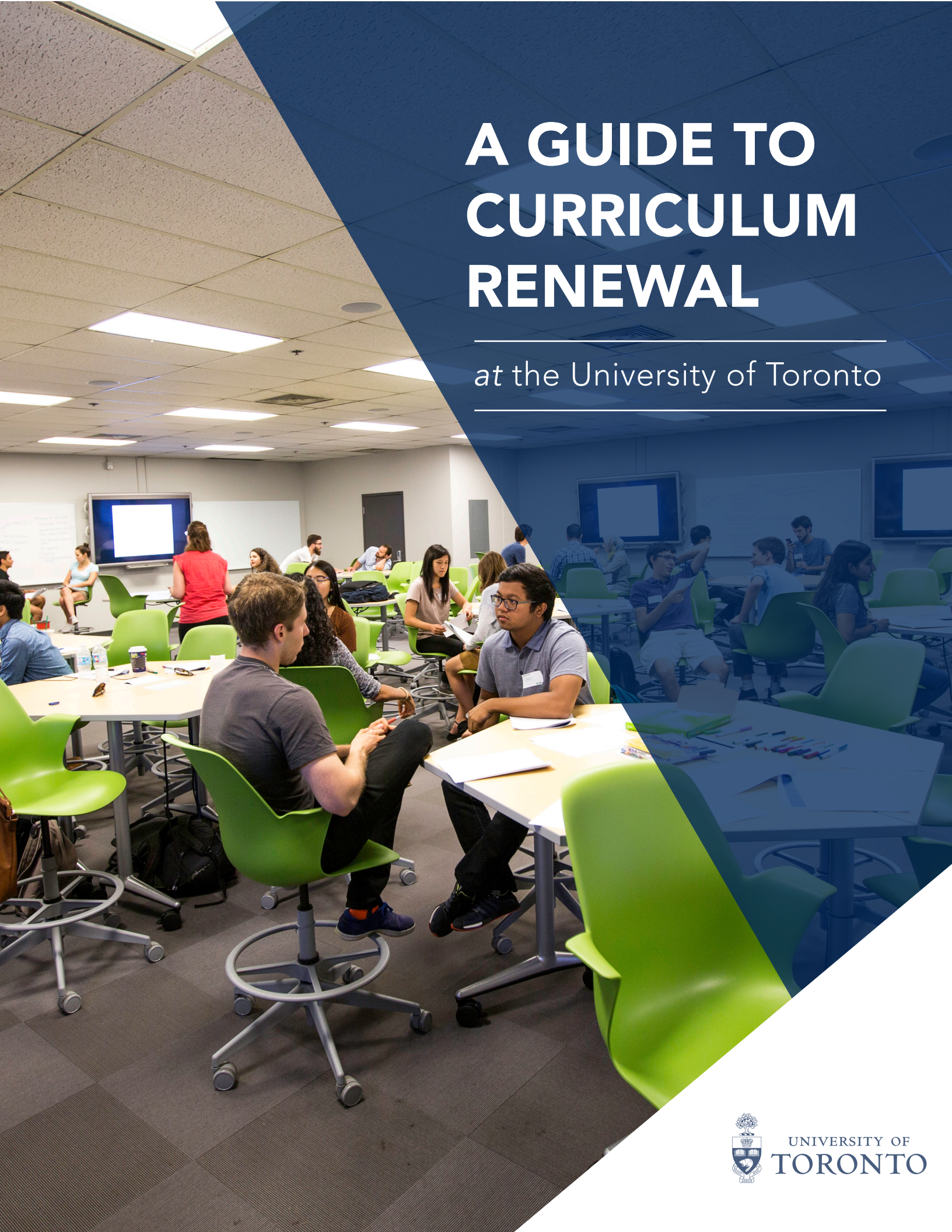
A GUIDE TO CURRICULUM RENEWAL

at the University of Toronto



UNIVERSITY OF TORONTO

A Guide to Curriculum Renewal at the University of Toronto

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Introduction

Curriculum renewal, as the term is used in this guide, refers to an initiative undertaken by a Faculty or unit that seeks to evaluate, analyze, and/or improve some element of a program's curriculum. There are many entry points into curriculum renewal, for example an external review, enrollment concerns, a shift in departmental priorities, or the creation of a new program. The initiative might involve a whole program, a collection of courses (e.g. all second-year courses), or the whole Faculty. A Faculty or unit may be interested in investigating the development of specific student skills (e.g. critical thinking or communication) within a program, and that, too, would be considered curriculum renewal.

Regardless of how a unit comes to curriculum renewal, it is important to keep in mind that renewal is *not* a fixed process that must be followed, step by step, in its entirety for a project to be successful. Curriculum renewal is an iterative process – a unit may find, once outcomes have been established, that it is necessary to revisit data collection, or it may be beneficial to further refine the program vision at that point, and so forth. A unit may decide that program visioning, or curriculum mapping, are not steps that need to be taken. There is no one correct way to approach curriculum renewal and there is no such thing as a perfect curriculum renewal process. A unit may discover questions that would have been convenient to address at the beginning, but were not thought of, or there may be unexpected complications at certain points in the process. However, there will also be unexpected insights discovered throughout the process, and new interests sparked as a result. The driver for curriculum renewal may be to fulfil a specific goal (e.g. preparation for program review), but ideally engagement of faculty, students, and staff with the program's curriculum as an ongoing process of continuous improvement will keep the program relevant and impactful.

There are two main themes underpinning the renewal process in this guide – backwards design, and alignment. Backwards design, a concept adapted for the educational context by Wiggins and McTighe[1], refers to the development of programs, or courses, or lessons with the end goals of the experience in mind. In other words, a developer considers the expectations for students before designing elements of the program, course or lesson. Given that concept, the renewal process starts by asking what a program will prepare graduates for.

Alignment, using the term broadly, refers to two primary theories that were developed near the beginning of the new millennium - John Biggs' constructive alignment[2], and L. Dee Fink's integrated design[3]. Both theories address the principle that there should be coherence between the intended learning outcomes of an educational experience (for example, a course or program), and the assessments and teaching strategies implemented to demonstrate the achievement of those outcomes. In other words, the learning outcomes are developed based on the end-goal of the course or program, the assessments in a course or program are developed to help students achieve the learning outcomes, and the teaching and learning activities (e.g. class discussions, practice exercises, etc.) are developed to help students prepare for the assessments. In summary, backwards design informs what a program (or course, lesson, etc.) should focus on by identifying what students need to be able to do/know/etc. by the end of the experience, and alignment ensures all the components support students' progress toward and achievement of those end goals.

UTQAP Connection

Curriculum renewal intersects with requirements of the University of Toronto Quality Assurance Process (UTQAP). Throughout this document, "UTQAP Connection" boxes highlight these intersections to allow units to streamline their efforts wherever possible.

Guiding Principles for Curriculum Renewal[4]

The renewal process should include *contributions from and collaboration among instructors*.

This could include:

- Collaborative, faculty-led examination of a program
- Participation on a review team of full-time faculty members
- Participation in analyzing information and developing an action plan
- Consultation with instructors, which could include sessionals

The renewal process should be *evidence-informed*.

Possible information sources for analysis of the curriculum:

- Course results (student grades, performance on assessments, etc.)
- Curriculum maps
- Enrollment statistics in a program or particular courses
- Student consultation (surveys, focus groups)
- Alumni surveys
- Instructor consultation

***Focus on student learning* is essential.**

Considerations include:

- Development of students' learning experiences throughout a program
- Student-centred teaching and learning activities across program
- Opportunities for significant learning experiences (e.g. research opportunities, experiential learning opportunities, etc.)

