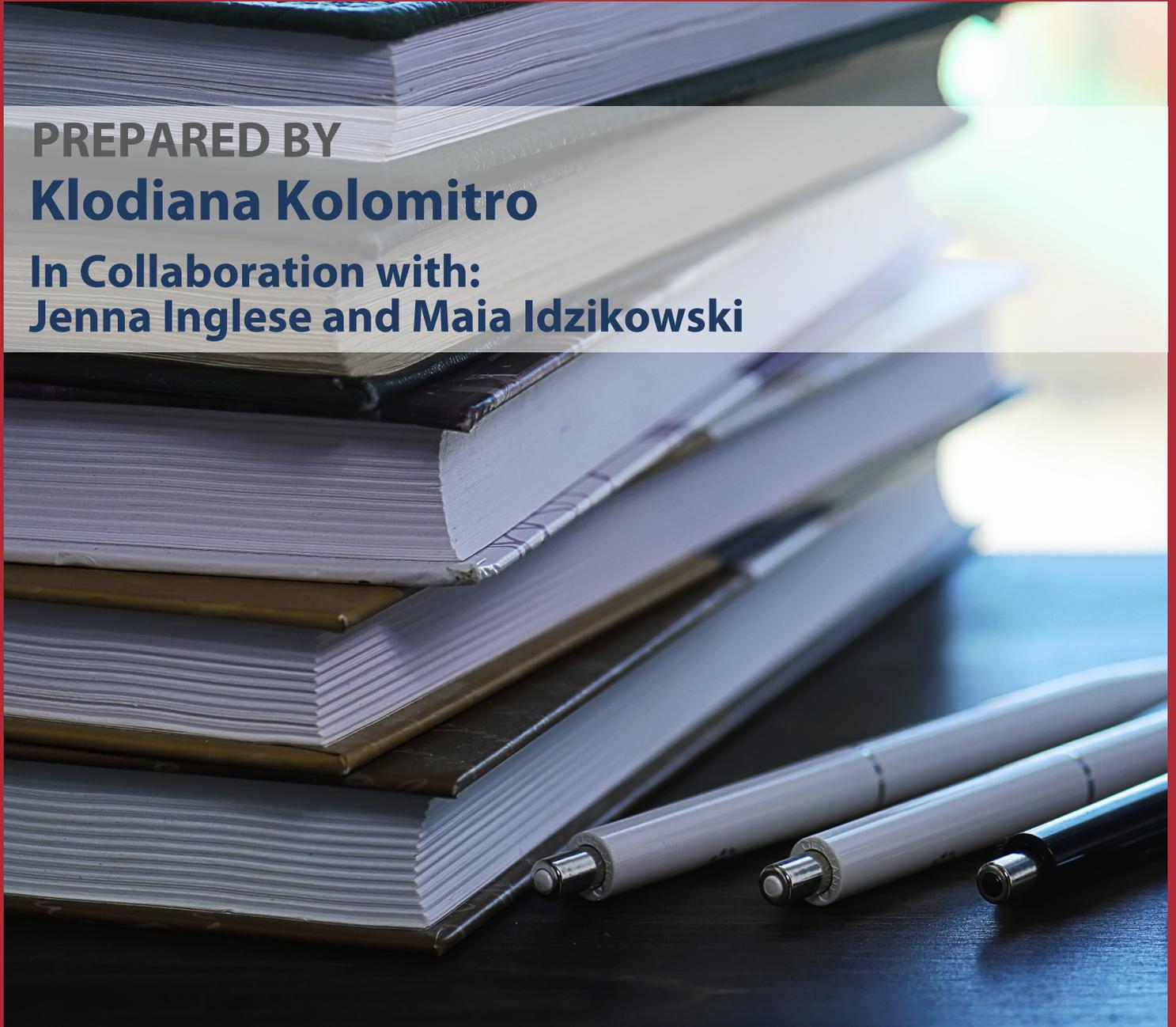


CURRICULUM DESIGN HANDBOOK

PREPARED BY
Klodiana Kolomitro

In Collaboration with:
Jenna Inglese and Maia Idzikowski



CONTENTS

Introduction	2
Overview of Handbook	2
Guiding Principles for Curriculum Development	2
Purpose: Curriculum Assessment	3
Framework	3
Set Goals - Making a Plan to Review Your Curriculum	4
Articulating Your Theory of Change	4
Program (Re)design	5
Vision & Mission	6
Teaching Philosophies: Conceptions of Curriculum	7
Considering Program Organization	8
Develop or Validate Program Outcomes	9
Aligning Program Outcomes and Course Outcomes	9
Tips for Writing Learning Outcomes	9
Taxonomies of Learning	12
Diversity in the Curriculum	13
Gather Evidence	15
Evidence-based Curriculum: Validating Data	15
Evidence-based Curriculum: Sources for Data Collection	15
Curriculum Mapping	16
Sample Curriculum Maps From Self-Studies at Queen's	17
Reflect: Questions to Consider When Creating Curriculum Maps	20
Revise and Reassess	21
Constructing Your Assessment Plan	21
References	22

INTRODUCTION

Overview

The Queen's University Centre for Teaching and Learning (CTL) developed this handbook primarily aimed at departments and faculty that require assistance in evaluating the possible answers to the question: "How is our curriculum enhancing the student learning experience?" Thus, the ultimate goal of this handbook is to support faculty in curriculum redesign in order to maximize student learning. With recent literature, theory and supporting resources, this handbook exists as a model that utilizes data to help you make informed curricular decisions.

Critical to our approach is the belief that curriculum is not static, but rather an ongoing conversation that is liable to change, thus continual redesign and renewal is crucial for curriculum evolution/development.

"Good novels, if we are ready for them transform us. Good curricula should have the same effect" Overly & Spalding, 1993

"Curriculum... is a design of Events that brings about conversion. Curriculum is not worth the journey if it does not convert those who participate in it into something better" -Schubert, 1991

Guiding Principles for Curriculum Development

How we make decisions about curriculum depends on our values and philosophies about curriculum, teaching and learning. At Queen's, the following principles help to guide the (re)design process:

- Collaboration and contribution among instructors
- Evidence-based Analysis
- Focus on student learning and enhancement
- Program-level perspective
- Continuous improvement

Our framework of change for curriculum development:



Purpose

Curriculum can be defined as a “web of interrelated and aligned activities” working together to achieve certain learning outcomes. Simply stated, curriculum is a “plan for learning” (Thijs & van den Akker, 2009).

Curriculum development is a multi-step, ongoing, and cyclical process aimed at designing an effective curriculum. For some departments/units the process is initiated following a program review; for others, their interest stems from the recognition that a revitalization of their current curriculum is needed or a new program needs to be developed.

Curriculum Assessment: A process of gathering and analyzing information from multiple sources in order to improve student learning in sustainable ways.

