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Orientation to Trades & Technology

a Curriculum Guide and Resource Book with Special Emphasis on the Needs of Women

by Marcia Braundy
Journeywomen Ventures Ltd.

BRITISH COLUMBIA
CENTRE FOR CURRICULUM, TRANSFER & TECHNOLOGY
WITT
With funding assistance from Human Resources Development Canada

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Revised for the
Province of British Columbia
Ministry of Education, Skills and Training
and the Centre for Curriculum, Transfer and Technology
with support and assistance from the WITT National Network
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Preface

This curriculum guide was originally developed in response to recommendations made by the instructors who attended the Women in Trades and Technology conference in Prince George in June 1986. The instructors recommended that the curriculum guide be flexible enough to respond to the needs of a wide variety of learners and geographic areas and that it identify the key elements necessary to all programs for Women in Trades and Technology. It has been revised to meet the National Standards for Exploratory Courses in Trades and Technology for Women developed by WITT National Network. The revisions also reflect changes in technology, and the use of instructional technology by learners and instructors in the delivery of the program.

The ministry contracted the revision to Marcia Braundy of Journeywomen Ventures Ltd., the original author. She was assisted by both a provincial and national advisory committee. Ms. Braundy is a university educated journeylevel carpenter who has been involved in Apprenticeship and women's employment and training issues both nationally and provincially. She has developed and taught Women in Trades and Women in Trades and Technology courses in British Columbia at Selkirk College, Nelson, and the College of New Caledonia, Prince George.

Acknowledgments

The original 1987 committee, established by the British Columbia Ministry of Advanced Education and Job Training, advised on the scope and format of the guide and reviewed prepared materials, to create this unique resource. We are indebted to the original project team: Marcia Braundy, College of New Caledonia; Mark Creighton, Ministry of Social Services and Housing; Etta Connors, Camosun College; Linda Coyle, Kwantlen University College; Kirk Gable, College of New Caledonia; Sandra Malloy, Women's Secretariat, Ministry of Advanced Education and Job Training; Joan Mason, Ministry of Advanced Education and Job Training; Heather Watt, Vancouver Women in Trades; and Roberta Taylor, East Kootenay Community College. Thanks also go to the College of New Caledonia Advisory Committee for their support, including Kathy Conroy, Paul Ramsey, and Liz Ritch.

The 1997 Project Committee advised on the revision process and on the inclusion of new material, which enables *Orientation to Trades and Technology* to meet the national standards. Members of the BC Committee included: Linda Coyle, Kwantlen University College; Priti Shah, Drishti Consulting; Christine Baker, Salishan Pathways Human Resources Society; Deanna Rexe, Public Consulting Group, BC; Shirley Holloway, Dean of Trades and Technology, and Joyce Van De Vegte, Camosun College; and the author, Marcia Braundy, Journeywomen Ventures Ltd. The national committee included: Valerie Overend, SIAST; Brenda Grzetic, WITT Newfoundland; Maggie McDonald and Ingrid Bron, WITT National Network; and Danuszia Mordasciewicz, Human Resources Development Canada. The Project Committee was ably assisted by Dennis Anderson, Centre for Curriculum, Transfer and Technology, and Jean Campbell and Susan McGregor, BC Ministry of Education, Skills and Training.

