916) 686-7726
Christy Moustris

Other key personnel: (916) 689-6500

Elaine Clark	English
Deb Melveldt	Health

Will do the following:

- Answer telephone questions
- Accept visitations
- Visit other programs
- Speak at conferences
- Participate in panels
- Participate in a conference

Program summary

- One career cluster:
  - Health Careers
- Cluster subject areas include
  - English
  - Social Studies
  - Science
  - Health
- Faculty share common planning period to develop themes and learning activities.
- Other faculty include
  - Math
  - Drama
- Additional clusters being considered for implementation.

See also:

Hazleton Area High School
Model Four
101 S. Church Street
Hazleton, PA 18201
(717) 459-3111 Ext. 3125
Dr. Edward S. Lyba

NCRVE

National Center for Research in Vocational Education

University of California at Berkeley

INTEGRATION & TECH PREP SERVICES

The National Center for Research in Vocational Education (NCRVE) was established to engage in applied research and development in the area of vocational education and to provide dissemination and training. It is located in the Graduate School of Education at the University of California at Berkeley and functions in collaboration with the following sites: University of Illinois at Urbana-Champaign; University of Minnesota; RAND; Teachers College, Columbia University; Virginia Polytechnic Institute and State University; and the University of Wisconsin-Madison.

Type of Assistance	For more information
RESEARCH	
The primary function of NCRVE is to provide research and development, as well as dissemination and training activities in the area of vocational education and related subjects. NCRVE research activities include, but are not limited to, applied research into the nature of work, the relationship between work and learning, and the learning process itself.	Product Catalogs containing lists of all recent materials produced by NCRVE are available from **NCRVE Materials Distribution Service, Western Illinois University, Horrabin Hall 46, Macomb, IL 61455** or by calling **(800) 637-7652.** The e-mail address is **msmds@uxa.ecn.bgu.edu** (Internet).
NATIONAL RESOURCE ROSTERS	
The National Roster of Local Practices in the Integration of Vocational and Academic Education provides a list of schools that have implemented one or more integration models. A database contains site names, program summaries, state directors, and key personnel.	Information and application forms for the Integration Roster may be obtained from Laurie Holland at **(510) 643-6317.**
The roster and database enable NCRVE to respond to the need for a national network of experienced professionals who are willing to share their expertise regarding implementation of vocational and academic integration.	Customized, printed listings from the database may be obtained from Laurie Holland at **(510) 643-6317.**
The Tech Prep Resource Roster of Experienced Practitioners will be published in the winter of 1993-1994.	Information on the Tech Prep Roster may be obtained from Darrel Clowes. The telephone number for NCRVE at Virginia Polytechnic Institute and State University is **(703) 231-5982.**
OFFICE OF SPECIAL POPULATIONS	
The Office of Special Populations maintains a database to provide assistance with Tech Prep and integration program implementation issues related to special populations. The database includes publications (e.g., newsletters, journals, state-produced materials) and listings of educational information and service centers, along with organzations and professionals working with special populations.	Information on available database search topics or customized searches and about the annual search for exemplary programs may be obtained from Zipura Burac Matias at **(217) 333-0807.**
The office conducts an annual search for exemplary vocational programs serving special populations. In 1994, exemplary career counseling programs, including the counseling component of Tech Prep programs, will be targeted. Exemplary program information is disseminated through conference presentations, publications, and the office's database.	