Curriculum is effective when it:

- Is viewed as a systemic and continuous activity
- Is viewed as a means for self-improvement
- Measures meaningful indicators of change
- Incorporates multiple indicators and sources of evidence
- Results in improving programs and processes
- Involves the participation and input of faculty, staff and students
- Focuses on the program, not on the individual performance of educators

Why assess curriculum? It can serve major purposes:

- To identify aspects of a curriculum that are working and those that need to change
- To assess the effectiveness of changes that have already been made
- To demonstrate the effectiveness of the current program
- To meet regular program review requirements
- To satisfy professional accreditation

Framework

Stage 1. Set Goals - Making a Plan to Review Your Curriculum

Stage 2. Develop or Validate Program Outcomes

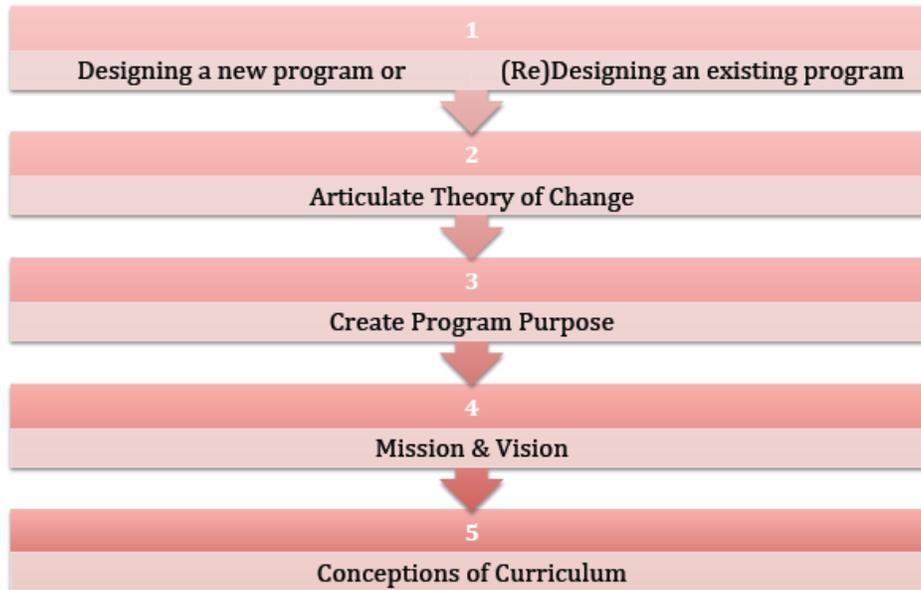
Stage 3. Gather Evidence (that those outcomes are effectively being taught and addressed)

Stage 4. Revise and Reassess

SET GOALS – MAKING A PLAN TO REVIEW YOUR CURRICULUM

Articulating Your Theory of Change

Are you designing a new program or redesigning a current program?



Theory of change:

Theory of change focuses on defining all of the necessary conditions that are required to bring about a given long term outcome. Theory of change processes uses backwards mapping requiring planners to think in backwards steps from the long-term goal to the intermediate and then early-term changes that would be required to cause the desired change. This creates a set of connected outcomes known as a “pathway of change”. The Centre for Theory of Change website explains that a “pathway of change” graphically represents the change process as it is understood by the initiative planners and is the skeleton around which the other elements of the theory are developed. According to Bamber and Stefani, research in higher education is increasingly being “asked to demonstrate impact to produce evidence for student learning” (2015). In order to evidence a value, articulating your theory of change is key along with using evidence as a discursive tool (2015). To begin drafting a theory of change, it may be helpful to identify an initial long term goal in the space below, as well as two shorter term goals that must be achieved in order to reach the long term goal. This process can be repeated as many times as necessary in order to achieve satisfactory program change and improvement.

Long term goal:

Short term goal #1:

Short term goal #2:

Program (Re)Design: Questions To Consider & Creating a Program Purpose

Why do we think we should review, evaluate, renew, or reform our program?

- Whom will you involve?
- What are the strengths of our current programs?
- What are the weaknesses? What do we think we can do better?
- What are the constraints to our development?
- Are there existing opportunities from which we might benefit (e.g., collaborations with other departments, the field)?
- What assessment methods are most appropriate?
- What kind of changes need to be made in order to enhance the student learning experience?

Developing a Program Purpose

- Why should students choose this program?
- How will it be of benefit to them?
- What is the purpose of the program?
- What unique areas of focus or strengths does the program offer?
- What learning experiences are core to the program?
- What are the strengths of our students? What are their misconceptions?
- Imagine three years from now, that the Globe and Mail has written an article about this program being the best in North America. What does the article highlight? What are students, faculty, alumni and employers highlighting about the program?

By answering as many of the above questions as applicable in the space below, you will be able to clarify the goals of your program redesign process. It is important to keep in mind the current program mindset and culture, while brainstorming the benefits and setbacks associated with the environment.

Vision & Mission

VISION: an image for the future of the department, a realistic, attractive FUTURE What is the program trying to accomplish?

Through what means?

For whom and for whose benefit?

What are our current strengths and of what are you proud?

What attracts students to this program?

Example:

The Schulich School of Medicine & Dentistry will be a global leader in optimizing life-long health through innovations in research, education and active engagement with our communities.

We will lead in:

- Creating knowledge in healthy development and aging across the life span from pre-conception to end-of-life, examining the underlying mechanisms of development and aging and how it is influenced by genetics and environment
- Translating knowledge across the research domains of basic, clinical, health services, policy and population health and in partnership with the communities of Southwestern Ontario, to benefit global health
- Embedding the science of healthy and successful development and aging into the education curriculum

MISSION: Why the school and program exist, its raison d'être, its unique role and contribution to academia, the profession and society.



Example:

Our Mission

The Schulich School of Medicine & Dentistry provides outstanding education within a research-intensive, distributed learning environment where tomorrow's physicians, dentists, health researchers and other scholars learn to be socially responsible leaders in the advancement of human health locally, regionally and globally.

Teaching Philosophies: Conceptions of Curriculum

John D. McNeil (2006), describes four different conceptions of curriculum; Humanistic, Social Reconstructionist, Systemic, and Academic, all of which outline curriculum designs and a purpose of education aligned with each conception. These, of course, are not the only conceptions about curriculum but provide example frameworks in literature that may guide you in your redesign process.

