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Abstract: The integration of academics and occupational education is a concept supported by the business community, vocational educators and state and federal policy makers. The 1990 Carl Perkins Amendments required federal moneys to be spent on programs that integrate academic and vocational education course sequencing, so that students achieve both academic and occupational competencies (Section 235). This study analyzed the process and product of courses developed within a secondary Health Professions Center magnet program in Indiana against the elements of success as outlined by Statz and Grubb (1991) and Pritz (1989).

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Conceptual Framework of the Project

Academic and vocational education are increasingly the foci of external as well as internal accountability pressures. Reduced enrollments, increased secondary graduation requirements, and high dropout and illiteracy rates have led to recognition that the integration of vocational and academic education offers an opportunity to foster change in an educational system that is in need of reform.

Federal legislation, such as the Carl D. Vocational and Applied Technology Education Act and its subsequent amendments, and the national attention to the Goals 2000 effort have led to increased attention to a closer relationship between the academic and occupational preparation of students. Section 235 of the Perkins Amendments specifically requires that federal moneys will be directed to the integration of the dual structured educational system.

A new vision of vocational education is emerging. According to Mark Musick, cooperation between academic and vocational teachers, increased collaboration between the business/industrial arena and all levels of the educational system, quality technical education and learning, and enhancement of the academic preparation of students are factors in this evolution. Musick states:

> Literally thousands of persons... now have a new vision of vocational education. Unfortunately, in too many high schools, the vocational curriculum is out of step with the nation's high tech, information-based economy. The emphasis is on learning to perform a specific task or use a certain piece of equipment. Not enough time is devoted

to helping students acquire a broad technical and academic foundation for effective problem-solving decision-making, and communication at the worksite.

(Bottoms, 1993, p. vii)

National efforts have been initiated, such as the State Vocational Education Consortium of the Southern Regional Education Board (SREB), a group of school sites and systems in 19 states. Originating in 1987 with 28 pilot sites, the Consortium has expanded rapidly and now includes some 300 sites (Bottoms, 1993). According to Bottoms, SREB was formed to "develop, apply, evaluate, and advance approaches to strengthen students' basic competencies in communications, mathematics, and science, and their critical thinking and problem-solving abilities" (Bottoms & Presson, 1989, p. vi). SREB worked with vocational education, business and industry, and government leaders in an effort to improve general academic and vocational education in the high school setting. In its research efforts, over twenty-five schools were studied, approximately 2,700 high school transcripts were reviewed, and over 1,700 vocational students were involved in a one year post-completion follow-up study. The research report of the SREB recommended raising the academic and technological literacy of graduates of secondary education.

Nine key practices of the Consortium's Making High Schools Work program include:

1. establishing high expectations for students in vocational and academic courses;

2. developing and revising occupational courses to emphasize mathematics, science, communication and problem-solving skills;

3. developing and revising academic courses so as to teach concepts via functional and applied strategies;

4. requiring students in occupational and general studies to complete a challenging educational program including college prep equivalent credits in math, science, and a vocational major;

5. encouraging academic and vocational teachers to integrate curriculum and instruction;

6. revising instructional processes to increase students' active engagement

7. providing guidance and counseling services to aid students in identifying future goals and a planned program of study;

8. providing extra assistance to students in completing the challenging program; and

9. participating in program evaluation which includes student assessment data which can then be used for curriculum revision (Bottoms, 1993).

Efforts in various states have led to the adoption of a curriculum of academics in which academic and vocational teachers have worked together as a team to develop curricula. The Indiana State Legislature enacted Senate Bill #419 in February of 1993, which requires the implementation of Tech Prep, an articulated secondary/post-secondary educational program intended to provide students with opportunities to develop basic academic as well as occupational skills in a seamless educational ladder. Pilot sites are developing and implementing self-designed programs with the approval of the Indiana Department of Education. Concurrently, the Indiana Department of Education has become a member of SREB and is involved in four pilot sites within the state. As a result, administrators and educators in Indiana secondary schools are involved to varying degrees in educational reform, some of which is state mandated and some of which is self-initiated.

A variety of practices and approaches are being initiated in schools across the United States. These approaches have varying goals, desired outcomes and purposes. Grubb, Davis, Lum, Plihal, and Morgaine (1991) identified eight integration models. These models suggest various ways to approach educational reform and may be modified. Benefits and limitations exist for each model and should be considered seriously prior to choosing a particular one to use. The descriptive model titles, as presented by Lankard (1992) are as follows:

1. incorporating more academic content into vocational courses;
2. combining vocational and academic teachers to enhance academic competencies in vocational programs;
3. making academic courses more vocational relevant;
4. curricular alignment modifying both vocational and academic courses;
5. the senior project as a form of integration;
6. the Academy model;
7. occupational high schools and magnet schools; and
8. occupational clusters, career paths and occupational majors.

Description of the Program

The School of Health and Human Services operates within the Indianapolis Public School (IPS) System, which has an enrollment of approximately 46,000 students. The Health Professions Center (HPC) is part of the School of Health and Human Services and offers three levels of preparation in four career tracks to its 250 students yearly. These options include career exploration in the fields of allied health, nursing, dentistry, and medicine.