Any renewal should be in the context of an *examination of the program as a whole*.

Considerations include:

- Examining courses in the context of how they contribute to program level student outcomes
- Considering course sequence, scope, teaching and learning activities/assessments, and how these contribute to students' overall learning experience

***Continuous improvement* is an essential feature of curriculum renewal.**

This means that curriculum renewal should take into account:

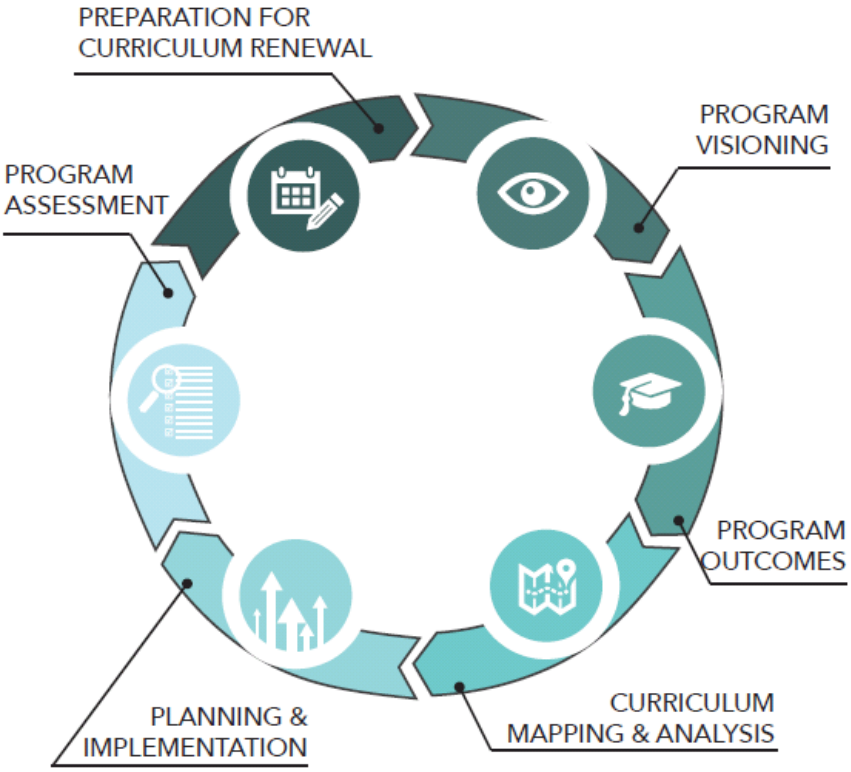
- How often a curriculum review will be conducted
- Iteration – review is part of normal practice, not a one-off event
- Maintaining momentum and faculty engagement

UTQAP Connection

Regardless of what prompts curriculum renewal, changes to programs resulting from the "renewal of a program in order to keep it current with its academic discipline" constitute a "major modification" under the UTQAP and are implemented following governance approval of a "major modification" proposal. The creation of an entirely new program also requires a proposal under the UTQAP. Contacting your Dean's Office early in the renewal process will allow you to work out timelines for implementing changes and to assemble the information required for proposal approval as you move through the renewal process. The principles listed above inform required elements of UTQAP proposals.

Overview of the Curriculum Renewal Process

There are several different models for the process of curriculum renewal, but most processes have common elements or stages. A unit creating a new program, or approaching an external review, may find it useful to progress through each step in the process; however, each unit can determine the appropriate path of entry based on the scope and priorities of their project.



Preparation for Curriculum Renewal

Before a unit begins to make changes to a program's curriculum, it's important to consider who and what to consult to determine what changes will improve the curriculum. What information do you need to make well-grounded decisions about the curriculum?

Program Visioning

Considering the vision of the program is helpful in articulating the program's identity, which contributes to the creation of outcomes and establishes the overall focus of the curriculum. What is the program trying to accomplish?

Program Outcomes

Create program-level outcomes to articulate the specific expectations a unit has for a graduating student. Program outcomes translate the goals and purposes of the program into concrete expectations. What should your students know and be able to do by the time they graduate?

Curriculum Mapping & Analysis

Curriculum mapping provides an analytic framework to establish how elements of the curriculum relate to the program outcomes. What is the program curriculum currently doing well? What needs improvement?

Planning & Implementation

The analysis stage will have revealed areas for improvement in the curriculum which should result in curricular change. Before planning changes in specific courses, consider an overall pedagogical strategy for the program. What change is needed to make the program curriculum effective?

Program Assessment

Assessment is the process of collecting, analyzing and evaluating information from multiple and diverse sources in order to develop a deep understanding of student learning within a course, series of courses, or program. How do you know the program curriculum is doing what it is intended to do?

Other Considerations

Timing & Scale

As a metaphor, consider a house renovation project. Depending on the issues with a house, the time available, resources, patience, etc. the home owners would decide on the scope of the renovation project - they might choose to simply patch holes and put on a fresh coat of paint; renovate one or two whole rooms; or, bulldoze the whole house and rebuild from the ground up. House renovation is a helpful metaphor to consider when deciding on educational reform, described by Garfield Gini-Newman and Roland Case in their book *Creating Thinking Classrooms: Leading educational change for a 21st century world*[5]. Depending on the state of the curriculum, the time the department has to make changes, the resources required and available, and so on it may make sense to revise a course or two to address a specific issues within the curriculum; overhaul a section of the curriculum (e.g. several second-year courses); or, completely reinvent the entire curriculum. Even though it may be exciting to imagine a completely re-envisioned curriculum, that route may not be a feasible option. It is important for a unit to consider what they have the time and resources to accomplish before getting too far along in the renewal process.

Leadership Models

Curriculum renewal may require the commitment of the department at large, but facilitation of the process requires strong leadership from one or several people to keep the initiative moving. The following is a list of possible leadership/facilitation models that the unit could consider:

- **Program leader:** a Department Chair, Associate Chair, or Program Director may elect to take the lead on a curriculum renewal project as part of their leadership or administrative duties for the department.
- **Faculty member:** a faculty member, with the support of the Chair and/or Associate Chair, may volunteer or be assigned the task of leading a curriculum renewal initiative. This option will likely include course release to accommodate the workload, or the leadership role may count as the faculty member's service to the department.

- **External facilitator:** if it is not feasible for a faculty member or someone else within the department to take on the role of facilitating the process, it may make sense for the department to hire a facilitator externally or seconde someone for the duration of the process.

In all models, it is useful to have a committee of faculty and staff to consult with and support the renewal process. If the unit has a standing curriculum or program committee, it may make sense to have one act in this capacity, if feasible. If there is no pre-existing committee, it may be worthwhile to form at least one for the duration of the process. A guiding principle is that curriculum renewal is not a ‘spectator sport’. It necessitates the engagement of leaders and faculty from the unit.

Preparation for Curriculum Renewal

The first stage in the curriculum renewal process is dedicated to establishing the context of the program, and seeking feedback on the program from a variety of sources and stakeholders. When designing a course, it is important to review situational factors that may impact the success of the course so that they can be kept in mind throughout the design process.[6] Situational factors might be things like the number of students, students' reasons for enrolling, or the instructor's prior teaching experience. Similarly, reviewing program-level situational factors is an important step for the success of the curriculum renewal process. What is the unit's motivation for undertaking curriculum renewal? What are similar programs doing? What are students' perceptions of the learning experiences offered within the program? Are there any courses within the program that students struggle to complete?