Conceptions	Curriculum Design	Purpose
Humanistic	<ul style="list-style-type: none"> • self-directed learning • teacher as facilitator 	<ul style="list-style-type: none"> • goals are personal growth, integrity, autonomy • provide learner with intrinsically rewarding experiences
Social Reconstructionist	<ul style="list-style-type: none"> • teacher and student take active roles in curriculum development (active learning) • focus on collaboration with the community and its resources 	<ul style="list-style-type: none"> • instrument for effecting social reform
Systemic	<ul style="list-style-type: none"> • outcome-based programs • prescribed goals with standards • assessments evaluate progress 	<ul style="list-style-type: none"> • aligns goals, standards, programs, and instructional materials with assessments for learning outcomes
Academic	<ul style="list-style-type: none"> • matching subject matter concepts and pedagogy 	<ul style="list-style-type: none"> • students have the opportunity to experience what research is like and to learn what counts as knowledge • inquiry-driven

John D. McNeil, Contemporary Curriculum in Thought and Action, 2006

You will bring these conceptions of curriculum into your teaching and contingent on the course subject, the size of the class and your own beliefs, you will be able to adopt and shift between particular conceptions that work best for you.

Considering Program Organization

There are numerous approaches to organizing programs. The design that you select should align with your teaching methodologies. A well-configured program should have alignment and scope, but also be sequential, continuous, and integrated.

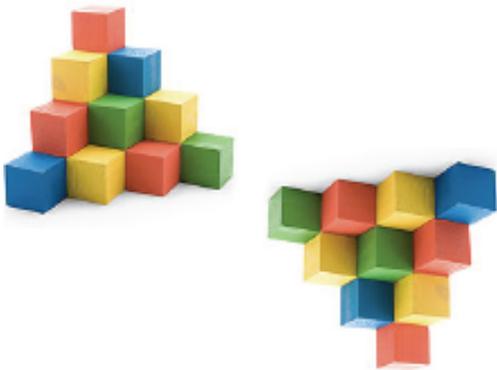


Spiral - the curriculum is organized around key concepts/skills that are introduced and revisited for deeper understanding as the learner moves through the program of study (University of British Columbia, MD Undergraduate Curriculum Renewal, 2014).

Modular - the basic idea of modularity is that at all levels, there should be the opportunity to choose and combine modules in different ways (therefore, choice and flexibility). These modules are relatively autonomous based around a limited number of objectives that the learner is expected to achieve. These objectives should be achieved within a clear and realistic time limit as the modular framework is built around the idea that the time and human material resources should be spent to achieve foreseeable results. The modules could be remedial or developmental.

(<http://www.learningpaths.org/papers/modules.htm>)

Module 1	Module 2	Module 3
Topic 1	Topic 1	Topic 1
Topic 2	Topic 2	Topic 2

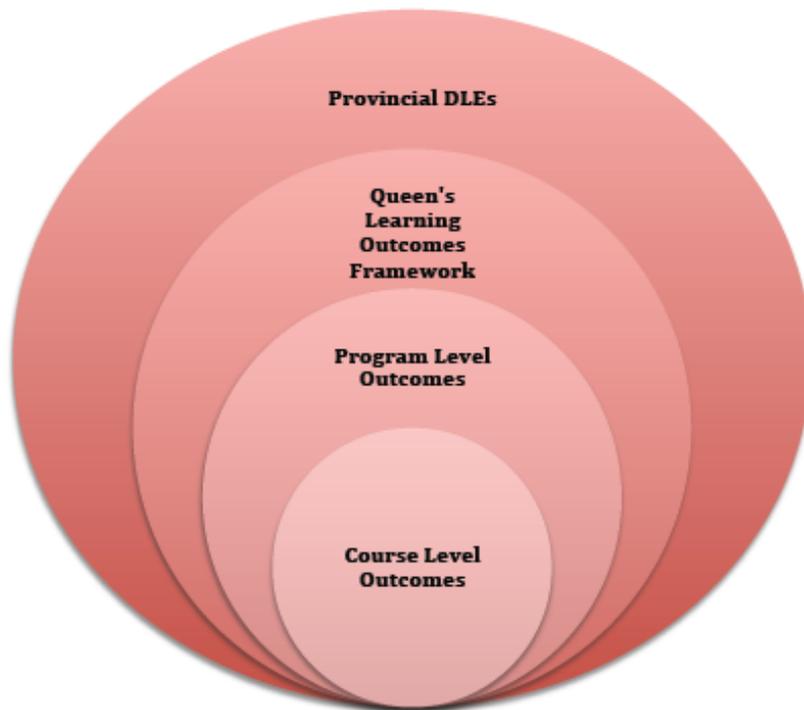


Linear - the linear model for curriculum proceeds in a sequential manner from beginning to end, in a hierarchical formation in order to build up skills. You start with facts and ideas and gradually build on those. You could also start with a problem and build upon the skills required to solve it. (Cambridge International and Examinations, 2013)

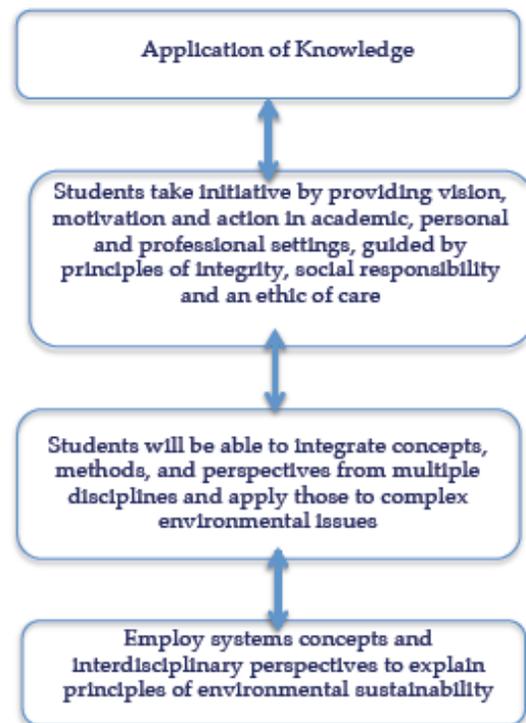
DEVELOPING OR VALIDATING PROGRAM OUTCOMES

Aligning Program Outcomes & Course Outcomes

Course learning outcomes describe course-specific knowledge, skills and habits of mind a student will have to be able to demonstrate as a result of their experience in the course. At the program level, courses should be organized to form an integrated and coherent curriculum based on the intended course learning outcomes. Accordingly, each academic program must articulate how the program of study addresses each of the Degree Level Expectations.