Type of Assistance	For more information
GENERAL OUTREACH	
NCRVE provides general outreach services assisting schools, school districts, and other educational agencies with workshops, conferences, professional development institutes, teleconferences, and other strategies that will help them integrate vocational and academic education programs and to implement Tech Prep programs. Teleconferences are held each year and directly connect the field to research. NCRVE will also provide assistance to educational agencies planning conferences, workshops, or other related activities by connecting conference planners to speakers and other available resources. However, NCRVE is not able to fund workshop activities themselves.	Help with workshops, conferences, or other general outreach activities may be obtained from the Director of the National Network for Curriculum in Integration and Tech Prep at **(510) 642-3824**. Information on participating in National Teleconferences, AVA Preconferences, and professional development institutes may be obtained from Susan Faulkner, Virginia Polytechnic Institute and State University, at **(703) 231-7337**.
TARGETED OUTREACH AND NETWORKING ACTIVITIES	
NCRVE will annually select up to five school sites, school districts, or consortia of secondary and postsecondary schools to provide extensive services. These services will include, but are not limited to, direct research support, assistance with implementation of integration of vocational and academic education and Tech Prep, and networking activities with other sites actively engaged in the implementation of integration and Tech Prep programs.	Information on targeted outreach and networking activities may be obtained from the Director of the National Network for Curriculum in Integration and Tech Prep at **(510) 642-3824**.
NCRVE also annually selects up to five school sites, school districts, or postsecondary institutions that form a *Network of Innovation Sites*. These sites have a recognized history of accomplishment with the integration of vocational and academic education and/or Tech Prep. Networking will be accomplished through a newsletter, electronic mail, and regional meetings.	
The Office of Special Populations maintains a network of state-level administrators of special populations programs that focuses on the implementation of the 1990 Perkins Amendments.	Information on special populations networking activities may be obtained from Zipura Burac Matias at **(217) 333-2603**.
INSTITUTES	
National Summer Institutes	
Through Carl D. Perkins funds, NCRVE financially supports summer institutes for staff development on the integration of vocational and academic education and Tech Prep for urban school districts. NCRVE uses a competitive process to select school sites to participate in the summer institutes.	Information on the summer institutes may be obtained from Ruth Katz at **(800) 762-4093**.
Regional Institutes	
NCRVE also assists educational organizations interested in providing regional institutes for staff development on the integration of vocational and academic education and Tech Prep. NCRVE staff will provide an array of non-financial assistance to those interested in providing staff development, including but not limited to, helping arrange for speakers or presenters, suggesting material and instructional supplies for the institute, and assisting with logistical problems.	Information on the regional institutes may be obtained from the Director of the National Network for Curriculum in Integration and Tech Prep at **(510) 642-3824**.
CONSORTIUM FOR PRODUCT QUALITY	
The National Consortium on Product Quality in Vocational Education will establish standards for exemplary curriculum and instructional products designed for secondary and postsecondary vocational education programs; and will identify, certify, and disseminate exemplary products.	Information on the Consortium may be obtained from Margaret Ellibee, University of Wisconsin, at **(608) 263-3679**.

LIST OF OTHER NCRVE PRODUCTS

NCRVE offers a variety of products that fall into the following seven general categories:

1. Informational Materials
2. Economic Context
3. Institutional Context
4. Curriculum and Pedagogy (including Integrating Vocational and Academic Education, Tech Prep, Literacy, and Guidance and Counseling)
5. Students (including Special Populations)
6. Personnel
7. Accountability and Assessment

A complete listing of all available products can be requested from

Materials Distribution Service
Western Illinois University
46 Horrabin Hall
Macomb, IL 61455
(800) 637-7652
Internet: msmds@uxa.ecn.bgu.edu

Also available is a partial listing of products specifically related to the integration of vocational and academic education. Products in this catalog include the following:

Academic-Career Integration in Magnet High Schools: Assessing the Level of Implementation
B. Tokarska, Y.-P. Si, R. Thaler, R. L. Crain
This report examines the degree to which one city has been able to create programs with a dual emphasis on college preparation and career education, which we call "academic career magnets," and the degree to which the students have responded to the opportunity to attend such schools. The city, New York, is in many ways an ideal site for a test of the feasibility of these types of programs. The city has a long history of creating magnet programs, and has several hundred separate high school programs.
MDS-415 **December 1992** **$5.00**

Achieving Integration Through Curriculum Development: Videotape of 11/24/92 Teleconference
The purpose of this teleconference was to share methods of achieving integration of vocational and academic education through curriculum development. Over 1,200 sites from fifty states and the District of Columbia, the Virgin Islands, Bermuda, and Canada registered to downlink the teleconference, which focused on the following questions: What is the occupational cluster approach to integration? How can applied courses be used to integrate? What is the Senior Project?
MDS-466 **Videotape** **$15.00**

Annotated Resource List: Integration of Academic and Vocational Education
TASPP
In light of the multiple objectives in the 1990 Perkins Amendments, there is a growing need for resources for practitioners seeking to integrate vocational and academic education. This annotated resource list was designed to provide practitioners with essential information.
MDS-442 Technical Assistance Report $1.50