Thanks to those who gave so generously of their time and ideas: Susan Booth, BRIDGES author, who along with Dr. Carol Brooks, from Quinta Consulting in London, Ontario, wrote the first Women in Trades and Technology program and completed the original research on relational learning with women and men in trades and technology; Caitlin Macart and Cindy Hale of the Splinter Group, Powell River, BC - tradeswomen, technicians, and teachers; Mary Gillies and Connie Schmidt, successful technologists who were very willing and able to share their skills; the Toronto YWCA Life Skills Division, for the wonderful resources they have created; Elaine Bernard, machinist turned techno-interpreter with little time and a commitment to share it; Joan Connors, College of New Caledonia, who makes math accessible; Patti Schom-Moffatt, a technical consultant with a commitment to women's training; Moira Gutteridge, University College of the Fraser Valley, who has a great pre-technology program; Linda Breault, at University College of the Cariboo; the library staff at the College of New Caledonia and Selkirk College for their patience and assistance; Tom Sawtell, Developmental Studies at CNC; Patricia Miller and Mary Ann Kenney at the Canadian Council for Human Resources in the Environment Industry; the International Technology Education Association for sharing their resources; Linda Coyle, Joan McArthur-Blair, Sandy Berman and Adrienne Montani for their excellent work work on gender, diversity and life management skills; Christine Zimmerman and Laurie Jorgenson for review and feedback; Kate Braid for her incisive analysis of gender issues in trades and her generosity in sharing it; Mildred Minty, a pioneer in providing diversity training for apprenticeship counsellors and

instuctors; Gay Kiesling of the Renton, Washington ANEW program: pioneers in the field of TTO training for women; Kootenay WITT for sharing their excellent resources; Alice Macpherson, Kwantlen University College, for her efforts in reviewing the material in this book; and Susan Webber, Advanced Education Media Acquisition Centre for the wonderful assistance provided in identifying audio/visual materials and their sources. You were all needed.

Special thanks should go to Linda Coyle, Deanna Rexe, Brenda Greztic and Valerie Overend for the active and ongoing support and provision of additional resource materials and ideas; and to Gordon Thorne at GT Publishing for his clarity, enthusiasm, encouragement and proclivity for the "bon mot," as well as his vision and understanding of the need for this publication.

Contents

Work-Related Skills

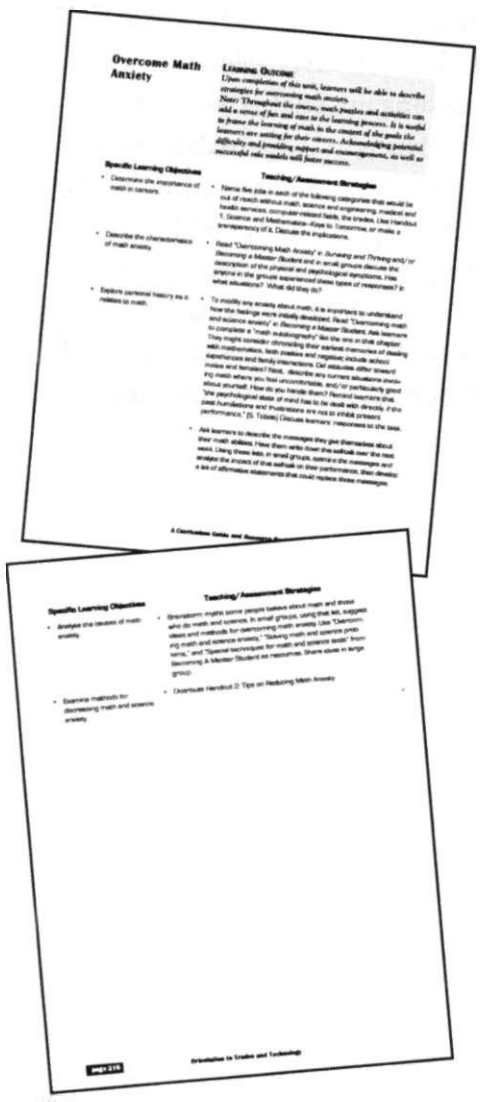
Career Development

Part I: Program Overview

Curriculum Guide Organization

THIS GUIDE IS DIVIDED INTO THREE PARTS:

- *Part I: Program Overview provides statements as to the purpose, rationale, and goals of the curriculum guide;*
- *Part II: Using This Curriculum Guide gives practical information on how a course can be set up;*
- *Part III: Course Units is divided into sections and topics containing sample units that can be used as a foundation for building your own course. Each topic has a general introduction identifying the units covered, their purpose, requirements, and key ideas. Each unit begins by identifying the Learning Outcome(s) and is then organized into two columns: the left-hand column states the specific Learning Objectives to be achieved within that unit, and the right-hand column identifies how these objectives are to be achieved by giving examples of possible learning activities and teaching strategies.*