The amount and extent of research and consultation needed to prepare effectively for a curriculum renewal project depend largely on the scale and scope of the project. A unit that is planning to completely overhaul their entire curriculum will need more extensive preparation than a unit that is planning to review the development of a few key skills across the second year courses in a program. Given that, it is important to establish goals for the renewal project, and from those goals determine the parameters of the research and consultation needed to move forward with the project.

Establish Drivers for Research

Before getting started, consider what kinds of information will help the unit make well-grounded decisions about the curriculum, specific to the scope of the initiative. Framing this thinking in the form of questions may help drive the preparation stage. What goals does the unit have for curriculum renewal? Why is change necessary? What are the best ways to engage faculty, students, and other stakeholders in the renewal process? What internal data will help the unit better understand the context of the program? What external data will help the unit better understand the context of the program? Who should be consulted with to compile feedback on the program?

Once goals have been established, consider documenting the driving questions in a shared file that can be referenced as needed, or used as an organizing structure for the findings.

Review External Data (Environmental Scan)

- Review of similar programs nationally and internationally (on-par and ideal)
- Input from non-governmental organizations (e.g. associations, employer/host surveys, non-profits, think tanks, etc.)
- Reports from disciplinary and other associations
- Review of research landscape (e.g. recent discoveries, new directions, etc.)

Review Internal Data

- **Application data** - provides information about the kinds of students who are currently drawn to the program
- **Enrollment data** – provides demographic information about students so the unit knows who is taking the program (gender, age, program(s) of study, year of study, part-time / full-time, domestic / international, commuter / non-commuter, etc.)

- **Course evaluation data** - provides information about students' perceptions of the extent to which the institutional core teaching and learning priorities were part of their overall learning experiences within their courses
- **Grades** – provides information about which courses students typically perform well in versus average or poorly
- **Drop / withdrawal / fail rates** - provides information about course completion patterns
- **Student satisfaction survey data** - provides information about students' satisfaction with aspects of their program, department and/or the university
- **Graduation and retention rates**[7] - provides information about how many students successfully make it through the program (and at what points students leave the program, if applicable)

All of these data can help paint a picture of students, their experience, and how they enter and move through the program. Basically, how 'successful' the program is through particular lenses.

Consultations

The preparation phase should include diverse consultation to get a wide variety of perspectives on the program.

- **Current students and alumni** – run surveys, focus groups, and/or other forms of consultation to garner feedback from students and alumni on their experience and satisfaction with the program. It is also useful to find out more about what alumni have done since completing the program and what elements of the program they have found relevant to their life, work, or post-graduate studies.
- **Faculty** – while faculty will be involved in the substantive phases of the renewal process, it is also useful to engage with them during the preparatory phase to learn what they consider the strengths, weaknesses, opportunities, and challenges of the program.
- **Staff** – although not as directly impacted by curricular matters as students and faculty, unit staff play a significant role in the administration of the program. It is useful to garner feedback early in this process on how the current curriculum features into their work, what impressions they have of it (particularly if they work with students), and how changes to the curriculum may influence the work they do to support the unit, the program, and the students.
- **Disciplinarily cognate units/programs** – review similar programs within the unit and connect with other units that offer similar or related programs to learn what works best for them. What have they found successful? What have they found challenging? In what ways are the programs similar, and what makes them distinct?
- **Structurally cognate units/programs** – it can be helpful to look at what works well in programs that have a similar structure to the unit's program, but belong to different disciplines. For example, if the unit is interested in creating a new graduate program with a variety of fields or concentrations, it would be useful to connect with another unit within the university or beyond that offers a graduate program with a variety of fields or concentrations to learn what benefits and challenges that structure offers.
- **Graduate or professional programs** – If the program has a graduate-level or professional counterpart, it is helpful to consult with the leaders of those programs – especially if the undergraduate program is helping to prepare students for those graduate programs. Consulting with graduate or professional programs can help to establish a point of distinction for content or skill level (e.g. where should the undergraduate program leave off, and where should there be useful overlap?), and it can also help to learn what gaps (in content, skill, and attitude) may exist at the level of admission which the undergraduate program should address.

Departmental Research Inventory

In what ways do the research endeavours of the faculty – disciplinary and those related to teaching & learning – impact the curriculum? Are there current areas of expertise that are not being utilized in the curriculum that could be valuable? Are there gaps in the alignment between research areas and teaching requirements that may indicate a need for future hires? Is it possible to build student research opportunities into the curriculum based on the faculty members' projects?

UTQAP Connection

Because the review of external and internal data, consultation with faculty, students and staff, and consideration of faculty research in relation to the undergraduate and graduate curriculum are hallmarks of the requirements of the UTQAP cyclical review process, and specifically of the self-study, it may make sense to leverage this required process to support curriculum renewal. Consult the schedule of reviews and the Dean's Office to determine if the timing can be aligned.

Program Visioning

Early in the renewal process, it is useful to bring faculty and staff together to discuss the overall values of the program, the purpose of the program, the key approaches to teaching and learning, and the nature of the learning environment. Ideally, this discussion will be informed by the analysis completed during the preparation step.

The following is a list of questions compiled by the University College Dublin Teaching & Learning unit to guide discussion on the purpose and values of a program. The examples in the table have been adapted to suit the context of higher education in Ontario.

Question	***Examples***
What are the current trends and potential future developments that might have an impact on the purposes of the program?	International student mobility; size and growth of domestic education systems; student characteristics
Based on these, what is/are the key purpose(s) of the program, including who it is aimed at?	*Purposes:* Subject specialization, internationalization, inter-disciplinary engagement, active citizenship, widening participation, employability, building partnerships and networks, etc... *Aimed at:* students with an interest in a career in science; practitioners in a specialized field
What do you value most, individually and collectively, in the discipline/subject/profession?	Theoretical perspective, professionalism, identity with subject, historical perspective, competent designers, problem-solvers, specialist knowledge, empathy, ethical behaviour, scientific approach, evidence-based practitioners
What are the core educational values in the program?	Autonomous student learning; opportunities to learn from peers; work experience; thinking reflectively; social-awareness; curiosity; dedication; motivation; student commitment to their studies
What is the nature of the learning environment?	Strong laboratory component; 50% of work is on-line; work placements integrated into the program; year abroad encouraged; studio work is key throughout; clinical skills laboratories in early years; lectures aligned with seminars; tutorials are the primary approach
What are the key teaching, learning and assessment approaches that reflect the collective values?	Group work; problem-based learning; simulations; critical writing; debates; case-based assessments; student presentations; essays; online multiple choice questions

Table 1

A unit may want to consider gathering the whole department for a half-day or day-long program or curriculum retreat at this stage in the process. A retreat is beneficial for a number of reasons, including:

- Time for a comprehensive review and analysis of the findings from the data gathering, research, and preparation stage
- Deeper engagement with discussions about the goals and purpose of the program
- Getting into a different environment may help the unit focus on program visioning

It can be useful to marshal the discussion points into the form of a vision and/or values statement - a statement can provide not only focus for the discussion, but can be used on the department's website or other informational materials to provide context for prospective students, new faculty, and other institutions. To illustrate, here is the program intent from the Department of Statistical Sciences at the University of Toronto, which outlines the vision of their undergraduate programs:

> Statistical Science encompasses methods and tools for obtaining knowledge from data and for understanding the uncertainty associated with this knowledge. The purposes of the undergraduate programs are to: (1) equip students with a general framework for obtaining knowledge from data; (2) give students skills that they are able to flexibly apply to a variety of problems; and (3) to provide students with the ability to learn new methods as needs, data sources, and technology change.
>
> Students in the major and all specialist programs of study in statistics will acquire core learning outcomes in statistical methods, theory, computation, and communication. The three specialist programs are distinguished by the depth of the outcomes in each of these areas. All of the programs of study prepare students for employment as a statistical scientist or for graduate studies in statistics or related disciplines. The distinctive aspects of each of the specialist programs provide particularly strong preparation, not typically achieved through undergraduate programs in statistics at other institutions, for specialized employment or graduate study opportunities. In particular, the mathematical rigor of the Specialist Program in Statistics ensures excellent preparation for advanced graduate studies in statistical theory and methods. The Specialist Program in Applied Statistics provides outstanding scientific training for collaborative work in industry or research, and preparation for post-graduate work in statistics, biostatistics, or a concentration discipline where the students' quantitative expertise will prepare them to make potentially unique contributions.

Consider a hypothetical unit, the Department of Scandinavian Languages and Literatures. The Scandinavian Department found, during the preparation stage, that students in their undergraduate Swedish Studies program need more research skill development. The information collected during the consultation process provided the following perspectives: a number of the program's past graduates who went on to graduate programs indicated they felt unprepared for the work that was expected of them; several employers confirmed that the graduates of the program generally lack the ability to gather and analyze information at a satisfactory level; and, a number of the faculty responsible for teaching upper-year courses suggested that many students have a difficult time completing research papers. Given the emphasis placed on the importance of research by multiple types of stakeholders, and the concerns that surfaced regarding the effectiveness of the current curriculum to adequately provide students with opportunities to develop the requisite skills, it would be worthwhile for the unit to make research a part of the program's goals, and perhaps its vision. With that in mind, the Scandinavian Department revised the Swedish Studies program vision to the following:

> The Swedish Studies program offers students a comprehensive exploration of Swedish language, culture, literature, and politics. The curriculum consists of a variety of language, literature, and culture courses designed to prepare students to conduct research in a variety of areas within the discipline. Graduates of the program will be prepared for work in many areas – for example, work in translation, graduate studies abroad, government work, tourism, international relations, and so forth. The Department of Scandinavian Languages and Literatures is known for its intimate class sizes which

allow fruitful interaction between students and their peers, as well as with instructors. The Department is also known for its strong relationships with government agencies, employers, and researchers in Sweden. Students in the program can take advantage of an exchange program with the University of Stockholm to work on research projects in various sectors in the city.

UTQAP Connection

A 200 word “Program Description” is required for all new program proposals. The visioning process described captures all of the required elements.

Program Outcomes

The work put into establishing the vision, purpose, and goals of the program should help provide direction for creating program outcomes. Basically, it is necessary to take those goals and translate them into tangible, 'measurable' outcome statements. Biggs and Tang[8] describe an outcome as

> …a statement of how we would recognize if or how well students have learned what is intended they should learn…[it] tells us what, and how well, students are able to do something that they were unable, or only partially able, to do before teaching. Good teachers have always had some idea of that…in outcomes-based teaching and learning, we are simply making that as explicit as we can – always allowing for unintended but desirable outcomes.

Biggs and Tang were referring to course-level outcomes in this quote; however, the principle is relevant to outcomes at any level. It is important to make explicit our expectations about what we want students to take away from a course or program. The last part of the quote is especially important – it is not possible to anticipate or account for everything a student is going to learn, and that is not what learning outcomes seek to do. The purpose of outcomes is to make the expectations and priorities clear, with the knowledge that there will be other things students take away from courses and programs.

Advantages of Learning Outcomes

- **Transparency to students** - outcomes statements (at the program, course, or lesson-level) articulate expectations for students, which helps them understand the focus of the experience, and what will be required of them.
- **Focused and strategic teaching and assessment planning** - by articulating what students should be able to accomplish by the end of an experience, other elements of the experience can be strategically aligned with those outcomes.
  Outcomes can be the driver for:
  - Assignments and tests
  - Choice of instructional mode
  - Choice of course content
  - Assessment and feedback
  - Accreditation or program assessment
  - Curriculum development
- **Better learning and better performance on assignments and tests[9]** - while this influence is indirect, the relevance driven by the alignment and transparency noted above leads to more focused and motivated work on the part of students, which improves performance on assessments.
- **Meeting internal requirements** (UTQAP) and external requirements (e.g. professional accrediting bodies) - internal and external quality assurance processes require units to have program outcomes and show how the program has been designed to support those outcomes.

Challenges and Limitations of Learning Outcomes

- **Reductionist** - by nature, outcomes are meant to be straightforward, active, and 'measurable' (i.e. assessable); therefore, they cannot easily capture amorphous, big-picture goals (e.g. developing a love of learning). As addressed earlier in the section, learning outcomes should be used with the acknowledgement that they cannot capture all learning that happens in a course or program.

- **An exclusive focus on measurement is results or product-oriented** - program outcomes are focused on the end goal of an experience, and therefore neglect what students take away from the process of achieving that end goal.
- **Can be perfunctory if not engaged with in a meaningful way** - it is entirely possible to write a list of outcomes just for the sake of it. Unless outcomes are tied to assessment, and are used to drive teaching and learning methods, they do not serve a real purpose.
- **Potentially challenging learning curve** - orienting course design to a learning outcomes framework is a different way of thinking about a course for many instructors, which requires time and practice to feel comfortable.[10]
- **Orienting and educating students on outcomes** - understanding learning outcomes statements is not necessarily intuitive, so it often takes a bit of work to walk students through outcomes so they understand how to read them and make use of them.

In program planning, outcomes should be aligned, or connected, with divisional and institutional goals, and with the Degree Level Expectations established by all University of Toronto divisions. Further along the renewal process, the program outcomes will be aligned with course level outcomes, as described in the introduction to this guide. The program outcomes are specific enough to explain how those broad expectations are accomplished within a given program, and course outcomes will specify what expectations an instructor has for the course, which are related to one or more program outcomes.

In the previous section, a sample vision statement was provided for the Scandinavian Department. The unit established that research needed to be a priority for the Swedish Studies program, and consequently made research a priority in the program vision. Now that the unit is determining learning outcomes for the program, they recognize the need to have one or two outcomes related to research skills to ensure the expectations for graduates represent the vision of the program. Starting from the broadest level, the DLEs, the unit would determine which expectation category is the most appropriate representation of the goals related to research (see the Vice-Provost, Academic Programs' website for more information on the DLEs). Here's an example of how the Scandinavian Department might break down the research goal at different learning outcome levels:

Level	***Example***
Institution-Level Outcome (i.e. UDLE category)	Knowledge of Methodologies
Program-Level Outcomes	Students will be able to use research within the field to make evidence-based decisions
Course-Level Outcomes	Students will be able to critique the findings of a peer reviewed academic article

Table 2

Note: the Scandinavian Department might have additional program outcomes related to research, and in turn would have several more course-level outcomes present in a variety of courses that would align with the full suite of research-based program-level outcomes.