Assessing the Integration of Academic and Vocational Education: Methods and Questions
W. N. Grubb, C. Stasz
This outlines the issues involved in "assessing academic and employment outcomes of vocational education" as required by the 1990 Amendments to the Perkins Act. It also develops a series of questions that could be addressed to state and local education officials to assess the effects of the Perkins Amendments on both state policies and local practices. This paper was originally prepared for the National Assessment of Vocational Education (NAVE), U.S. Department of Education.
MDS-445 Working Paper $4.00

Career Magnets: Interviews with Students and Staff
A. L. Heebner, R. L. Crain, D. R. Kiefer, Y.-P. Si, W. J. Jordan, B. Tokarska
This document reports on a large ethnographic study of students and staff in career magnet schools. The study concludes that the magnet schools made many students feel more hopeful about their future career opportunities. Contrary to conventional wisdom, preparing students for employment after high school did not deter them from pursuing college. In fact, knowing that they had skills which could pay their tuition or provide them with a fallback career seemed to make it easier for them to take the risk of aspiring to college. Many students also benefited by leaving their home neighborhood for a magnet school. This document is a companion piece to *The Effectiveness of New York City's Career Magnet Schools: An Evaluation of Ninth Grade Performance Using an Experimental Design (MDS-173).*
MDS-386 August 1992 $6.50

The Challenge to Change
W. N. Grubb
This article, reprinted from the February 1991 issue of the *Vocational Education Journal*, describes three successful approaches to integrating vocational and academic education. The programs that were examined included occupational clusters and career paths; the academy model; and integrating vocational and academic coursework.
MDS-323 Reprint Series $1.00

Collaborative Efforts Between Vocational and Academic Teachers: Strategies that Facilitate and Hinder the Efforts
B. J. Schmidt
This study reports outcomes of structured interviews completed at three SREB-Vocational Education Consortium (VEC) pilot sites to determine strategies that facilitate and hinder, high school vocational and academic teachers in working together. From thirty interviews, the statements were synthesized to 57 positive and 41 negative strategies distributed among four categories: (1) instructional strategies, (2) curricular strategies, (3) collaborative efforts, and (4) administrative practices and procedures. The strategies can serve as a starting point for others contemplating changes in curriculum and instruction to achieve the integration of vocational and academic education. The study provides insight at the "grass roots," school-site level as to what will and will not work when teachers collaborate.
MDS-164 October 1992 $2.75

"The Cunning Hand, the Cultured Mind": Models for Integrating Vocational and Academic Education
W. N. Grubb, G. Davis, J. Lum, J. Plihal, C. Morgaine
Many approaches to integrating vocational and academic education exist. There is no single model that could apply to all schools. This document identifies and examines eight integration models, each with several variations. These models include incorporating more academic content in vocational courses; combining vocational and academic teachers to incorporate academic content into vocational programs; making academic courses more vocationally relevant; curricular alignment; modifying both vocational and academic education; the senior project as a form of integration; the academy model; occupational high schools and magnet schools; and occupational clusters, career paths, and majors.
MDS-141 July 1991 $7.50

The Effectiveness of New York City's Career Magnet Schools: An Evaluation of Ninth Grade Performance Using an Experimental Design
R. L. Crain, A. L. Heebner, Y.-P. Si, W. J. Jordan, D. R. Kiefer
Over eighty percent of New York City's eighth graders apply to a magnet school and three-quarters of them are accepted. Because the lottery system creates exactly the same statistical results as a classical randomized experiment, the authors state with near certainty that students with average reading ability and grades too low to be normally admitted to a magnet school get a better education if they "win the lottery." With only ninth-grade results so far, students' reading scores and number of courses passed have gone up, and the number of students dropping out at the transition from middle school to high school has gone down.
MDS-173 April 1992 $6.00

Helping Teachers to Understand Their Roles in Integrating Vocational and Academic Education: A Practitioner's Guide

B. J. Schmidt, C. R. Finch, S. L. Faulkner

This guide is based on descriptions of vocational and academic teacher involvement across the integration process. The purpose is to help the educational practitioner understand more fully how teachers fulfill the roles required of them in the integration process. To do this, teachers' roles are viewed from thest four major integration themes: (1) Faculty Cooperation, (2) Curriculum Development, (3) Instructional Strategies, and (4) Administrative Practices and Procedures. For each of the themes, a number of subthemes address specific ways to help teachers understand their roles in integration. The themes and subthemes evolved from interviews completed at ten school sites in different states that have exemplary integration efforts underway.