EXAMPLE:

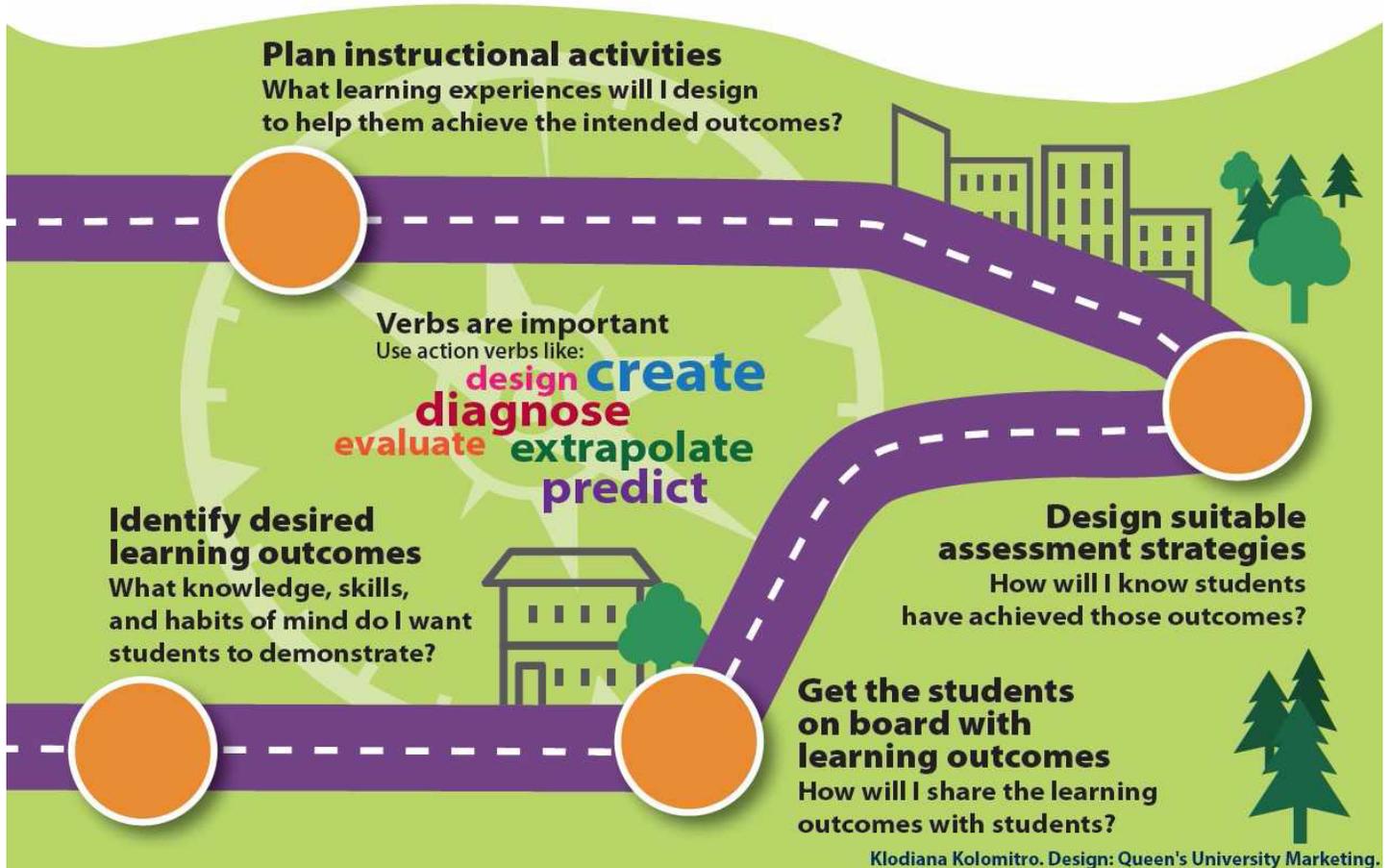


Writing Effective Learning Outcomes

Learning outcomes are direct statements that describe the knowledge, skills, and habits of mind that students are expected to reliably demonstrate after a learning experience.

Learning Outcomes

Learning outcomes are direct statements that describe the knowledge, skills, and habits of mind that students are expected to reliably demonstrate after a learning experience.



Answering the following questions will aid with identifying and refining learning outcomes. This process can be repeated to examine both course learning outcomes and program level outcomes, while keeping in mind the Queen's learning outcome framework and the degree level expectations. For a full guide on writing effective learning outcomes, refer to Centre for Teaching and Learning's Guide on Learning Outcomes.

Writing Effective Learning Outcomes:

Learning outcomes describe learning that is essential and enduring; learning that really matters in the long term and what students need to know after they have forgotten the details of the course. Learning can be described in either future tense – to be achieved for a new course or program, or in past tense – learning that has been achieved for accreditation or academic review processes (Gosling & Moon, 2002). In its simplest expression, a learning outcome consists of a direct statement that often starts with: "Successful students will be able to" plus an action verb indicating the level of learning that is intended plus a statement providing disciplinary context and identifying what the learner will be able to do as a result of the change. This applies to both course and program learning outcomes although course outcomes are more specific.

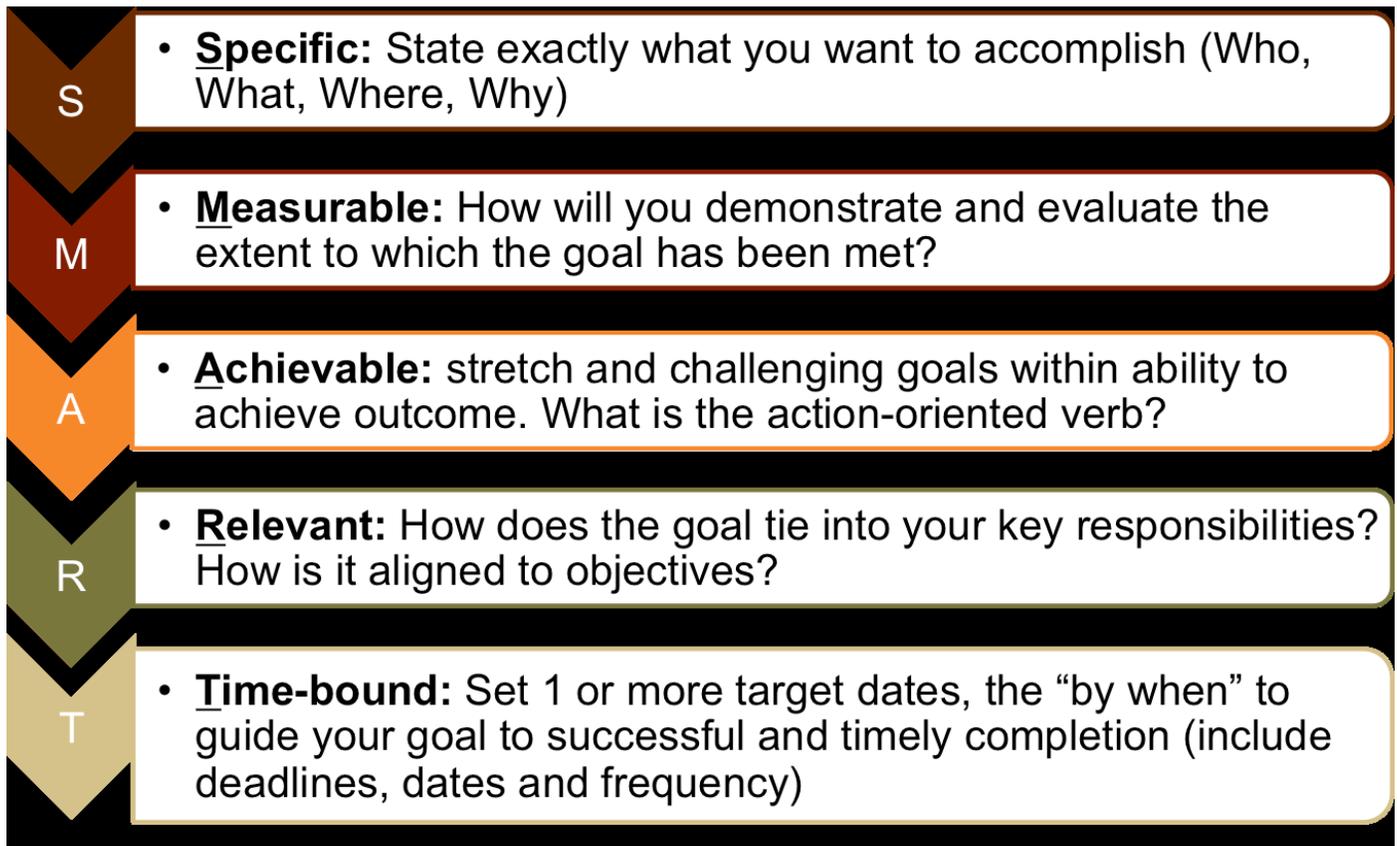
What knowledge, skills, and habits of mind do I want the students to demonstrate?