It is unnecessary to think about course-specific outcomes at this stage in the process. However, when creating program-level outcomes, it is useful to think about how students might demonstrate achievement of them - e.g. by the time they graduate, what will they have done throughout the program to show that they're able to use research within the field to make evidence-based decisions? Perhaps they will have created solutions for mock clients based on research findings. Perhaps they will have taken on a field research project with a faculty member and a team of students. Etc.

See Appendix A for examples of program outcomes.

UTQAP Connection

Any program that has been through a UTQAP process (review or academic change) likely already has established learning outcomes. It will be essential to use those as a starting point in the curriculum renewal process and to document any changes to the learning outcomes as part of the "major modification" proposal. The Dean's Office can provide previous UTQAP self-studies or proposals containing these learning outcomes.

Curriculum Mapping & Analysis

Once program outcomes have been established, it can be helpful to assess how well the curriculum meets or supports those outcomes. Curriculum mapping provides an analytic framework for better understanding how the skills and subject matter currently, or potentially, embedded within individual courses contribute to the established program-level outcomes of a program.

Curriculum mapping is "the process of associating course outcomes with program-level learning outcomes and aligning elements of courses (e.g. teaching and learning activities, assessment strategies) within a program, to ensure that it is structured in a strategic, thoughtful way that enhances student learning."[11] In other words, mapping provides a global view of how elements of the curriculum relate to the program outcomes.

If the unit is revising an existing program, mapping consists of associating courses with program outcomes. Mapping the curriculum (which could be just core required courses, or core and elective courses) allows units to identify curricular gaps, where outcomes are not currently being taught and/or assessed, and curricular redundancies, where outcomes are taught in multiple courses without a rationale for the overlap.

In the case of new program development, or where a program is making significant changes, it may not be optimal for a unit to associate the new outcomes with the existing curriculum. Instead, it may make more sense to create a curriculum map to guide the development of new courses. In this case, the program outcomes would be used as the starting point for considerations of course alignment (implementing the concept of backwards design that was described in the introduction), and units would build the curriculum from the end of the program to the beginning. In other words, start with the advanced courses where students would demonstrate mastery of the program learning outcomes, and work backwards through the students' development to the introductory courses. Starting with the end point in mind helps to ensure that 1) students leave the program with the appropriate level of mastery, and 2) students are given appropriate opportunities throughout the entire curriculum to develop skills and knowledge before demonstrating mastery of the outcomes near the end of the program.

Typically, curriculum maps are structured with the learning outcomes along one axis and the courses along the other axis (see Table 3). At the cross-section of each line (consider a cell in Excel), the unit would note whether or not that program learning outcome is addressed in that course, and use an alpha or numerical code to indicate the level of development of the outcome within that course (the code for the sample map is outlined below). It can be helpful to have course outcomes to complete a curriculum map, but in the absence of those, instructors will need to articulate the main course goals.

It is important for units to understand that each outcome should NOT be addressed in every course - in fact, a well-balanced curriculum would likely see a maximum of three or four outcomes addressed in a given course.

Sample Curriculum Map

I = Introduced[12]: The learning outcome is explicitly introduced in this course; teaching and learning activities focus on basic concepts and skills with entry-level complexity.

D = Developed: The learning outcome is explicitly developed or reinforced in this course; teaching and learning activities focus on enhancing and strengthening existing knowledge and skills, as well as expanding complexity.

P = Proficient: Students explicitly demonstrate graduation-level proficiency or mastery of the learning outcome in this course; teaching and learning activities focus on the use of content or skills at multiple levels of complexity.

Pgm. Outcome	***LO1***	***LO2***	***LO3***	***LO4***	***LO5***	***LO6***	***LO7***	***LO8***
Course101	I							
Course102			I	I		I		
Course103	I	I	I		I		I	I
Course104		I			I			I
Course105			D					
Course201	D		D					
Course202		D	D	D		D		D
Course203					D		D	
Course204								
Course205						D		
Course301	D	D		D			D	
Course302								
Course303	D		D					
Course304						D		
Course305								
Course401	P			P				D
Course402			P					
Course403		P			P		P	
Course404	P							P
Course405			P					P

Table 3

Sample questions to prompt analysis:

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 discussions?

Curriculum mapping can be used as an opportunity to track more than just courses and outcomes. Since the unit is taking the time to gather data on the program as a whole, it is a great opportunity to track other elements of the curriculum that might be of interest to the unit. For example, it may be beneficial to know what courses provide students with research experience (field or other); or, it may be helpful to learn which courses involve other kinds of significant learning experiences, such as field work, writing intensive assignments, and so forth. Units can use mapping as a chance to pull together information to complete the picture of the curriculum for analysis.

UTQAP Connection

UTQAP new program proposals require proponents to map out how courses and other requirements support program learning outcomes and Degree Level Expectations.

Continuing with the Swedish Studies program example, the department has decided to find out 1) how well the current curriculum supports the new program outcomes related to research, 2) what types of assessments students currently complete related to research, and 3) what instruction students are given related to research. The completed curriculum map showed introductory level exposure in one second-year course, and proficient-level exposure in several fourth-year courses. The department decided to drill a bit further into the specifics of those courses to assist their analysis. The chart below provides an example of how the unit might gather and record that information:

Learning Outcome: Students will be able to use research within the field to make evidence-based decisions

Course	Outcome Coverage	Instructional Methods	Assessments
Course203	I	Lecture on research strategies Class discussion	• Weekly quizzes – one lesson dedicated to research strategies • Mid-term exam – several multiple choice questions and one short open-response question related to research strategies • Final exam – several multiple choice questions related to research strategies
Course402	P	Seminar – mixture of lecture and student presentations Class discussion	• Weekly 2-3 page reading response with at least one additional reference • 10-page paper on an elected topic that requires students to have min. 8 sources, at least 5 of which must be peer-reviewed
Course404	P	Seminar – mixture of lecture and student presentations Class discussion	15-page paper on a specified topic that requires students to have min. 5 sources, all of which must be peer-reviewed

Course405	P	Independent study – instructor sets certain readings and student selects other options; student conducts independent research over the course of the semester.	Guided research project: • Project proposal with annotated bibliography • Mid-term check in (in-person interview where student discusses project) • Final report (15-20 pages) with references

Table 4

From this information it appears that students are given at least one opportunity to demonstrate mastery of the learning outcome, but arguably the opportunity in Course405 offers more in-depth experience than Course402 and Course403. The lesson in Course203 is helpful, but the assessment methods may not be the best way to determine whether students have a proper introductory understanding of research strategies since they do not involve students testing out any strategies per se. Most significantly, there does not appear to be any instruction or assessment related to research between second year and fourth year, which means that in the current curriculum, students will reach research-intensive fourth year courses with potentially minimal research skills. It could be inferred that this gap reduces student preparedness and interferes with the ability of the instructors of advanced courses to set projects at a sufficient level of difficulty and depth.

See Appendix B for resources on curriculum mapping.

Weather Station Courses

Mapping is a useful opportunity to identify "weather station courses" where several outcomes are addressed, courses that all students take, or other courses that are especially significant to students' progress within the program. The benefit of having weather station courses in the program is they allow a unit to do a manageable check-in on student progression and development. It is very difficult to track student progress for every outcome and every course, so weather station courses make program assessment more efficient. In the sample map, courses such as Course103, Course202, Course301, and Course403 have the potential to be effective weather station courses.

