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**CLOSING THE GAP:
 INCREASING VOCATIONAL AWARENESS IN THE SCIENCE CLASSROOM**

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Abstract

In this article the authors, two counsellors and a teacher, collaborate to propose a role for the counsellor in implementing career education in the academic classroom. Specific attention is directed to the science classroom. A brief view of the career education concept is presented. This is followed by an examination of the science teacher's responsibility in assisting students to understand science and technology and its career implications. It is proposed that the counsellor is in a unique position to provide career education consultation to the science teacher. The argument in favor of a cooperative approach to facilitating vocational awareness is made, and practical ideas for integrating career education into the science classroom are presented.

Résumé

Les auteurs de cet article, deux conseillers et un professeur, se concertent pour définir le rôle du conseiller quant à l'établissement d'un programme d'éducation à la carrière intégré à l'enseignement régulier, et particulièrement aux cours de sciences. Suite à une brève présentation du concept d'éducation à la carrière, les auteurs analysent la responsabilité des enseignants à aider les élèves à comprendre la science et la technologie de même que leurs implications en termes de carrière. Ils proposent aussi que le conseiller occupe une position privilégiée qui l'habilite à servir de consultant en matière d'éducation à la carrière auprès des professeurs de sciences. Ils préconisent enfin une approche conjointe en vue de faciliter la prise de conscience au plan vocationnel et mettent de l'avant des idées pratiques pour intégrer l'éducation à la carrière dans le cadre des cours de sciences.

It has been apparent for some time that the job market for young Canadians is becoming increasingly more difficult to enter. In 1978 Statistics Canada reported that approximately 17.2 percent of Canadians between the ages of 15-19 were out of work (France & Mitchell,

1981). This is over twice the amount for any other age group. Paradoxically, while unemployment levels in Canada continue to rise employment opportunities in new technological areas also continue to rise (e.g., Axworthy, 1982; Willies, 1982). There is an increasing need for students to select careers in these rapidly expanding fields. The economic prospects are putting tremendous pressure on students, and as a result school personnel are in need of a more active role in seeking solutions.

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Many school boards are beginning to investigate the idea of integrating career and vocational education into their curriculums. The Counselling Task Force to the British Columbia Ministry of Education (1980) has reinforced the need of the entire school staff to cooperate more effectively if counselling services are to be effective. Not only does the report state that counselling services be a shared responsibility, but that the counsellor, under the direction of the principal, coordinate the effort. The issue for all the school staff is how to go about integrating counselling services with the academic curriculum in an effective manner. This integration of services is particularly relevant to the incorporation of career and vocational education into the regular school curriculum.

Career education is a recent and relatively new philosophy of education. Career education has been defined as an approach that links educational instruction with work and life roles from grade one through the adult years (e.g., Hoyt, Evans, MacKins, & Mengum, 1974; Hoyt, 1977; Sankey, 1981). Thus, career education not only provides job information and skill development, but it attempts to develop values and attitudes about the psychological, social, and economic meaning of work. It should be made clear that the objective of career education goes beyond choosing a career and includes developing decision-making skills, exploration of values, and interests, and development of work styles (France & Mitchell, 1981).

Thus, career education has an important role in relation to the community and the educational system. Career education can facilitate the integration of school curriculum with the community, which includes such aspects as the home and the world of work. The counsellor's role is to serve as a link between the student and the community, while having input into the school curriculum as consultant to the teacher. Instead of being a course by itself, career education can be presented as a component within other courses. The purpose of career education is the same as the purpose of all education: preparation of the student to understand the role of the self in society and the skill and awareness to function satisfactorily within society. Career education links education with the reality of society by demonstrating the relevance of academic subjects to careers.

In this article the authors, two counsellors and a teacher, collaborate to demonstrate the

practicality of this idea by describing a *proposed role for the counsellor in the academic classroom*. Although the focus is on the science classroom, the concept itself can apply to any academic subject.

Focusing on the Problem

Today it is frequently asked, why are young Canadians failing to seek careers in the expanding fields of advancing technology? The most obvious answer seems to be a lack of understanding about science and technology and their career implications.