How will I share the learning outcomes with students?

How will I know that students have achieved these outcomes?

What learning experiences will I design to help the students achieve these outcomes?

Learning outcomes must be SMART:

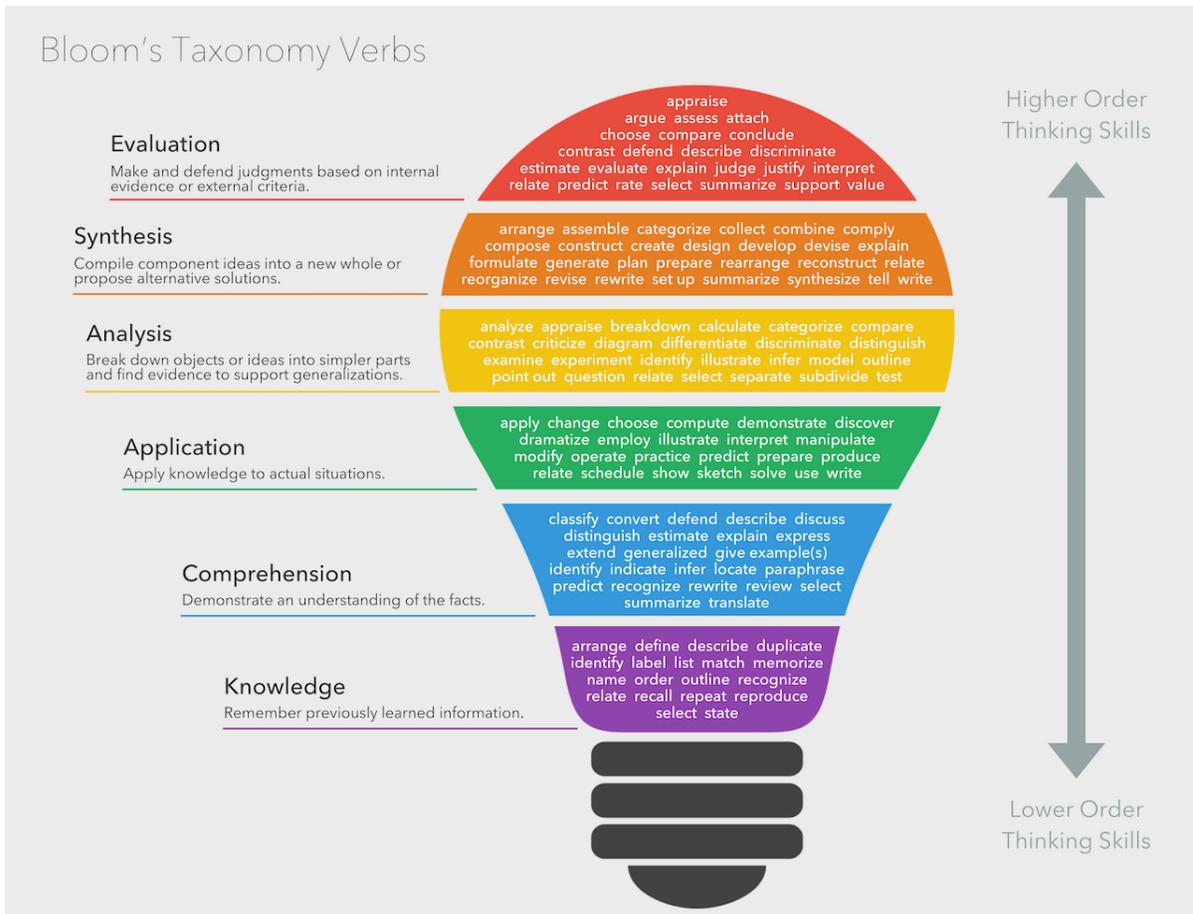


Taxonomies of Learning

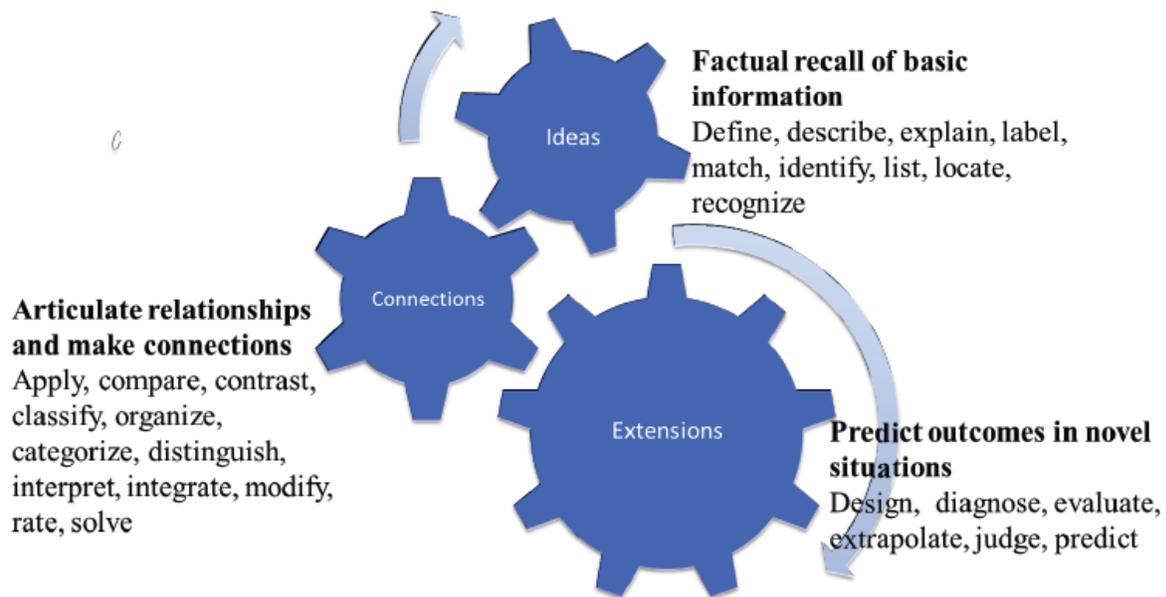
Bloom's Taxonomy

Within each of the domains, Bloom's Taxonomy of the Cognitive domain describes an ascending order of levels of complexity in thinking and learning. The taxonomy is hierarchical, and for students to achieve the higher order stages, they first need to perform at the lower levels. For example, in order for students to apply knowledge, they need to first understand it. The above diagram offers a list of verbs, students' activities and products to describe learning at different levels – this may be a useful paradigm in articulating learning outcomes. Each of the taxonomies have been explained below:

- **Remembering:** The student exhibits memory of knowledge and material through the ability to recall and identify facts and basic concepts.
- **Understanding:** The student exhibits the ability to organize, describe and explain a concept using their own words.
- **Applying:** The student can apply knowledge in order to solve problems and adapt to new situations.
- **Analyzing:** The student exhibits the ability to further break down the knowledge and use evidence to support hypotheses.
- **Evaluating:** The student demonstrates the ability to form opinions and support their beliefs through data and analysis. The student can also evaluate the quality, validity and accuracy of information.
- **Creating:** The student can use their knowledge to synthesize new information and build upon the concepts they have learned in order to form a deeper level of knowledge.



ICE Model



(Wilson, 1999; Fostaty Young & Wilson, 2000)

The ICE framework represents the gradual progression and growth of the learner towards deeper understanding. Ideas are the fundamental, discrete pieces of information that make up the building blocks of learning. Connections are the relationships that students form among ideas, whereas extensions are the new learning and application of knowledge to new situations (Fostaty Young and Wilson, 2000).

There are many taxonomies of learning (eg. Bloom's, ICE framework, and SOLO taxonomy to name a few), but if none of those resonates with you, you can create your own frame of learning.

Diversity in the Curriculum

Why do we aim to practice inclusive and responsive teaching?

When learning, we all draw on past experiences and current knowledge in order to create connections and bring material into long-term memory. When looking at the learning process, it is evident that personal background and context is a driving force when interpreting and connecting with new knowledge. People make connections through what they already know, using that knowledge as a lens and context through which they view new experiences and process new information. Thus, inclusive and responsive teaching, coupled with an environment that is accepting and welcoming of diversity is of utmost importance, especially in a postsecondary setting where the breadth and depth of content expands (Association of Schools of Journalism and Mass Communication, http://www.asjmc.org/resources/diversity_booklet/5_curriculum.pdf). The goal is to create a culture of learning where everyone involved is aware and respectful of differences.