Reviewing Evidence of Student Learning

A review of student work is a useful way of analyzing how well students are performing in the program, and gauging to what extent they are learning what the program intended them to learn. It is not feasible to review samples of student work for all program outcomes; however, if there is a specific issue a unit is trying to address through curriculum renewal (consider the research skills example), it may be helpful to review specific examples of student work at the analysis phase to guide decisions about changes to the curriculum in the Planning & Implementation phase.

Planning & Implementation

The analysis stage is intended to reveal areas for potential improvement in the curriculum which could result in curricular change. Before discussing opportunities for change in specific courses, it is recommended that the unit consider an overall pedagogical strategy for the program. Are there specific teaching methods the unit would like to be consistent throughout the program? For example, perhaps it would be beneficial to establish a consistent use of case-based assignments through key courses to give students the best chance to develop certain skills. Or, perhaps the unit would like to provide opportunities for reflection in several courses to ensure students are thinking about their learning as they move through the program.

Depending on the nature and scope of any gaps and/or redundancies identified through the analysis, it is possible there will be opportunities for course changes identified at one or more course-levels in the program; from a relatively minor change such as an adjustment to an assessment in a key course, to a significant change such as a complete overhaul of the curriculum sequencing and the creation of new courses. Deciding on the scale and scope of change involves balancing the needs identified through the analysis process and the availability of resources and time for supporting the change process. This decision-making process should be an open and collegial one with broad consultation among all faculty within the unit, but particularly among faculty responsible for delivering the elements of the curriculum under review.

Once a decision has been made as to the scope and scale of proposed changes, the pace of change is the next important factor to consider when developing an implementation plan. While it is tempting to consider making the changes all at once, it will likely be necessary to prioritize what changes are made first, especially if the changes are substantial. Course development and redesign are time-consuming, and the unit may not have the resources needed to develop/redesign a suite of courses simultaneously. As a result, it is helpful to prioritize the outcomes that are most important for the program. For example, if students' communication skills are the most pressing concern raised through the review process, it may be worthwhile to focus on making course changes related to that outcome(s) first. Alternately, if there are two or three courses where several changes are needed to support multiple outcomes, it may make sense to start with those courses first.

UTQAP Connection

If the timing works, a UTQAP external review can be a good opportunity to receive feedback from colleagues at peer institutions on your prioritized plans prior to governance approval and implementation.

Consider the Scandinavian Department. In the previous stage the department discovered that students would benefit from more opportunities to develop their skills in the mid-level courses. Given that, the faculty have decided to add research components to some pre-existing courses, and add a required research methods course to the program as well. Here is what a brief outline of that plan might look like:

Course	Situational Factors	Current Teaching Methods & Assessments	Potential New Teaching Methods & Assessments

Course203	150-200 students In-class lecture course TA-run lab session	Lecture on research strategies Class discussion Weekly quizzes Mid-term and final exams	• Add library session in week 2 or 3 where students learn how to search databases and select quality sources • Add annotated bibliography assignment with exemplars
Course302	50-80 students In-class lecture course	Primarily lecture and class discussion. Midterm and final exams, along with student group presentations.	Add weekly multiple choice question creation assignment (which requires students to cite a new resource related to the week's lesson, along with the question)
Course304	80-100 students Combination of in-class lectures and online component	Primarily lecture, in-class discussion, online discussion board, online quizzes.	Add weekly resource share to discussion board – students choose a resource, explain its value, and each student must select two classmates' sources to read and respond to.
Course306	30-40 students In-class lecture	N/A - New Course	Major research assignment: • Students submit a research proposal with thesis, preliminary works cited – peer-reviewed during in-class workshops • Students workshop draft of research paper • Submission of final 15-page paper with 10+ sources

Table 5

Signature Pedagogies

Originally developed for consideration in professional programs, signature pedagogies refer to ways of teaching and learning that are representative of a given discipline – for example, the use of daily rounds for medical students, or the specific form of the Socratic Method used in law classrooms. Consider whether the unit's discipline has (or should have) a signature pedagogy that could be built into strategic courses in the program. A starting point for determining signature pedagogies is to consider whether there are any defining characteristics or modes of behaviour from the unit's discipline. For example, in a creative writing program, the use of peer workshops is a signature pedagogy, as it mimics the editing and revision process of the publishing industry.

Program Assessment

Learning is a complicated process. Program assessment should reflect this complexity by utilizing a diverse collection of methods. This will provide a more reliable picture of student learning within the program and courses, which will further support the credibility of the findings and the rationale for potential curricular change. For the purposes of assessing student learning, there are three categories of evidence: direct evidence, indirect evidence, and supportive evidence. The assessments in the Swedish Studies example (Table 5) all constitute direct evidence. ***Direct evidence*** reveals what students know and can demonstrate, and is evaluated or assessed in light of student learning outcomes. Student artifacts from course work, such as exams, capstone projects, or portfolios, are examples of direct measures. In all cases, direct evidence involves the evaluation of demonstrations of student learning. ***Indirect evidence*** is not based directly on student academic work but rather on the perceptions of students, alumni, employers, and other outside agents. Artifacts in which students judge their own ability to achieve the learning outcomes are considered indirect evidence. For example, alumni may be asked the extent to which the program prepared them to for their current position. In all cases, indirect evidence is based on perception rather than direct demonstration of learning. Finally, ***supportive evidence*** is evidence not directly connected to student learning. Graduation rates, job placement data, faculty-to-student ratios, program promotional materials, and cumulative GPAs could all be included in this category. Ideally, program assessment should include all three types of evidence.

UTQAP Connection

UTQAP new program proposals require proponents to describe their plans for program assessment.

Recall in the previous example that the Scandinavian Department discovered students were not able to demonstrate research skills at the level they expected by the end of the program. The unit implemented several changes aimed at providing students with more opportunities to develop their research skills in mid-level courses. During the curriculum mapping and analysis stage, the unit determined assessments capable of effectively measuring students' achievement of the program's research skills learning outcome. The first thing the department might do is examine the direct evidence of student learning. They could do this by comparing the baseline evidence collected for this learning outcome before the program changes were implemented (i.e. the student assessments specified above) with the same evidence collected from students after the changes were implemented. Has there been improvement in student attainment of the learning outcome?

The unit might also collect indirect evidence in the form of student surveys or interviews aimed at measuring the perceived impact of the changes on student learning. This indirect evidence might help them explain patterns noted during their analysis of student work. Did students feel they were given enough opportunities to practice their research skills? Was there a particular course or learning activity that was particularly helpful?

Finally, the unit might examine supportive evidence such as course enrollment patterns or grade distributions. Are students completing courses in the order intended? Have grade distributions changed in the affected courses? If so, has the change been positive or negative?

