Technology education programmes and vocational pathway options

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Abstract
While technology education is generally recognized as a vital part of general education for all students through the compulsory years of schooling, it is evident that there are advantages to including vocational options as part of an overall curriculum structure. It is the intent of this paper to examine such options within North America, with reference to specific program examples.

The recent introduction, development and expansion of technology education curricula has resulted, in some localities, in the retention or re-definition of content that has the potential to provide students with specific career/job preparation skills prior to their completing high school graduation requirements. Such experiences vary, but can lead directly into employment, be credited toward an apprenticeship undertaking, be articulated with post-secondary college programs, and/or provide the student with an in-depth exploration of selected career pathways. For some students, these vocational or work-based elements can additionally contribute to a pattern of courses required for a high school diploma. There are, however, specific issues that need to be addressed with respect to these optional program routes.

Introduction

An examination of the emerging technology education trends in North America reveals great diversity in program content, delivery and organisation. In some instances, traditional approaches and curricula prevail, in others completely new programs are being developed that place students in new modular technology facilities far removed from the old woodworking and metalworking shops of former industrial arts programs. Despite such variation, intended student outcomes or program objectives more often that not include statements that reflect career related issues and development. A typical example states that students have the opportunity to "explore and pursue technological careers and associated lifestyles".[1] Such overall program goals are directly related to the transition to employment conditions and issues facing youth as they complete senior high school. Achieving such outcomes can be, and is being done in a variety of ways from exposure to career related material and information to on-the-job vocational experiences.

The rationale for vocationally linked options becomes even stronger when the transition pathways of youth are examined. For example, over half of high school students in the United States do not engage in post-secondary education leading to a degree.[2] Similar statistics prevail in Canada, with many studies additionally citing the rather dismally high rate of youth unemployment, especially among the non-post-secondary participant group. This "forgotten half" of youth, as Paulter[3] reminds us, can particularly benefit from some of these work related options. Extensive longitudinal studies of youth transition in Canada have further revealed weaknesses in student school preparation that show students lack adequate and appropriate work experience as new labour market entrants; have very limited job search skills; and have limited career aspirations.[4,5]

North American Context

Within North America, the various states and provinces have each maintained autonomy with respect to education, particularly for students from kindergarten to Grade 12 (aged 5 to 18 years). Technology education, within this context has developed from what were often well established industrial/industrial education programs, and has been brought

into focus by a number of technology curriculum framework efforts.[6,7,8]

The introduction and development of technology education has met with a somewhat mixed reception. Some jurisdictions have proceeded with well developed curricula and implementation plans, while others continue with the traditional industrial arts types of endeavours that exhibit strong vocational ties. Generally though, the movement in each state and province is toward a technology education curriculum of some form. The typical curriculum organisers of communications/ information, manufacturing/production and transportation technology, continue to reflect somewhat of an industry flavour, although curriculum delivery emphasises a distinct technological processes and products approach.

The development of technology education in North America is also taking place within a context of concern about, and changes with, the overall K-12 educational system. Several reports over the past decade (in both countries), have highlighted problems with the educational system and have suggested changes that essentially address key issues such as improving academic standards and student performance; the notion of a better school to work transition; the linking of academic subjects with vocational education in high schools; and improving work related programs and opportunities for high school youth.[9,10,11,12]

The Technology Education Continuum

Most programs are designed to provide a continuous progression of student exposure and development in various aspects of technology, beginning with awareness and integration across the curriculum at the primary and elementary levels, that progress to exploring specific technologies at the middle school (junior high) level. At the senior high level the program continues as part of a general education program with more in-depth development within selected technological fields.

Also within a senior high school framework some alternative technology education curriculum structures have emerged from various aspects of the more traditional practical arts array of subjects. In some places, business, home economics, vocational education and other practical arts areas have become part of the overall curriculum construct for technology education.[13] This not only adds considerable breadth to the curriculum, but also enables students to pursue, in the latter three years of their schooling (aged 16 to 18), a vocational career specific option of choice, or bits and pieces that contribute to general career exploratory program.

Other jurisdictions have also integrated vocational programs and courses within a broad technology education curriculum framework at the high school level, or have parallel programs of a work-base nature that enable students to either explore careers or gain specific occupational skills that will enable them to enter the job market upon completion of high school. Yet other examples are designed to link high school programs with continued technical preparation (rather than direct work preparation) at the post-secondary education level.

Some Work Related Program Examples

Various work related options can be found in schools across North America. Invariably, they are offered to students in the senior high school Grades of 10, 11 and 12, with a few such options available to slightly younger students under specific circumstances. Varied in nature, in terms of intended student outcomes and processes involved, each may appeal to specific groups of students. Availability though, varies widely by state and province and within specific school districts.