When designing assessments, it is important to consider that various students will approach learning differently. Rather than have students write a final exam worth a large portion of their mark, assignments throughout the year that appeal to different approaches to learning would be beneficial. For instance, many First Nations cultures pass down knowledge through storytelling. Perhaps an assessment based on storytelling or presentation format would be appropriate in order to learn about course material and First Nations simultaneously. Additionally, marking rubrics could also be interpreted in different ways. In the storytelling example, it would be vital to keep in mind that not all students have the same presentation style. For example, students should not be penalized when giving a presentation if their delivery is soft-spoken and less 'enthusiastic'. Overall, assignments that encourage students to think critically and engage with course material in a more meaningful way that is also connected to diversity not only develops traits of acceptance, but also of critical thinking and inquiry as well. Useful resources include the Queen's Equity and Human Rights Offices as well as the DEAP (Diversity Equity Assessment and Planning) Tool.

In the space below, it would be beneficial to identify one learning outcome that reflects inclusive and responsive teaching.

What does inclusive and responsive teaching look like in your classroom or in your unit?

What are some things you do personally or have observed that help create an 'accountable' or 'brave' space?

GATHER EVIDENCE

Evidence-Based Curriculum: Validating Data

Where is the Data Coming From?

Analyzing and validating data sources ensures diverse sources of information, which will make evidence more reliable. So, who are the stakeholders you should consider gathering information from?

- Undergraduates (all years)
- TAs
- Graduate Students
- Alumni
- Colleagues from similar programs elsewhere
- Employers
- Faculty
- Staff
- Professional Associations
- Other

Sources for Data Collection

- Curriculum mapping
- Focus groups, surveys or other means of gathering evidence (students, alumni, TAs, faculty, employers)
- Student artifacts (portfolios, projects, other products; performance, demonstrations)
- 'Model' programs elsewhere
- Others
- For samples of surveys to send to students, refer to Appendix A

Sample Alumni Survey

1. What year did you receive your degree from [] Program at Queen's University?
2. One year after you graduated from the Program, what was your employment? Or, if you were pursuing further education, what was it?
3. What is your employment now? Or, if you are pursuing further education, what is it?
4. The program was designed to build skills in the following areas. To what extent did the program help you develop the following: (List the program learning outcomes on a scale/continuum from 'to a great extent' to 'not at all')
5. Reflecting back on your studies, please indicate the extent that the following experiences contributed to your learning: (List experiences on a scale/continuum from 'to a great extent' to 'not at all')

- 6. Is there any other skill or knowledge area that you wish this degree had better prepared you for?
- 7. What learning experiences or aspects of the program have been most beneficial to you post-graduation?
- 8. What learning experiences or aspects of the program have been least beneficial to you post-graduation?
- 9. What changes (if any) would you recommend for [] Program?
- 10. Is there anything else about your experience in the Pattern II Program that is not covered in this survey and that you would like to comment on?

Analyzing Data

What general trends do you see in the data?

What data most surprised you? Why?

What are some of our strengths? How about areas for improvement?

Curriculum Mapping

Curriculum Mapping is the process of associating course outcomes with program-level learning outcomes and aligning the different elements of courses within a program, in a coherent and purposeful way that enhances student learning (adapted from Harden, 2001). When designing a curriculum map, it is best to create two maps: one referencing the current curriculum 'as is', and the second outlining the desired curriculum.

A Curriculum map is a visual that shows how curriculum flows through your program. It captures and records which learning outcomes are being addressed where in the program and how (at what level of sophistication).

Why map the curriculum?