France, Kelpin and McDowell (Note 1) emphasize the role that information plays in the career development of students even in the earliest years. Work attitudes and perceptions of careers have already begun to form in elementary school. Counsellors and teachers need to have competencies in all aspects of information, so students can be made aware of those expanding career areas in technology at an early age.

The next obvious question is, who is responsible for explaining to students the advances of technology and employment opportunities emerging from such advances? Certainly the career counsellor cannot be expected to teach students much about technology in our society although this understanding is often essential for appropriate career decisions. For a number of years, the public, the students, a variety of educators, and the counsellors have urged a major revision of science teaching into programs that would emphasize modern technologies and relevant employment opportunities. It is only in recent years that science educators have begun to accept that it is their role to provide such information to students (e.g., George, 1981; Page, 1979). At the same time these educators admit to their current failure in providing this information. According to Page (1979) students know very little of the impact and accomplishments of science in Canada, which is reflected in the lack of relevant curriculum material. George (1981) reiterates the critical need for science courses to inform Canadian students of the failures and successes of technology. He further indicates that the typical secondary student graduates with a distorted view of science and technology.

Technology is usually defined as "applied science". This definition suggests that science teachers should be directly involved in helping students to understand the impact of science

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and technology in everyday life and its career implications. Every science teacher should be concerned with addressing the societal consequences of modern science and technology. The thirty-eight secondary school teachers meeting at the Exeter Conference on Secondary School Science Education (Phillips Exeter Academy, 1980) unanimously agreed that no other high-school discipline but science was appropriate or likely to meet this challenge. The curriculum Committee on Junior Secondary Science, appointed by the British Columbia Ministry of Education, has strongly advocated the teaching of technology and the implications of technology within science courses (Erickson, Erickson, & Haggerty, 1980).

Many science educators now acknowledge this need for change in their current teaching practices. According to Greager (1980), science teachers can find adequate time within their courses to teach about the technological implications of science by eliminating trivia. She defines trivia as "any arbitrarily selected bit of information that students have no reason for knowing other than to remember it for the next test" (p. 387). Hurd, Bybee, Kahle, and Yager (1980) suggest that science teachers must break away from the limitations of current textbooks, courses, and teaching models to be successful in making the required curriculum changes. At the same time science teachers, as well as others interested in science curriculum change, realize that they have only the skills to initiate the bridge between technology information and the application of this knowledge to careers. The counsellor can assist the teacher in this process by providing information on the manpower requirements and on technologically oriented careers (France, Kelpin, & McDowell, Note 1).

The recommendations from all sides are for the science teacher and the counsellor to give greater attention to the employment opportunities in science and technology. The science teacher is best able to provide a general understanding of the nature of technology and its impact on society. Counsellors can best meet the individual questions about possible career matching with the attitudes and abilities of each student. The greatest service to students will come from a cooperative effort on the part of both teachers and counsellors.

Science and Career Development Ideas

Carr (1981) has suggested that one of the primary responsibilities of the school counsellor

is to act as a consultant in the school environment. The counsellor is in a unique position to act as career education consultant to science teachers. The counsellor may take the facilitator role by providing information and ideas to teachers in aiding them to integrate career education concepts into an already established curriculum. Or the counsellor may work more actively with teachers to develop a comprehensive career education component for a revised curriculum and participate along with the teacher in its implementation. The goal of all consultation is a cooperative effort to improve classroom learning. This improved classroom learning will provide a basis for efficient career and vocational counselling by preparing students to seek appropriate details regarding specific science and technology fields. In effect the counsellor works with the science teacher, developing a team, to integrate career awareness and development concepts and activities into the learning experience. Specific ideas for accomplishing this integration include a range of classroom activities.

Classroom Activities

Integrating career education into the classroom is the most effective approach in creating awareness and bridging the gap between the community, curriculum, teacher and science. Students in effect study the role of science and science-related careers in terms of the man-made world.

For example, Mangum, Becker, Coombs, and Marshall (1975) suggest the following activities for students to gain an understanding of the application of science and technology in everyday life.