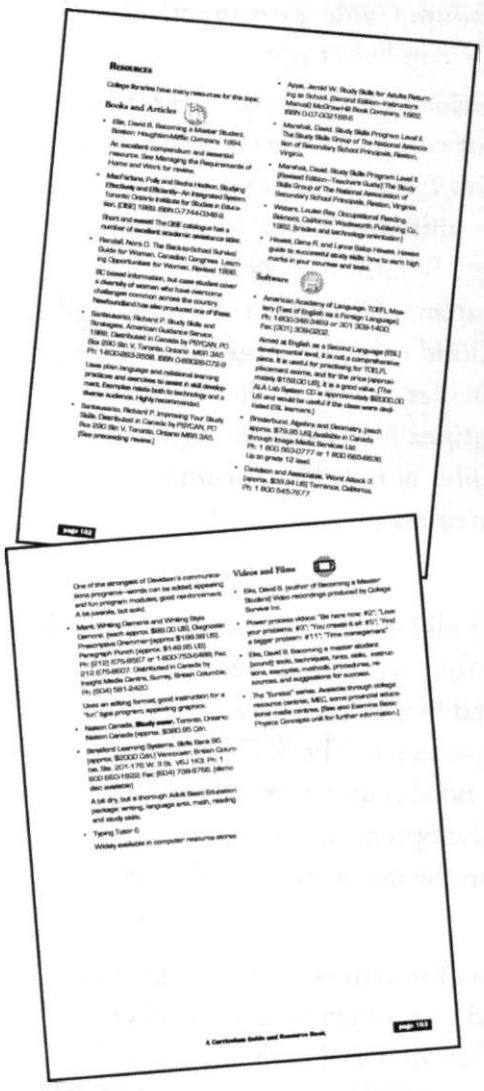


Sample Course Unit Outcomes and Strategies

Just as it is recognized that not all learners will need to cover all units, so it is recognized that they will not all need to cover every Learning Outcome identified in the units. How much and what you use is up to you as the instructor. The WITT Standards and Guidelines contain recommended course lengths (see Appendix A). It is important to stress that the Specific Learning Objectives are sequential, as are the topics within the major sections. The topics build upon each other.

Each unit also includes a section of resources. These range from handouts that can be distributed to your learners, to teacher background information, and titles of useful books, films, and videos on the topic. Information on distribution, length, and ordering numbers of recommended videos and films is also included. The videos and films recommended are available through some provincial media outlets, the National Film Board or your college film librarian should be able to help you; but again, ordering can take time, so order as early as possible.

The Province of British Columbia has developed competency-based learning packages for many of the individual trades areas, and also for those skills that often are considered to be "common core" used across trades and many technologies. Originally developed as part of the TRAC system, this material has been developed and enhanced over the years both broadly and in



Sample Unit Resource

specific trades. While the TRAC system is no longer in use, the model for competency-based Learning Guides is often used as a resource for both entry level trades training and advanced trades training. Some of these guides are still called TRAC, and others are specific to their trade area. The material includes excellent simple explanations, graphics, background material, and self-tests. It has been purchased for use by many colleges across the country and by some provinces. The 1996 Outdoor Power Equipment and Motorcycle Repair Curriculum materials have rewritten and updated many of the elements of the TRAC course, and that has been reflected in the learning activities and resources throughout this book. Saskatchewan and Alberta have also been developing some trades-specific, competency-based training materials which can be shared with other provinces, and it will be important to determine what access you have to these material in your own province. At the present time, entry level "common-core" type learning guides are available only from British Columbia (which is currently revising some of the more actively used material) and Quebec. It is not essential that the TRAC system be used. Specific trades or technical instructors could use the learning objectives given to develop and present their own activities.