The faculty of HPC, consisting of five members, is part of the larger 15 member math-science and HPC magnets' faculty group of Arsenal Technical High School. This high school is one of seven high schools within the IPS system and has approximately 200 faculty members.

The IPS system is involved in restructuring ita organization and in pursuing innovative educational reform. Adherence to Indiana's requirements for Performance Based Accreditation (PBA) allows individual schools to establish outcomes for students, faculty and administrators. PBA facilitates the active participation of educators in establishing these expectations and developing and implementing curriculum.

The Process of the Integrated Academic Curricular Development

A variety of reasons triggered interest in the integration of the science and the health occupations education (HOE) courses. Students lacked the science knowledge for problem-solving at the job sites. Generally, occupational educators have been criticized for focusing upon specific knowledge and skill training perceived to be required for student preparation for the work world. Moreover, science teachers as well as academic teachers have been criticized for not providing participatory instructional strategies and opportunities for students to perceive the linkages between content and the real world (Grubb et al. 1991). Additionally, business and industry have argued that schools are not preparing students who have the necessary skills for working in a global economy, e.g. higher order thinking, problem-solving, communication, and longevity. These reasons precipitated an interest in developing and implementing a health occupations education curriculum to prepare students for future career entry.

Development Tenets

From the beginning in 1987, certain basic beliefs guided the process of curriculum development. These beliefs reflected the professional attitudes and values of the educators and administrators involved, and resulted in the following principles which guided the Curricular development:

1. The curriculum product must adhere to state curriculum proficiencies in the areas of science and health occupations education.

2. The curriculum should reflect basic concepts of exposure, re-enforcement, and enhancement.

3. The developmental effort should involve teachers from both the areas of science and health occupations education.

4. The implementation of the curriculum should be based on a feasible time frame, personnel, equipment and supplies, etc.

5. The curriculum should be implemented within two years of development.

Developmental Stem

The first step in the development process was to investigate the concepts and skills in the existing HOE curriculum. Next, studies examined state proficiencies for health education and science, specifically, biology and chemistry. After listing both the state health education and science proficiencies and HOE concepts and skills, the matching process took approximate] y six months. There were areas which did not match--for instance medical terminology and the biological classifications. In this case, the science and HPC courses operated independently.

The third step included the development of goals and objectives by two of the science and HPC teachers. Following this development, the teachers created activities congruent with the student goals and objectives. The activities were derived from a wide variety of sources such as existing lab manuals, reference materials, clinical lab procedures, and teachers' creative efforts. The fifth step was to develop a syllabus which listed each day's activities. Finally, needed materials were ordered in preparation for curriculum implementation. Steps three through six were completed in approximately a one month period of intensive effort on the part of the two teachers.

In the summers following the first and second years of implementation (1988 and 1989), extensive revisions were undertaken. The reasons for these changes included the need for smoother implementation, improvement of activities, and more extensive inclusion of affective domain activities and evaluation. The third summer's (1993) revisions focused upon identification and evaluation of student outcomes at the completion of fret, second, third and fourth years of health occupations education. Computer assisted instruction has been developed and was implemented in the Fall, 1993.

Description of the Integrated Curriculum Product

The Curricular product is a course description and list of goals for Integrated Human Studies I and II while the second year courses are identified as Integrated Human Studies III and IV. The goals include "to integrate biology concepts with those of Health Professions, to provide students with the knowledge, attitudes and skills needed to progress to the sophomore level of Health Professions, to fulfill the state biology and health

education requirements for graduation, and to provide hands-on experience in many of the basic procedures utilized in various health care fields" (Wegner and Ransdell, 1992, p. 1).

Course objectives for the Integrated Human Studies I and II are as follows: The students should be able to:

1. acquire knowledge of the structure and function of the human body;
2. relate the effects of various diseases on body systems;
3. display behaviors which lead to a healthy lifestyle;
4. master recognition of prefixes, roots and suffixes of medical terms;
5. use animal dissections to develop skills of investigation and observation;
6. be aware of professional behaviors displayed by members of the health care team;
7. develop skills needed at work as a health care team member; and
8. understand the structure and function of plants and animals (Wegner and Ransdell, 1992, p.1).

Specific unit and lesson objectives are more detailed and are created and implemented by individual faculty members.

The curriculum guide includes instructional methods, a ***list*** of ***textbooks*** and ***materials*** required, and a listing of course topics for each class. The syllabus is a vital component of the guide and reveals the total integration of the science (biology and chemistry) and HOE concepts. Activities identified on the syllabus list objectives, materials, procedures, and method of evaluation. Faculty members are encouraged to develop appropriate instructional strategies when specific activities are not identified.

Science and HPC teachers meet weekly to discuss the effectiveness of the activities, changes which need to be made, student discipline, and student development. Although courses are not team-taught, close cooperation and elaboration between the teachers is a critical component of implementation of the integrated courses.