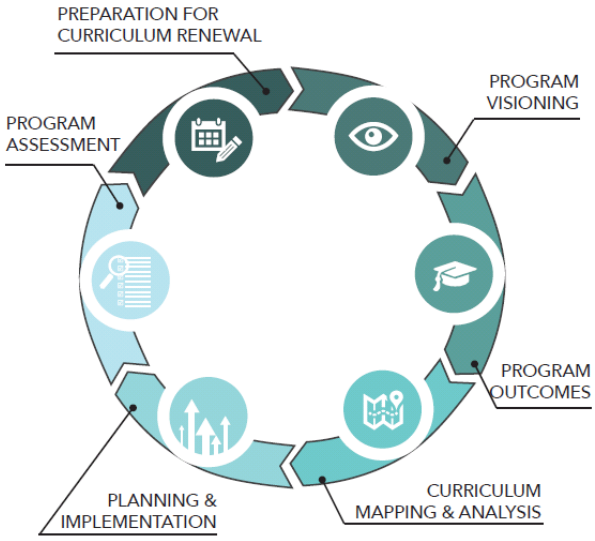
The numerous individuals typically involved in data collection and the need for data to be collected over several years as students move through a program adds complexity to the program assessment process. In the Scandinavian Department example, instructors from

several courses need to collect student assessments. Additionally, because the department implemented changes in second and third year courses, the impact on students' achievement of the program learning outcomes cannot be measured until students have completed the program - meaning that units will need to wait at least two years before collecting evidence to examine the impact of these changes. Balancing the need for diverse evidence and the practicality of the evidence collection process can be a challenge, but thoughtful planning can make this significantly easier. Devising an assessment strategy helps to coordinate evidence efforts. When creating a program assessment strategy, consider the following questions:

- What evidence (direct, indirect, and supportive) should be collected to determine whether students can successfully demonstrate each outcome? How will the evidence be collected? Who will be responsible for collecting the evidence? When will the evidence be collected?
- How will the evidence of student learning be analyzed? Will rubrics or other tools be utilized? What are the criteria for success? When determining the criteria for success, make sure to consider any baseline data that has been collected.
- How will the results of the program assessment process be reported? What action will be taken as a result of the findings?

Program assessment works best when it is ongoing, not episodic. Continuous improvement is best fostered when assessment entails a linked series of activities undertaken over time. A unit might consider assigning the data management role to a faculty member, which would count as service to the department, or engage an RA or staff member to support the effort. It can be helpful to maintain the discussion around assessment by creating a long range plan detailing assessment activities, and considering how existing unit governance (e.g., curriculum committees) may support this (e.g., as standing agenda items, or informal annual reports). Situate current efforts in the context of previous and future efforts, and review earlier efforts and actions taken to monitor progress. Make sure to communicate the results of assessment efforts so that lessons learned can be carried forward as those responsible for coordinating assessment and evaluation change over time.

Curriculum Renewal for Continuous Improvement



Program assessment is the 'end' of the process, but as the diagram of the process indicates, curriculum renewal is cyclic and ongoing. To make sure the great work the unit puts into the renewal process is maintained and refreshed over time, it is important to set up a plan for continuous improvement – this will ensure the curriculum stays relevant and effective as both internal and external factors evolve. Establishing a plan for continuous monitoring and, when appropriate, improvement, can ensure that the curriculum continues to meet the intended standards and outcomes, and puts the unit in a strong position for the next round of self-study and external review.

A unit may wish to consider forming teams of faculty to take responsibility for the maintenance of certain elements of the curriculum, instead of each instructor having responsibility only for his or her own course(s). Using a team keeps the program-level perspective alive, and can take any number of forms – consider the following organizations: teams by year of study who are responsible for ensuring all courses in a year are at an appropriate level and avoid gaps or unnecessary redundancy; teams by subject stream who are responsible for ensuring appropriate scaffolding among related courses; teams by learning experience who are responsible for ensuring the ongoing maintenance of certain types of learning experience (e.g. undergraduate research opportunities); etc.

UTQAP Connection

The cycle of curriculum renewal is formally supported through UTQAP processes of review and academic change which, in line with Ontario's Quality Assurance Framework (QAF) are designed to foster continuous program improvement. For example, UTQAP reviews involve self-study and external review phases (both of which connect to curriculum renewal as suggested earlier) as well as an implementation phase. The implementation of recommendations often involves major or minor modifications to programs, or the creation of new programs (which again connect to curriculum renewal as described throughout this guide).

Faculty teams will help keep the momentum going, and ensure ongoing oversight of certain elements of the curriculum. However, strong leadership is always key to keeping curriculum initiatives alive and thriving. It is typical for some initiatives to peter out with a change in leadership (new Chair, new Associate Chairs, etc.) so it is important to plan for those changes to ensure projects do not get lost with changes in leadership.

Further Reading

Banta, T.W. & Blaich, C. (2011, February). Closing the assessment loop. *Change: The Magazine of Higher Learning*, 22-27.

This article addresses the important but often neglected step of evaluating the effectiveness of outcomes. The article provides a handy list of characteristics of effective outcomes assessment, and outlines some key best practices to help make the process most beneficial (e.g. faculty engagement).

Boud, D. and Associates (2010). *Assessment 2020: Seven propositions for assessment reform in higher education*. Sydney: Australian Learning and Teaching Council.

Compiled by a collective of dozens of assessment researchers, academic renewal practitioners, and senior academic managers from institutions around the world, this short article outlines seven propositions to help institutions rethink assessment practices. The article emphasizes the importance of treating assessment as a learning exercise, and the importance of involving students in assessment practices.

Dyjur, P. & Kenny, N. (2015, May). *Analyzing Curriculum Mapping Data: Enhancing Student Learning through Curriculum Redesign*. Handout from presentation at the University of Calgary Conference on Postsecondary Learning and Teaching, Calgary, AB.

This article was written to accompany a session on curriculum mapping presented by the University of Calgary team in 2015. The straightforward outline and numerous examples make this article a useful resource to those who are new to curriculum mapping and would like a broad overview.

Gaff, J.G., Ratcliffe, J.L, and Associates. (1997). *Handbook of the undergraduate curriculum: A comprehensive guide to purposes, structures, practices, and change*. San Francisco, CA: Jossey-Boss.

As a rather sizable tome, it is unlikely that readers of this guide will want to read this guide in its entirety. However, the organization of the content allows for readers to select the areas of most interest to them. There are sections by faculty/discipline, sections for different portions of the renewal process, and so forth. Each chapter present several different models/options relevant to the topic, and outlines the benefits and limitations of each. Given the age of this text modern contexts will not be represented, so readers should keep that in mind as they review this book.

Goff, L. and Associates. (2015). *Learning Outcomes Assessment: A Practitioner's Handbook*. Toronto, ON: Higher Education Quality Council of Ontario.

This handbook provides a comprehensive orientation to program outcomes – their significance, the frameworks for their use, and the assessment of them at a course and program level. The handbook also includes a section on assessment of various challenging curricular areas, such as critical thinking, communication, and research. Overall, the handbook is pragmatic, accessible, and would be a worthwhile resource for units to review when considering a curriculum renewal project.

McNay, M. (2009). *Western Guide to Curriculum Review*. London, ON: University of Western Ontario.

The Western guide provides an overview of considerations for approaching a curriculum renewal project from a different perspective and context than this guide. Western's guide has a different method of organization, and there are concepts that are not referenced

here but may be interesting for units to read (e.g. the section on pedagogies of engagement).

O'Neill, G. (2010). *Programme design: Overview of curriculum models*. www.ucd.ie/teaching retrieved Nov 2 2016

This overview is useful not only because it offers several models and perspectives on program design, but it offers models that differ from the 'official' approaches at Canadian institutions (e.g. a process model as opposed to product model).

Wolf, P. (2007). A model for facilitating curriculum renewal in higher education: A faculty-driven, data-informed, and educational developer–supported approach. *New Directions for Teaching & Learning*, *112*, 15-20.