- Promotes curriculum involvement
- Creates a pictorial of the way we work- “A picture is worth a thousand words”
- Gives faculty members a better understanding of how their course is linked to other courses in the program and to the overall program outcomes
- It helps us understand and communicate your existing curriculum, and establish a baseline for improvement
- Reveal gaps as well as redundancies in the curriculum
- Increase faculty collaboration and congeniality

Guiding questions to begin the curriculum mapping process:

1. Which program-level learning outcomes are being most/least emphasized?

2. How is learning progression encouraged for each learning outcome?

3. Where are the gaps and redundancies in this program?

4. What recommended areas of focus would you have for future curriculum discussion?

Sample Curriculum Map

Why map the curriculum?

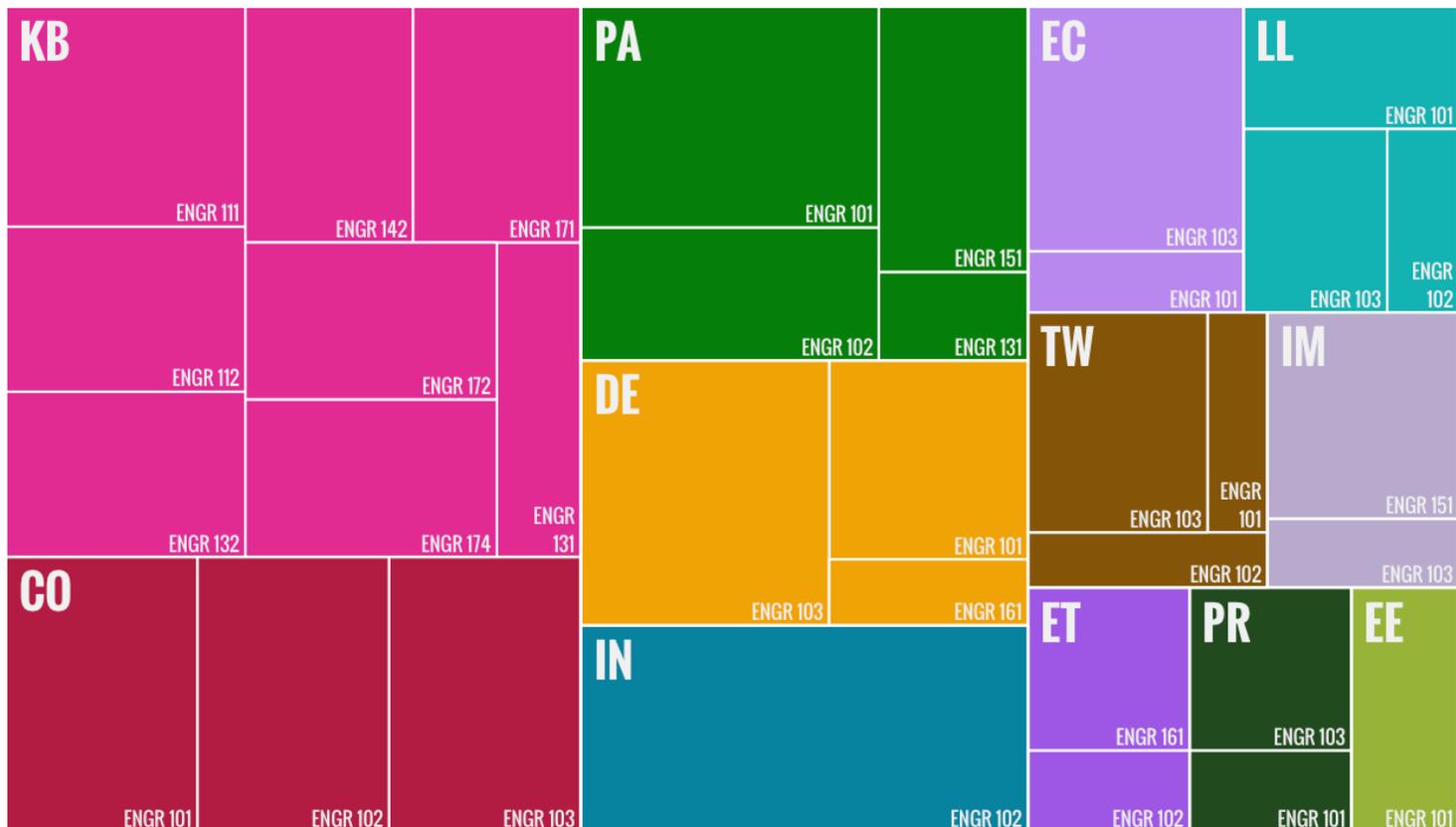
- Promotes curriculum involvement
- Creates a pictorial of the way we work- “A picture is worth a thousand words”
- Gives faculty members a better understanding of how their course is linked to other courses in the program and to the overall program outcomes
- It helps us understand and communicate your existing curriculum, and establish a baseline for improvement
- Reveal gaps as well as redundancies in the curriculum
- Increase faculty collaboration and congeniality

Example 1: Course Outcomes Mapped to Program Outcomes

Program Learning Outcomes	Course Learning Outcomes	X-100	X-107	X-340	X-450
Relate, explore, and evaluate the influences of many of the major fields in this discipline.	1.1 To relate the practice of health promotion with the social determinants of health.	C			
	1.2 To explore various concepts that affect physical health, aside from exercise and nutrition, in order to learn about new ideas and how they impact physical health.	I	I, C	E	
	1.3 To recognize and define key concepts in public and population health.			C, E	E
2. Conduct and apply multidisciplinary, independent research and analysis using a range of theories and approaches.	2.1 To conduct and apply principles of scientific research to develop a research proposal on a health-related topic.			C, E	
	2.2 To apply the principles of knowledge translation and knowledge mobilization tools in order to promote knowledge exchange between researchers and practitioners.				E
	2.3 To appreciate the different applications of qualitative and quantitative methods in the study of global health.			C, E	
3. Communicate accurately and reliably in an oral, written, and visual format to a range of audiences.	3.1 To research and report on appropriate health promotion information in order to demonstrate research and writing skills	I, C	C	C	E
	3.2 To articulate the variety of theories of addiction and their role in problem definition	I			E
	3.3 Effective listening and speaking skills in order to facilitate effective communication		I	C	E

Example 2:

Curriculum Mapping: Assessment Approach by Graduate Attribute:



Data Integration

- NSSE
- School of Graduate Studies (Flow-throw)
- CGPSS
- Baccalaureate Graduate Outcomes
- Others (to be used to address your concerns or support your claims)

Questions to Consider When Creating Curriculum Maps

How do these results align or conflict with other curriculum assessment results?

What instructional/assessment strategies are we most/least using? How well are they working?

How are the instructional and assessment methods used in the courses congruent with the discipline?

What learning outcomes are we most/least emphasizing?

How do our instructional and assessment strategies align with the intended learning outcomes?

How does student learning progress across the program for each of the learning outcomes?

How could student achievement of the learning outcomes be better supported through this progression?