- (1) Students collect data on traffic areas and how experts make decisions on speed limits, timing of a traffic light, etc. and what kind of preparation is needed in traffic planning and management;
- (2) Chemistry students study labels on items used in the kitchen. The items are then labelled according to chemical categories. Students learn the relationship of chemicals to everyday life and chemical nomenclature;
- (3) Laboratory activities are conducted which focus on the role of career scientists, such as the crime laboratory scientist, soil analyst, zoning engineers, and the health scientist;
- (4) Students compile a list of science practitioners in the community that are willing to correspond with students in the class.

- The information can be shared in discussions or put on a class bulletin board; and
- (5) Science careers can be studied in relation-ship to their future prospects. What careers will be important by the year 2000?

An excellent example of science teaching closely integrated with career education is the health services course described by Solomon (1980). In this course advanced anatomy and physiology instruction is combined with field experience in local hospitals and on going career counsellings. The course curriculum was developed by academic and counselling personnel in conjunction with community professionals so that a maximum integration of academic, training, and vocational-career experience is achieved. It is stressed that success of the course is based on the re-education of staff and the community to see a broader range of activities as relevant in the academic setting. The science teacher, counsellor and community professional are all viewed as integral members of the team developing such community-based experiential education.

Another approach is the Career Day concept. A day is set aside for the presentation of careers in which students have an interest. Either booths or classrooms are designated with a particular career focus. Students visit the career of their choice and are exposed to information that focuses on what the occupation is about and how to get into it (France, Neumann, & Adams, 1981). A Career Day promotes school, community, industry and business cooperation.

Books like *The Technology Connection* (Botting, Geard, & Osborne, 1980) that focus on the interrelationships among science, technology and society by providing a series of case studies can increase student's vocational awareness when incorporated into the academic curriculum. Such Canadian books assist teachers in discussing science related occupations, the academic preparation it would take to pursue these occupations, and ways that the concepts of science can be applied to the student's everyday life (Banta, 1980).

Recently, the National Science Foundation has funded the development of two packages of career education material for use in the science classroom or a separate career exploration course. The material, entitled *Career Oriented Modules to Explore Topics in Science* (COMETS - Smith, Moliter, Nelson, & Matthews, 1982) and *COMETS Profiles*

(Noyce, Seymour, & Smith, 1982), was developed to stimulate interest in science and encourage early adolescents to consider careers in science-related fields. The *COMETS* material is composed of 24 sets of lesson plans with over 100 activities for grade five to nine which assists the teacher or counsellor in showing students how the study of science may lead to interesting careers. The *COMETS Profiles* material presents 24 biographical sketches of women in science careers. The *Profiles* were especially developed to show young girls that women can develop careers in many science fields and to introduce them to role models. Both packages of material are designed for bringing community resource people in science careers into the classroom for teaching an interesting science lesson, explaining how a particular science concept is used in their careers, and/or discussing their careers. This innovative material is now being field tested across North America.

In summary, it is apparent that career education does not have to end in the classroom, but it is there that the relevance of academic subjects to careers can be initiated. In this regard the school counsellor should be the catalyst in the development of a career and vocational program that is cooperative. The counsellor usually has superior skills in the management of students in work-study programs, relating to local companies, and recognizing the needs of the community. Many science and other academic teachers will greatly appreciate this leadership and can be encouraged to develop appropriate curriculums. The National Science Teachers Association (1978) has recommended the development of such cooperative ventures. Schools now need cooperation not only between the teachers and the counsellors but also between the staff and the community resources. The evolution of community-based experiential programs will certainly meet the needs of our youth who are demanding an education with obvious career implications.

Conclusion

If the gap is to be closed between the rising career expectations of Canadian students and the demands of the market place, the gap between vocational awareness and the academic classroom must be narrowed. In the science classroom the teacher is called upon to provide students with an understanding of science and technology and to present the career implications of these fields. In turn, the school counsellor must facilitate contact

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between the student and the community, and take a consultative role with the science teacher in developing career-oriented information and experiences for the classroom. The key element of an effective career education program is cooperation between the classroom teacher and school counsellor. It must be remembered that the classroom is just one place where career education can enhance the curriculum. Ideally, the work of teachers, counsellors and the community can be fully integrated through locally developed, comprehensive programs. Thus, career education continues to grow as a vital factor of human resource development.

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