Purpose

This curriculum guide *was originally conceived and developed as a guide for instructors conducting courses for women entering trades, technology, and operations (TTO). It can, however, be used successfully with a wide range of learners regardless of their gender, age, or status. This guide covers far more material than can be completed in the time available for most courses (4-6 months). The topics are regarded as significant in a course designed for adults entering the field of trades and technology for the first time. Instructors will determine the depth and breadth of their programs through their choice of learning activities and teaching strategies. This guide by no means attempts to prescribe what should be taught; it should be regarded as a starting point and a resource to be used by you as a foundation on which to build your own course. You are encouraged to enhance, delete, change, and develop the sample units to fit your requirements and those of your learners.*

The purpose of this curriculum guide is to assist instructors to develop programs of hands-on orientation to trades and technology that will fulfil the following aims:

1. assist participants in developing life skills and the ability to plan careers
2. introduce participants to a wide variety of occupations in which women are currently under-represented, as well as a spectrum of newly emerging occupations in technical fields
3. provide participants with a realistic understanding of the requirements of working in these fields and provide skill training—physical, mental, and emotional—that will enable them to compete successfully for training and jobs in the field of trades and technology
4. assist participants to explore a number of trades and technologies in great enough depth to allow participants to make concrete decisions about their potential in each occupation.

Rationale[1]

Orientation to Trades and Technology *has been created to meet several needs. The primary function identified for this material is as a guide for instructors of Women in Trades and Technology exploratory courses. Much of the material, however, could be used in a wide variety of courses, from entry level trades training to employment orientation, or job re-entry to foundations in business.*

Women in Trades and Technology courses have been developed to respond to some clearly identified issues. Even as women have sought expanded economic opportunities, their access to the vocational areas that fulfil requirements of economic sustenance, job satisfaction, and interesting, productive work in trades and technology have been limited. Traditionally, women's education has not provided the basis for training and employment in these fields, especially in light of the added pressure of operating in what has been perceived as a male domain.

"To learn to be a skilled tradesperson (or technologist), a trainee needs to have the aptitude to develop these skills." The word "aptitude" causes much confusion. It has several definitions, the most common of which is "a natural tendency or inclination" (*Webster's New World Dictionary*), giving rise to the fallacy that aptitudes are innate; that is, they exist naturally rather than develop...A more accurate definition of aptitude, used by those who develop measuring instruments which attempt to predict the potential success of a learner in a vocational field, is: "A condition or set of characteristics regarded as symptomatic of an individual's ability to acquire with training some knowledge, skill, or set of responses..." (author's emphasis: *Warren's Dictionary of Psychology*). Thus, aptitude is the potential to learn, and the potential to learn mechanical reasoning is developed through socio-cultural and educational institutions which provide opportunities for human-machine interactions and positive reinforcement for those deemed to have aptitude.

The assumption that males have the "innate" aptitude for skill development in these areas and that women do not has meant that little has been done to enhance or encourage girls' and women's potential in tool skill and mechanical reasoning.

> "Because mechanical reasoning is presumed to be innate and because the learners who enter trades and technology training are predominantly males who have developed a

[1] The quotes in this section are all from "Mechanical Reasoning and Women", an article by Susan Booth, November 1981. Reproduced here with permission.

repertoire of sensory information, theoretical insights, and associated problem-solving skills, most instructors design courses that assume a certain level of sophistication. Already women are disadvantaged or eliminated - not because they do not have the potential or the aptitude, but because they have not had the benefit of the antecedent exposure and experiences necessary for the integration of the new skills and knowledge."

Recognition that these hand-eye and thinking skills can be developed with training means greater opportunities for both men and women to enter fields of work that would have been closed to them as a result of the deficiencies in their earlier socialization and educational experiences.