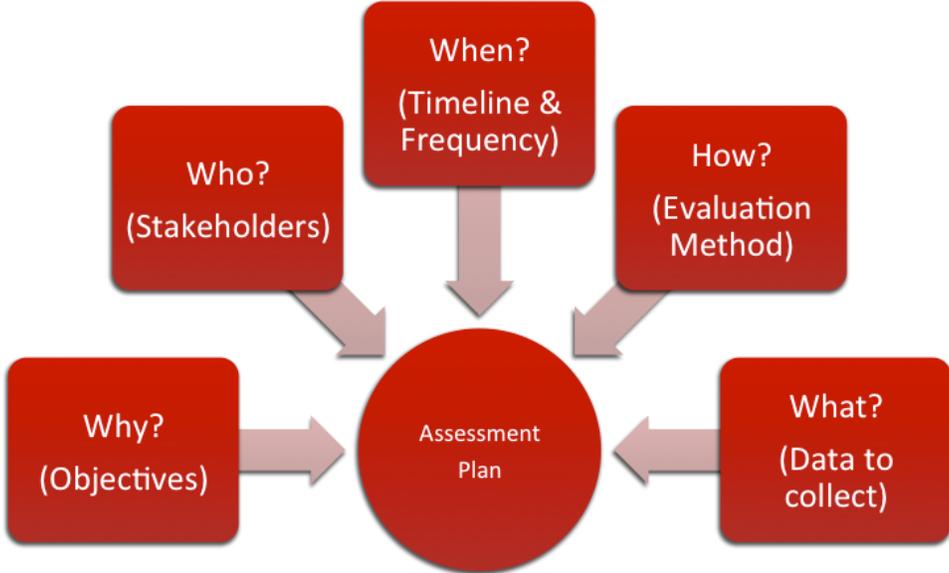
How is student workload distributed across the semester?

According to your flow through data what has been the demand for your program?

REVISE AND REASSESS

Constructing Your Assessment Plan

Developing reliable and sustainable means of gathering evidence of student learning is an essential component of curriculum design. An assessment plan would be beneficial.



Why? Objectives	Who? Stakeholders	What? Data to Collect	How? Evaluation Method	When? Timeline & Frequency
To identify where learning outcomes are taught and assessed in the curriculum	Faculty	Collect information on where, when, and how learning outcomes are being taught and assessed	Curriculum mapping	Every 4 years
To identify graduate students' perspectives related to the curriculum	Graduating students	Program strengths and weaknesses; recommended program changes	Exit groups and surveys	Annually

REFERENCES

- Anderson, L.W., & Krathwohl, D.R (Eds.). (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.
- Bamber, Veronica & Stefani, Lorraine. (2015). Taking up the challenge of evidencing value in educational development: from theory to practice. *International Journal for Academic Development*. doi: 10.1080/1360144X.2015.1100112.
- Biggs, J., & Collis, K. *Evaluating the Quality of Learning: the SOLO taxonomy*. (1982). New York: Academic Press. Brock University. (2012). *Academic Review Questionnaire: Current Undergraduate Students, Current Graduate Students, Undergraduate Alumni, and Graduate Alumni*.
- Cambridge International Examinations. (2013). *Moving from Modular to Linear Qualifications: A Guide for Teachers*. Retrieved from: <http://www.cie.org.uk/images/149738-moving-from-modular-to-linearqualifications.pdf>.
- Carlton University, Office of the Provost and Vice-President (Academic). (n.d.). *Learning Outcomes, Bloom's Taxonomy*. Retrieved from <https://carleton.ca/viceprovost/assessment-of-learning/learningoutcomes/blooms-taxonomy/>.
- Association of Schools of Journalism and Mass Communication. (2012). "Diversity in the Curriculum". 2012. Retrieved from: http://www.asjmc.org/resources/diversity_booklet/5_curriculum.pdf.
- Fostaty Young, S. (2005). Teaching, learning and assessment in higher education: Using ICE to improve student learning. *Proceedings of the Improving Student Learning Symposium, London, UK, 13, 105-115*.
- Fostaty Young, S., & Wilson, R.J. (2000). *Assessment and learning: The ICE approach*. Winnipeg, MA: Portage and Main Press.
- Henderson, C., & Quardokus, K. (2012). Department-level change: Using social network analysis to map the hidden structure of academic departments. *Physics Education Research Conference 1513, 170-173*.
- Humber College. (2016). *Pathways to Human Rights, Education and Actions*. Retrieved from: <http://www.humanresources.humber.ca/human-rights-equity-diversity/trainingprograms/pathways-to-human-rights-education-and-actions.html>.
- Kolomitro, Klodiana. (2015). *Developing Effective Learning Outcomes: A Practical Guide*. Queen's University.
- Mariani, Luciano. (n.d.). *Teaching the Modular Way: A Few Notes on Modularity in Language Teaching*. Retrieved from: <http://www.learningpaths.org/papers/modules.htm>.
- McNeil, John D. (2006). *Contemporary Curriculum in Thought and Action*. New Jersey: John Wiley & Sons, Inc.
- Meyer, C. B., & Stensaker, I. G. (2006). Developing capacity for change. *Journal of Change Management, 6(2), 217-231*. doi: 10.1080/1469701060069373.
- Quardokus Fisher, K., Smith, C., Sitomer, A., Ivanovitch, J., Bouwma-Gearhart, J., & Koretsky, M. (2016). *Identifying Features of Engineering Academic Units that Influence Teaching and Learning Improvement*. American Society of Engineering Education (ASEE) Annual Conference.
- Queen's University Equity Office. Retrieved from: <http://www.queensu.ca/equity/home>.

Queen's University Human Rights Office. Retrieved from: <http://www.queensu.ca/humanrights/home>

Senge, P. (1996). Rethinking leadership in the learning organization. *The Systems Thinker*, 7 (1), 1-6.

Texas A&M. (2014). Program (Re)Design For a Learner-Centered Curriculum. Current Student Survey Sample.

Trowler, P., Saunders, M., & Knight, P. (2003). *Change thinking, change practices*. York: Teaching & Learning Support Network – Generic Centre.

University of British Columbia, MD Undergraduate Curriculum Renewal. (2014). What is a Spiral Curriculum? Retrieved from: <http://cr.med.ubc.ca/what-is-a-spiralcurriculum/>.

University of Calgary. (2015). Analyzing Curriculum Mapping Data: Enhancing Student Learning Through Curriculum ReDesign. 17.

University of Waterloo, Centre for Teaching Excellence. (n.d.). Curriculum Mapping. Retrieved from: <https://uwaterloo.ca/centre-for-teaching-excellence/supportfaculty-and-staff/curriculum-renewal/design-and-development/curriculummapping>

Willness, Chelsea & Bruni-Bossio, Vincent. (2017). The Curriculum Innovation Canvas: A Design Thinking Framework for the Engaged Educational Entrepreneur. *Journal of Higher Education Outreach and Engagement*, 21 (1).