MDS-276 **December 1992** **$2.75**

Integrating Academic and Vocational Education: Guidelines for Assessing a Fuzzy Reform

C. Stasz, W. N. Grubb

The 1990 Amendments to the Perkins Act require the National Assessment of Vocational Education (NAVE) to evaluate "the extent and success of integration of academic and vocational education." This paper has the following three goals: (1) to examine principal integration and research issues; (2) to identify data on integration and suggest gaps NAVE might fill; and (3) to address problems that NAVE's evaluation might encounter.

MDS-375 **Working Paper** **$2.25**

Two Worlds: Vocational and Academic Teachers in Comprehensive High Schools

J. W. Little

Vocational and academic teachers occupy two separate worlds in comprehensive high schools. Vocational teachers have remained nearly invisible in the mainstream literature on high schools, despite the considerable attention devoted to the problems and prospects of a vocational curriculum. This paper attends to the place that vocational teachers occupy in the professional community of the high school.

MDS-438 **September 1992** **$5.00**

NGRVE

National Center for Research in Vocational Education

University of California at Berkeley

NATIONAL ROSTER OF LOCAL PRACTICES in INTEGRATION APPLICATION FORM

Please complete this form so that the list of nationwide examples of integration will represent the full range of practices in the field. This is a two-sided form.

SCHOOL _____

CONTACT PERSON _____

ADDRESS _____

_____

PHONE NUMBER: ( ) _____ _____

CHECK PRACTICE YOU HAVE IMPLEMENTED:
(If you have implemented more than one, rank them in order of importance—"1" is most important.)

_____ **Academic competency**—A comprehensive system of infusing academic context in vocational courses by vocational education instructors thereby providing students with improved academic performance and vocational competencies.

_____ **Teacher collaboration**—Academic teachers collaborate with vocational teachers to integrate academic competencies into vocational courses to enhance academic success of students.

_____ **Vocational relevance**—The academic curriculum has been extensively modified to improve student performance through the use of vocational (applied) learning experiences.

_____ **Curriculum alignment**—The vocational and academic curriculums have been modified and coordinated across courses and/or over time to create bridges between both curricula.

_____ **Senior projects**—A comprehensive program to provide seniors with a vocational project as a capstone to their secondary education.

_____ **Academy Model**—A dynamic "school within a school" program provides each participating student with a common core of courses combined with vocational curriculum which is tied directly to business, labor, and industry.

_____ **Occupational high schools and magnet schools**—The school has a vocational focus which has been combined with curriculum alignment and vocational/academic teacher collaboration to create an integrated program.

_____ **Occupational Clusters, Career Paths, and Majors**—The vocational and academic curriculum has been aligned to prepare students for careers in clusters of related occupations.

PLEASE DESCRIBE YOUR PRACTICE BY ANSWERING THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER (in 500 words or less):

1. What does the program look like? How is integration of vocational and academic classes addressed?
2. Who benefits from your program? Students in either vocational or academic classes only? Students in both vocational and academic classes?
3. How are (both) vocational and/or academic teachers modifying curricula?
4. What occupational academies, clusters, or paths (if any) exist? How do students select them?
5. What evidence of the success of your practice are you measuring?

REFERENCES: PLEASE PROVIDE TWO (Use personnel from agencies other than your own)

1. Name _____ Address _____
   Telephone _____ _____
   Agency _____ _____

2. Name _____ Address _____
   Telephone _____ _____
   Agency _____ _____

IF YOUR SCHOOL/PROGRAM/ AGENCY IS SELECTED AS AN NCRVE INTEGRATION MODEL, STAFF FROM THE AGENCY WILL . . .

_____ Answer telephone questions
_____ Accept visitations
_____ Visit other programs
  _____ Within 100 miles
  _____ Beyond 100 miles
_____ Speak at conferences
_____ Participate on panels
_____ Participate in a conference

PLEASE LIST THE NAMES, AREA OF EXPERTISE, AND TELEPHONE NUMBERS OF KEY PERSONNEL.

KEY PERSONNEL		
Name	Area of Expertise*	Telephone
1.		
2.		
3.		
4.		
5.		

* Please be specific. For example, use "Social Science" for an expert on the integration of social science with vocational education.

PLEASE RETURN FORM TO

Laurie Holland
National Center for Research in Vocational Education
2150 Shattuck Avenue, Suite 1250
Berkeley, CA 94704

THANK YOU FOR YOUR COMMITMENT TO THE FUTURE!