"Thus, a learning environment needs to be established that will quickly and effectively facilitate the transfer of a woman's diagnostic and problem-solving skills from people-centred to mechanical devices. This can be done by addressing her needs to acquire experiences in the physical manipulation of tools and machines, gain sensory exposure to the sounds, smells, and feel of the industrial environment, develop a technical vocabulary, learn basic math and science concepts applicable to trades and technology, and overcome learned hesitancies and dependency. To create this environment, the following requirements must be addressed:

1. Transferability Potential

Of initial importance is the recognition on the part of both the instructor and the women of the mechanical skills and reasoning processes she has already developed; she does not begin with a clean slate. Within her background are many experiences from which she can build upon and transfer to the mechanical world. It's a matter of changing the mind-set from "I've never done anything like this before" to "I've done a lot of similar learning and what I need to do now is to make the connections between that to this". Tradeswomen who report no trouble reasoning mechanically consistently compare the process to cooking and sewing.

2. Generic Introduction

A wide variety of experiences which will develop sensory, motor, language, math and science skills appropriate to the skilled trades must be designed. Attuning the sensory receptors to the environment is accomplished through immediate hands-on work where she not only learns the basic

tool skills common to all trades and technology fields, but also develops a familiarity and appreciation of the touch and feel of industrial materials, the smell and noise of the tools and machines, and the visual impact of a well-finished product.

Physical exertion to the uninitiated happens rapidly and feels like an indecent assault on the senses, so she is given time to learn how to develop and use her body efficiently and effectively. She works on increasing her strength, flexibility and endurance, and appropriately matching the various facets of her kinaesthetic capabilities to the task at hand.

She acquires technical vocabulary and math and science concepts through theory and through direct application as she follows instructions and works to completion of a job. She becomes an active, independent learner when she begins to ask questions, reference resource materials, make decisions, initiate projects of particular interest and relevance to her own learning needs, and evaluate-the completed task in terms of its stated objectives.

3 . Mechanical Tinkering

Tinkering is an absorbing, self-paced, exploratory type of learning, which has as its goal to work and play with an object until an increased awareness and understanding of the essence of the object emerges. Women traditionally practise tinkering (also referred to as "puttering") in the kitchen or sewing room, so here again it is more a matter of facilitating the transfer of an already learned skill to a new application. Through mechanical tinkering, an intimate familiarity is developed wherein theoretical concepts are grasped, information is processed, and a power relation is established: the tinkerer gains mastery over a complex inanimate object.

Mechanical tinkering is most beneficial when it is scheduled into the learning environment as a skill module of its own so a woman can develop an appreciation of its educational benefits and a comfortability and facility with its unstructured format. Six conditions are necessary if tinkering is to be successfully formalized as a method of teaching mechanical reasoning:

a) sufficient time must be allowed for the learning to take place;
b) the learning is autonomous, with resource materials and people used only as a learner chooses;

c) the tasks must be of interest and of some degree of complexity;
d) observations are reflected upon and discussed or recorded;
e) the learner evaluates herself for what she has learned, assesses the quality of the work, and critiques and corrects any mistakes;
f) the transferability potential of the experience is noted.

When these requirements are present in a learning environment, women can quickly develop mechanical reasoning skills and competently learn to perform the work required of them by skilled trades and technology instructors and employers."

Women-only programming, constituency-based programming:

A number of studies have shown that learners live up to the expectations of the instructors of their courses (see the bibliography in the Math Anxiety unit). Also, there is the term "self-fulfilling prophecy," which means that learners live up to their own expectations, rather than their hopes. While we still have a culture in which many women have high hopes and low expectations and aspirations, it is essential that these women have the opportunity to develop their skills and abilities in a supportive group environment with other women. This is particularly true in our current situation in which 70% of the workers who will be in the workforce in the year 2010 are a part of the labour market today.

It is important that learners test out their learning in situations where they will be judged against themselves, rather than the man standing next to them who may be at a very different place in his development. Women at similar stages of learning, competing, and co-operating with each other can provide a healthy and productive atmosphere in which to grow. Once a woman has achieved some general mastery, she is then ready to enter regular technical training and employment on a more equal footing.