Back-to-back classes were initially attempted because of the belief they would provide the optimum learning experiences. However, courses are now offered separately because of extreme scheduling difficulties within the high school.

Examples of Integrated Concepts

One example of integrated curriculum is found in biology and HPC courses. A biology unit on the circulatory system teaches students to identify names and functions of system parts. In the HPC class, students learn the medical terms that relate to those parts, as well as diseases, dysfunctions, and maintenance of the circulatory system. This unit addresses both the state high school science and health education proficiencies of identifying and describing the functions of body systems.

Similarly, an integration of chemistry and health professions is illustrated in the unit on "Observation and Measurements." In chemistry, the student practices metric measurement of volume, length, and mass. The unit also involves qualitative and quantitative observations of the chemical reaction which occurs when a candle burns. Additionally, the chemistry student learns to convert between metric units. In the HPC class, these same objectives relate to the health field. The student will again be working with length (height), volume (input/output), and mass (weight), and will learn the differences between qualitative and quantitative

observations of patients. Practice of dosage calculations and conversions between metric and apothecary units complete the unit objectives.

Analysis of the Integrated Curriculum

The curricular developmental process and product are a blend of four models of integration identified by Grubb et al., 1991. Specifically, models focusing on teachers, curricular alignment, occupational and magnet schools, and occupational clusters as previously discussed, provided elements which form the basis of the integrated curriculum developed at the Health Professions Center. The HPC curriculum requires the vocational and academic teachers to enhance academic competencies in the HOE programs. This collaboration and cooperation of the science and HOE teachers exemplifies one aspect of the Grubb models. Modification of vocational and academic courses provided the structure for the HPC curriculum endeavor. The Curricular product was evidence of an effort to sequence learning experiences that allow students to build logically upon prior knowledge. Extensive cooperation between academic and vocational teachers was critical to the development and implementation of the curriculum. The program is situated in a magnet high school and is identified within the School Of Health and Human Services, and therefore is characteristic of yet another Grubb model. The total Curricular design incorporates the concepts of occupational clusters and career paths. Students can prepare for entry-level employment, technical training, or post-secondary higher education in a variety of occupational fields. Students are encouraged to explore career opportunities as early as the sophomore level.

In an effort to analyze the success of the curricular process and product, the elements of success as identified by Statz and Grubb (1991) and Pritz (1989) were selected as criteria upon which to base judgement. These elements include the following:

1. vision and commitment from all levels,
2. consistent support from district administrators and state officials,
3. new resources for funding,
4. autonomy for teachers,
5. teacher training and restraining,
6. evaluation of efforts, and
7. adequate time for implementation.

Using these criteria, the HPC efforts to integrate academic and vocational education were viewed as successful. Initially resources were abundant as evidence of district commitment and support. Teachers were allowed a great deal of freedom in lesson objectives and in identifying problems which needed to be corrected in the existing curriculum. Additionally, they were encouraged to continue their education through HOE certification and degrees, professional vocational associations, and workshop attendance. Teachers were given professional leave time to attend workshops and meetings. Constant evaluation of the program effectiveness was conducted through formal and informal discussions. Adequate time was provided to develop and implement the program.

Not all criteria were met successfully. While administrators acknowledge the importance of the program's existence, operative needs of the program are not always

recognized. Severe funding difficulties within the Indianapolis Public School system could be a critical factor in this lack of ***recognition.***

Conclusions. Implications and Recommendations

In conclusion, the curricular process and product developed by the Health Professions Center was a combination of several integration models. The blend was appropriate for the given situation of the magnet school concept, the educational reform integration efforts and the resources of the school system.

The curricular development activity was successful in comparison to the elements of success as identified. Two of the elements were perceived to be vital in the success. These included the professional autonomy of the teachers and the administrative support of continuing teacher education. In addition to the elements discussed above, a crucial element in the development and implementation appeared to be the teachers' willingness to cooperate and collaborate.

The implications of the Curricular changes are reflected by increased student learning. Students have become more aware of how academics relate to their health career choices. This connection results in better performance in their academic as well as HPC subjects. Additionally, the sequencing of the topics and experiences have provided a more logical framework within which student learning occurs. Because this integrated curriculum is outcome based, students, teachers and administrators are aware of expectations and achievement of goals. Finally, data of student graduates show that all are either employed in a health care field or are enrolled in a college or university,

Continuous curricular evaluation and revision are highly recommended. The Curricular process and product accomplished by the Health Professions Center should be considered as a potential model for other systems. The model appears to meet the intent of Roy Peters, a leading proponent of new and revised secondary vocational education, who states, "We must provide quality education to our career-bound youth. Our goal is to ensure that all vocational students are prepared for the workplace and further education. It is not an either/or situation" (Bottoms, 1993, p. 6).

The elements of success provided a valid framework for analysis. However, student achievement should be included as a criterion for judging success. Additionally, it is recommended that teacher cooperation and collaboration also be included as an element for analyzing a successful model of integrating academic and vocational education.

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