Wolf's article offers a brief overview on the curriculum renewal process, following a different model than the one presented in this guide. The article contains useful tips for making it through the process successfully (e.g. identifying a faculty 'champion'), and generally offers sound guidance of an Ontario-based authority on curriculum renewal practices. Given the article's length, it is a quick supplemental document to provide a different voice and perspective to readers of this guide.

Appendices

Appendix A: Resources for Program Outcomes

Program Outcomes Example – Department of Statistical Sciences, Statistics Major Program (Faculty of Arts & Science)

Theory

1. Demonstrate general understanding and knowledge of how probability theory is used to represent uncertainty and randomness in a mathematical framework
2. Demonstrate an understanding of the philosophy and purpose of statistical inferential reasoning, including likelihood, non-parametric, and Bayesian approaches
3. Explain the theoretical rationale of some commonly applied statistical methods

Methods

4. Demonstrate understanding and the correct application of a variety of common statistical models and procedures. This should include:
    - Procedures for a variety of purposes including description, prediction, and explanatory modelling
    - Both observational and experimental settings
    - Methods based on probability models and methods based on computer algorithms
    - Model assessment and diagnostics
    - Limitations of the models and procedures
    - Data from a variety of sources and in a variety of formats
5. Design and critique data collection strategies, including an understanding of the role of randomization and some approaches relevant to surveys, observational and experimental studies
6. Create appropriate data visualizations for real world problems and demonstrate appropriate use of data visualization in data analysis

Computation

7. Use simulation to evaluate statistical methods, support theoretical solutions, and as an approach to inference
8. Employ technological tools to access, store, clean, and organize for analysis data in a variety of representations and a variety of sizes
9. Understand fundamental principles and concepts of computer programming that are applicable to a variety of languages and environments
10. Carry out data analysis for common methods using statistical software in a reproducible way

Professional Practice

11. Present accurate, clear, concise descriptions of statistical methods and the results of analyses to statisticians and non-statisticians, orally, in writing, and through appropriate data visualizations
12. Interpret a non-statistician's description of a problem and formulate a question, study design, and analysis in statistical terms
13. Identify ethical considerations and practice, such as the importance of maintaining objectivity, protecting the privacy and dignity of human subjects, and carrying out work carefully and accurately and reporting results completely, without bias, and with a discussion of the limitations of the analysis, in a range of statistical settings
14. Recognize how statistical methods can be used to solve problems in other disciplines and the importance of the context of the problem in devising solutions

Problem Solving

15. Understand statistical analysis as a unified framework involving an iterative process of question formulation, data collection and / or evaluation of the suitability of available data, data cleaning and preparation, exploratory data analysis, modeling, interpretation and communication of results
16. Apply prior knowledge to learning and evaluating the appropriate application of new methods and to solving problems in new areas of application
17. Recognize multiple approaches to analysing data, contrast the results, and consider the relative merits of the approaches

18. Assess results of statistical analyses for inconsistencies and sources of error, recognize the limitations of the analysis and when more complex analysis is warranted, recognize the implications of issues such as bias, causality, model assumptions, measurement error, confounding, multiple comparisons

Program Outcomes Example – Department of English and Drama, English Major Program (University of Toronto Mississauga)

- Recognize the major historical periods and authors of literatures in English; and identify major genres, literary forms, and rhetorical techniques
- Understand the diversity of perspectives, approaches, and identities inherent in the study of literatures in English
- Apply and assess a wide range of methods for the interpretation of literary texts, including close reading, primary research, and critical theory
- Analyze the literary, poetic, narrative, and rhetorical techniques of literary texts; and critique the historical, political, and philosophical underpinnings of those texts
- Write coherent, persuasive, evidence-based arguments about complex texts and ideas, in mechanically correct formats
- Create and express original ideas
- Undertake secondary research in order to engage the forms and techniques of academic argument and enter into ongoing critical conversations about literary texts
- Evaluate the social importance and function of literary study; cultivate the values of humanistic education -- independent, creative, and critical thought -- in a broader social context

For comprehensive guidelines please see the **drafting learning outcomes guide** developed for the Centre for Teaching Support & Innovation.

For a short handout on the creation of program-level outcomes, and their relationship to course-level outcomes, see **Writing Program Outcomes (PDF)** resource developed for the Office of the Vice-Provost, Academic at Ryerson University.

Appendix B: Resources for Curriculum Mapping

Curriculum Map Example – Department of Statistical Sciences, Statistics Major Program (Faculty of Arts & Science)

View the **Statistics Curriculum Map (PDF)**

For a survey template for gathering course data for curriculum mapping, see the **Curriculum Mapping Survey Template (PDF)**

For an Excel template for gathering course data for curriculum mapping, see the **Course Mapping Template (PDF)**

For an Excel template for the curriculum map, see the **Curriculum Map Template (PDF)**

References and Notes

[1] Wiggins, G.P. & McTighe, J. (1998). *Understanding by design*. Upper Saddle River, NJ: Pearson.
[2] Biggs, J. (1999). *Teaching for quality learning at university – what the student does*. SRHE / Open University Press, Buckingham. Note: The fourth edition is now available.
[3] L.D.Fink. (2003). *Creating significant learning experiences: An integrated approach to designing college courses*. San Francisco, CA: Jossey-Boss.
[4] The principles were adapted from:
Dyjur, P. & Kenny, N. (2015, May). *Analyzing curriculum mapping data: Enhancing student learning through curriculum redesign*. Paper presented at the 2015 University of Calgary Conference on Postsecondary Learningand Teaching, Calgary, AB.
http://www.ucalgary.ca/taylorinstitute/teaching-community/node/273
[5] Case, R. & Gini-Newman, G. (2015). *Creating thinking classrooms: Leading educational change for a 21st century world*. Vancouver, BC: The Critical Thinking Consortium.
[6] L.D.Fink. (2013). *Creating significant learning experiences: An integrated approach to designing college courses* (revised ed.). San Francisco, CA: Jossey-Boss.
[7] Retention rates refer to retention from Year 1 to Year 2, and graduation rate is taken at the sixth year of a cohort.
[8] Biggs, J. & Tang, C. (2011). *Teaching for quality learning at university: What the student does* (4th ed.). Berkshire, England: SRHE and Open University Press.
[9] Biggs, J. & Tang, C. (2011). *Teaching for quality learning at university: What the student does* (4th ed.). Berkshire, England: SRHE and Open University Press and Hattie, J. (2009). The black box of tertiary assessment: An impending revolution. In L. H. Meyer et al (Eds.), *Tertiary assessment & higher education student outcomes: Policy, practice & research* (pp.259-275). Wellington, New Zealand: Ako Aotearoa.
[10] Consider the following resources to help address the learning curve of using outcomes:
L.D.Fink. (2013). *Creating significant learning experiences: An integrated approach to designing college courses* (revised ed.). San Francisco, CA: Jossey-Boss.
Nilson, L.B. (2010). *Teaching at its best: A research-based resource for college instructors* (3rd ed.). San Francisco, CA: Jossey-Boss.
[11] Dyjur, P. & Kenny, N. (2015, May). *Analyzing curriculum mapping data: Enhancing student learning through curriculum redesign*. Paper presented at the 2015 University of Calgary Conference on Postsecondary Learningand Teaching, Calgary, AB.
http://www.ucalgary.ca/taylorinstitute/teaching-community/node/273
[12] Note that the definitions were adapted from sample curriculum maps developed by the Taylor Institute for Teaching and Learning at the University of Calgary and for the Office of the Vice-Provost, Academic at Ryerson University