Everyone facing employment or change of employment in today's complex world also needs as much assistance as possible in identifying labour market trends, making career decisions, setting goals, and developing and projecting their abilities to successfully access training and employment in their chosen fields. Women, especially those who have been out of the labour market for long periods of time and those who have been stagnating in low-paying, dead-end jobs, need the additional benefit of exploration

and skill development in the specific areas of women and work. In particular, they need to develop strategies to overcome both internal and external societal barriers to gain success.

Women and men alike need to develop and practise assertiveness skills, understanding the difference between aggressive, assertive, and passive or non-assertive behaviour. All individuals with family and home responsibilities can profit from exploring ways to balance the requirements of home and work or training, ways to manage stress, and ways to identify and ensure appropriate childcare arrangements. Often, women benefit from developing and practising these skills in a supportive, single-gendered environment, before applying them actively in the regular world of training and work.

Women in Trades and Technology programs are exploratory in nature. They provide the opportunity for women to develop the necessary skills to make career and training decisions that will allow them to compete successfully in the world of work.

Program Goals and Objectives

Goals

The following goals are for an Orientation to Trades and Technology course and have been developed by the Provincial and National Advisory Committees:

1. to provide a safe, supportive environment that will enable women to develop the self-confidence and technical skills necessary for success in training and/or employment in trades and technology
2. to provide the life skills and assertiveness training necessary to enable women to compete successfully in training and employment
3. to assist women to develop an awareness of the full range of possible occupations in trades and technology fields
4. to provide labour market information, career planning, and job-search skills to assist participants in making informed career choices
5. to assist women to develop strategies for dealing with the multiple roles of working women
6. to provide basic academic upgrading in math, science, and communication skills to enable participants to pursue further training and employment options
7. to provide hands-on skill development with tools and equipment in a training shop setting for a wide range of trades and technologies
8. to provide hands-on work experience in industry to encourage a realistic consideration of potential work environments.

Objectives

The learning outcomes for this course are identified separately at the beginning of each unit. Each unit contains a series of series of specific learning objectives that guide student learning.

Assessment and Evaluation

The goals of this program indicate that this is an exploratory course with a great deal of affective as well as cognitive learning. Success should be determined not only in terms of the numbers of learners gaining employment at the end of the course but also whether learners have improved their employability skills, met the goals set, and taken steps to change difficult or self-defeating lifestyle situations. There are also less tangible aspects such as the impact of the course on college relations with the community (i.e., assisting in the development of skills in a group that had not participated effectively in college programs; increasing the profile of the college with employers and in the community at large, etc.).

Keys to the assessment of learner outcomes are built into the teaching strategies, and often include assessment by the learner as well as the instructor. There are also peer evaluation opportunities built into many cooperative learning activities.

Learner evaluation of the program should be a major factor and should include their perceptions on the usefulness of each aspect of the course, its impact on their development, the effectiveness of instructors, instructional techniques, scheduling, learning environments, etc. Part of this self-evaluation should be ongoing, through class discussion, and additional information should be available in the learners' journals. Much can be collated from questionnaires distributed at the end of the course.

Follow-up evaluations of learners should be done at six-month, one-year, and three-year intervals. These should include questions that explore the training and career decisions taken in the interim, the progress toward any goals set, and the satisfaction gained in working toward those goals. It is also important to ask learners to identify specific skills or areas of study that they feel should have been included in the course, and what specific barriers or blocks they have encountered since graduating that have hampered the pursuit of their goals.

The specific technical instructors involved in the course should be asked to evaluate not only individual learner progress, but also their own part in the entire program, including scheduling, effectiveness of specific units, their desire to participate in ongoing programs, etc.

The employers should be asked to evaluate the individual learner, and give their own perception of the effectiveness of the training experience they were able to provide, as well as comment on their willingness to continue to participate in the work experience.