Coop Education

This is probably the most wide spread of all the examples. It was, according to Stern,[14] offered in about half of all secondary schools in 1992 and is on the increase throughout North America with similar rates of participation in Canada. Examples can be found that are closely linked to many of the vocational education areas as well as to science

and technology. In some schools it has been traditionally offered as a 'work experience' program. It typically involves supervised work-placement with part-time work in conjunction with a school classroom component. Student and employer expectations are clearly laid out. Overall, coop education serves a broad range of students that, according to a recent national report, includes a disproportionate number of low achievers.[2]

Youth Apprenticeship
These programs are attractive to students who wish to specialise in a specific trade area while completing their high school education. They are a relatively new concept in North America with several program variations evident across the continent. Many are called youth apprenticeships, especially in the United States, however, other labels such as 'Secondary School Workplace Apprenticeship Program' and 'Passport to Apprenticeship' are used in Canada. All essentially provide a structured work experience route with integrated paid work and school-based learning; have formally registered agreements (indentured apprentice) with state or provincial authorities and an employer; and provide some recognised certification in a career or career field at the end of the process.

Tech-Prep
This is a relatively new program that combines secondary and post-secondary education into an articulated program leading to a two year associate degree or two year certificate in a specific career field. It is intended to provide technical preparation in at least one field of engineering technology, applied science, or a practical arts area; promote continued academic preparation; and lead to placement in employment.[2] In secondary schools the occupational programs (practical arts) most likely to contain tech-prep are business & office and trade and industrial programs followed by agriculture, marketing, occupational home economics and health. Some form of school work links are considered an essential element of the program and the offering of tech-prep programs through technology education in the senior high school is a logical development for educators to pursue.[15]

School Based Enterprise
These are school based activities that produce goods or services for sale or use to people outside the school. Such programs are found in about one-quarter of secondary schools in the United States and involve such enterprises as restaurants, construction projects, child care centres, automotive repair, hair salons and retail stores. They are a viable option where there are too few available employers for other work-based programs.

Job Shadowing
This is one example of a type of program that enables students to explore business and industry options through observation at the work site. It does not provide hands-on experiences, but allows students, through structured activities, to observe and report about occupations as well as interact with workers. It is easily integrated into various high school course offerings.

Secondary Vocational Education
These programs are designed to provide specific job/employment skills using specialised facilities and instructors within the high school setting. Programs can span a range of vocational areas related, for example, to trade and business occupations. The general trend, especially in Canada, is for a reduction in specific vocational content and an increase in broader based technological competencies in readiness for more specialised preparation on the job in career specific post-secondary programs.

Issues and Considerations

While recognising the value of work-based programming for the forgotten half and the need for high school graduating students to

> have the skills and knowledge needed for the workplace as well for continuing their education, Frantz (1994)

warns that programs such as youth apprenticeship could perpetuate

> the bifurcation of youth into two groups and could intensify the sorting and tracking process now practised in most schools (p.32).[16]

He does not offer any solutions to this dilemma, but it is a further reminder of the continuing low status afforded vocational programs compared to those of the academic streams in comprehensive high schools.

It is also important that students following vocationally related pathways graduate from high school. Within the context of North America, this achievement is crucial and expected of all students. Failure to achieve some kind of diploma or leaving certificate at the end of schooling automatically labels a student a 'drop-out' despite the fact that students can legally leave school at age 16 (usually at the end of Grade 10). The academic qualification is therefore a necessary part of alternative high school routes in order to avoid such labelling and adding to the traditional negative image of vocational routes in school.

Many educators are attempting to forge closer links between technology education and what have traditionally been known as the academic subject areas, particularly science, and move away from the industrial roots of the discipline. For this group, forging links and articulation with vocational and work-place programs within high school presents somewhat of a dilemma. They consider it inherently dangerous due to the traditionally negative image of such programs, especially vocational ones, and are wary of being 'tainted' by such links and association. On the other hand, many school administrators oppose such attitudes since work related pathways provide alternatives for students who are struggling with the traditional general academic routes to high school graduation. This, in turn however, tends to support the image of vocational alternatives as being a dumping ground for less able students. It is a critical issue that needs to be addressed in North America.

