Tuning Sector-Based Learning Outcomes

As a key component to a comprehensive research program, HEQCO initiated a Tuning project to identify and measure learning outcomes in specific "sectors" of postsecondary education (i.e., life and health science, physical science, and social science) in Ontario colleges and universities. The term "Tuning" refers to a process of bringing together individuals to articulate student learning outcomes. It is a bottom-up process of articulating expectations by those who are "on-the-ground" to ensure that the learning outcomes are relevant, appropriate and useable.

This document presents recommended competencies and learning outcomes for the life and health science, physical science and social science sectors in Ontario. It covers the four most common types of qualifications granted by Ontario's postsecondary system: the two-year diploma, the three-year diploma, the four-year honours bachelor's degree and the master's degrees (research-based).

Readers are encouraged to review the full report associated with this project, titled "Tuning: Identifying and Measuring Sector-Based Learning Outcomes in Postsecondary Education" (Lennon, Frank, Humphreys, Lenton, Marsden, Omri & Turner, 2014). The report outlines the goals, purpose and value of identifying learning outcomes, presents ways they can be incorporated into programs, discusses issues of assessment, and provides examples of how students can demonstrate achievement.

How to use this document

This document presents a table indicating the characteristics associated with activities typically undertaken by students at each of these qualification levels (see Table 1). These characteristics describe the context in which learning outcomes should be assessed. These are characteristics of the activities, rather than features of learning outcomes, including the degree of autonomy, degree of interdependence, etc. These characteristics are fundamental to understanding the differences in the credential levels and in understanding the broad skill sets of students and should be considered when reviewing any of the learning outcomes to fully understand the abilities of the student.

Six core competencies are presented for each qualification level, the first five of which are common to all three sectors: 1) Knowledge, 2) Critical and Creative Thinking, 3) Communications, 4) Social Responsibility, 5) Personal and Interpersonal Capacities, and 6) Practice and Methods (specific to each sector). In broad terms, the competencies, subcompetencies and student learning outcomes include the knowledge (what successful students should know) and skills (what successful students should be able to do) expected upon graduation.

These competencies reflect related clusters of learning outcomes. This categorization is not meant to imply a desire for "category-pure" learning experiences, but rather an attempt to communicate in a clear, if not slightly oversimplified, manner. The competencies are considered relative to each credential (that is, diploma or degree type) to arrive at learning outcomes that explicitly articulate the expected abilities of graduating students. These learning outcomes are presented within cells of a matrix, with credentials as columns and categories as rows.

Generally speaking, these abilities are viewed as incremental across the credentials. It must be acknowledged, however, that a degree is not simply a "diploma plus two years." Two-year diploma programs, for example, may include student learning outcomes relevant to the knowledge and skills that students acquire in specific programs that are not necessarily part of a four-year bachelor's degree. For example, work-integrated learning may be included in the curriculum of a college diploma that is not carried through as an outcome in a degree.

Finally, all learning outcomes reflect attainment. The outcomes are described in terms of abilities that students will be able to demonstrate upon completion of a credentials, but are not meant to capture the specific level of proficiency a student may demonstrate. These outcomes are not intended to be aspirational, but rather to benchmark the current expectations. We also note that some programs will have higher expectations in some of the learning outcomes.

Table 1. Characteristics of Qualification Levels*

CHARACTERISTICS	TWO-YEAR DIPLOMA	THREE-YEAR DIPLOMA	BACHELOR'S DEGREE	MASTER'S DEGREE
	Activities are well-defined and...	**Activities are broadly defined and...**	**Activities are complex and...**	**Activities are exploratory and...**
PROCESSES AND SCOPE	...have clear constraints and processes, limited scope and involve unambiguous information	...involve adaptation/extension of standard processes; may have loose constraints and/or involve conflicting information	...require abstract thinking where processes are not immediately apparent; have a wide scope; often involve ambiguous or uncertain information	...require abstract thinking where processes are not immediately apparent; have an open scope; often involve unknown information and constraints
REQUIRED KNOWLEDGE BASE	...involve using limited theoretical knowledge but extensive practical knowledge	...involve extensive practical knowledge as it relates to fundamental theoretical knowledge	...involve a focus on theoretical knowledge as it relates to practical knowledge	...involve extensive and current theoretical knowledge related to the research area
INTERDEPENDENCE	...involve discrete and self-contained problems	...involve elements of extensive problems	...involve multiple elements or sub-problems which are interconnected	...involve the extension of interconnected ideas and concepts
INNOVATION	...involve the use of existing concepts or processes in modified ways	...involve the use of concepts or processes in non-standard ways	...involve the creative use of principles and research-based knowledge in novel ways	...involve the creation of new knowledge or novel application of existing knowledge to new areas
AUTONOMY	...have prescribed goals and methods; activities supervised	...have goals and methods loosely prescribed and activities supervised	...require independent determination of processes and methods with periodic supervision	...involve conducting independent research with limited supervision

* Table 1 is adapted from Section 4.1 of http://www.washingtonaccord.org/IEA-Grad-Attr-Prof-Competencies.pdf

Table 2. Competencies and Subcompetencies

Characteristics of Qualification Levels (Two-Year Diploma, Three-Year Diploma, Bachelor's Degree, Master's Degree)

PROCESSES AND SCOPE	REQUIRED KNOWLEDGE BASE	INTERDEPENDENCE	INNOVATION	AUTONOMY

COMPETENCIES	SUBCOMPETENCIES		
1 KNOWLEDGE	1.1 Theory and Concepts 1.2 Numeracy	1.3 Limits of Knowledge and Qualification 1.4 Multidisciplinarity	1.5 Breadth of Knowledge
2 CRITICAL AND CREATIVE THINKING	2.1 Critical Thinking 2.2 Creativity	2.3 Problem Identification 2.4 Problem Solving	2.5 Analysis of Risks and Benefits 2.6 Evaluation
3 COMMUNICATION	3.1 Reading Comprehension 3.2 Writing Skills	3.3 Listening Comprehension 3.4 Presentation Skills	3.5 Discussion Skills 3.6 Graphical Communications
4 SOCIAL RESPONSIBILITY	4.1 Ethical Principles and Guidelines 4.2 Legal and Professional Responsibilities	4.3 Health and Safety 4.4 Social Awareness and Impact	4.5 Global Awareness 4.6 Environment and Sustainability
5 PERSONAL AND INTERPERSONAL CAPACITIES	5.1 Diversity and Respect 5.2 Teamwork	5.3 Personal Reflection 5.4 Self-Direction and Independent Work	5.5 Lifelong Learning

	LIFE AND HEALTH SCIENCE	**PHYSICAL SCIENCE**	**SOCIAL SCIENCE**
6 PRACTICE AND METHODS	6.1 Investigation/Research Methods 6.2 Ethical Research 6.3 Resource Material 6.4 Information Management 6.5 Formatting/Referencing 6.6 Relevance of Research 6.7 Practice 6.8 Interdisciplinary and Inter-Professional Practice	6.1 Tools, Instruments, and Equipment (Hardware and Software) 6.2 Design 6.3 Uncertainty 6.4 Troubleshooting 6.5 Models 6.6 Resource Management 6.7 Information Management	6.1 Research Methods 6.2 Ethics of Research 6.3 Methods of Analysis 6.4 Social Impact 6.5 Resource Management 6.6 Information Management