Rogers (1995) points out the diversity of technology education and its implementation, directions and goals across United States. He notes that several states have distinct program goals that link technology education and vocational programs, especially with regard to better (future) vocational choices, vocational education entry level skills, and transferable technical skills. However, he questions the current degree of articulation between technology education (especially at the junior high school level) and vocational education programs, and the need for some consensus and agreement on the scope of the technology education curriculum and the nature of the articulation with vocational programs, particularly as part of the tech-prep movement.[17]

The question continues to be asked about how much vocational skill development should take place versus general education or 'generic' content/skills at the high school level? This is part of the usual concern about best use of school time and offering the most relevant curriculum experiences to students. At the very least, exploratory opportunities should be available in the development of generic work skills and attitudes. Beyond this, students need to be aware of the limitations and possibilities of their chosen pathways, especially of work-based options in specific career fields.

There is no doubt that work related approaches appeal to high school students, are a change from the normal school/classroom routines, and often connect to a preferred learning style. Certainly for many of the 'forgotten half' of youth, these are viable options. But few of these work-based vocational programs and options have undergone a thorough evaluation; and the overall lack of good empirical data to support the positive anecdotal evidence available suggests a need for evaluative action. A good solid data base of evidence supporting these programs would additionally help improve the somewhat negative public image of vocationally related options for high school students and promote them as viable pathways for many students to follow.

Another question that arises relates to the kind of teacher competencies and preparation required for the work-based or vocational options. Many technology education teachers have not worked in business or industry and in many jurisdictions would not therefore be eligible to teach in secondary school vocational programs. They would however be able to supervise, for example, coop or work shadow students, but even in this capacity, some appropriate industry work experience would be to their advantage.

Summary

The case for providing alternative, work or vocationally related pathways is strong given the transition problems facing youth as they exit the secondary school system. Programs and experiences that assist in eventual productive and satisfying employment are essential and a logical extension of technology education programs. The challenge to the educational system is to resolve the many issues which such pathways produce and create viably acceptable vocational options within a technology education context. A blending of the two in the latter years of schooling is not a panacea for the problems facing youth after school, but for a large proportion, the odds of an eventually successful transition to the work place can be increased in their favour through such efforts.

References

1 Province of British Columbia. (1994). Technology education: prescribed provincial curriculum guide kindergarten to grade 12 (pilot edition). Victoria: Ministry of Education.

2 United States Department of Education (1994). *National assessment of vocational education: interim report to Congress.* Washington, D.C.: Office of Educational Research and Improvement.

3 Paulter, A. J. (1994). Improving the school-to-work transition for the forgotten half. In Albert J. Paulter (Ed.) *High school to employment transition: contemporary issues*. Ann Arbor, MI: Prakken, (pp 201-5).

4 Sharpe, D. B. and Spain, W.H. (1991). *Youth transition into the labour market*. St. John's: Faculty of Education, Centre for Educational Research and Development.

5 Sharpe, D. B. and White, G. (1993). *Educational pathways and experiences of Newfoundland youth*. St. John's: Faculty of Education, Centre for Educational Research and Development.

6 Snyder, J. F. & Hales, J. E. (Eds.) (1981). *Jackson's Mill industrial arts curriculum theory*. Charleston: West Virginia Department of Education.

7 Dugger, W. E. (1985). *Standards for technology education project*. Blacksburg: Virginia Polytechnic Institute and State University.

8 Savage, E. and Sterry, L. (1990). A conceptual framework for technology education, *The Technology Teacher*, 50, 1, 6-11.

9 National Commission on Excellence in Education (1983). *A nation at risk: the imperative for educational reform.* Washington, D.C.: U.S. Department of Education.

10 National Committee on Secondary Vocational Education. (1984). *The unfinished agenda: the role of vocational education in high schools.* Columbus, OH: National Center for Research in Vocational Education.

11 Prosperity Secretariat Learning (1992). *Building a foundation for prosperity, a study of vocational education.* Vancouver: Spectrum Vocational Testing.

12 Economic Council of Canada. (1992). *A lot to learn: education and training in Canada*. Ottawa: Minister of Supply and Services.

13 Alberta Education. (1994). *Career and technological studies: program of studies.* Edmonton: Curriculum Standards Branch.

14 Stern, D., Stone, J. R., Hopkins, C., McMillion, M., & Cagampang, H. (1992). Quality of work experience as perceived by two-year college students in co-op and non-co-op jobs. *Journal of Cooperative Education,* 28(1), 34-47.

15 Anderson, L. D. (1995). Implementing the technology preparation (tech-prep) curriculum. *The Journal of Technology Studies*, XXI(1), 48-58.

16 Frantz, N. R. (1994). Youth apprenticeship in the United States: Transmission or transformation of the German apprenticeship system. *Journal of Industrial Teacher Education,* 31(3), 28-39.

17 Rogers, G. E. (1995) Technology education curricular content: a trade and industrial education perspective. *Journal of Industrial Teacher Education,* 32(3), 59-73.