UNIVERSITY OF CALGARY
Taylor Institute for Teaching and Learning

Taylor Institute
Curriculum Review Series #3

Curriculum Review: Program Learning Outcomes (PLOs)

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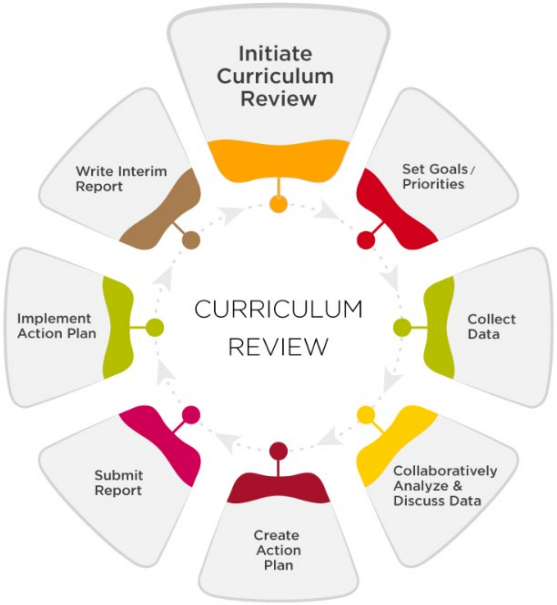
March 2025



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March 2025
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Recommended Citation
Dyjur, P., & Grant, K. (2025). Curriculum Review: Program Learning Outcomes (PLOs). Taylor Institute for Teaching and Learning. Calgary: University of Calgary.

Table of Contents

Program of Study 3
Learning Outcomes 3
Program Learning Outcomes (PLOs) 4
Writing Program Learning Outcomes 6
PLOs in the Cognitive Domain 7
Action Verbs for Writing Cognitive PLOs 7
PLOs in the Affective Domain 9
Action Verbs for Writing Affective PLOs 9
PLOs in the Psychomotor Domain 10
Action Verbs for Writing Psychomotor PLOs 10
Questions to Consider When Writing PLOs 10
Common Issues with PLOs and How to Fix Them 13
Work-Integrated Learning and Examples of Program Learning Outcomes 18
Academic Integrity and Examples of Program Learning Outcomes 21
Generative Artificial Intelligence and Examples of Program Learning Outcomes 21
Examples of Program Learning Outcomes for Undergraduate Programs 22
Examples of Program Learning Outcomes for Graduate Programs 26
Appendix 1: Rubric for Evaluating Your Program Learning Outcomes (PLOs) 0
References 27
Resources 30

Program of Study

Definition of Program

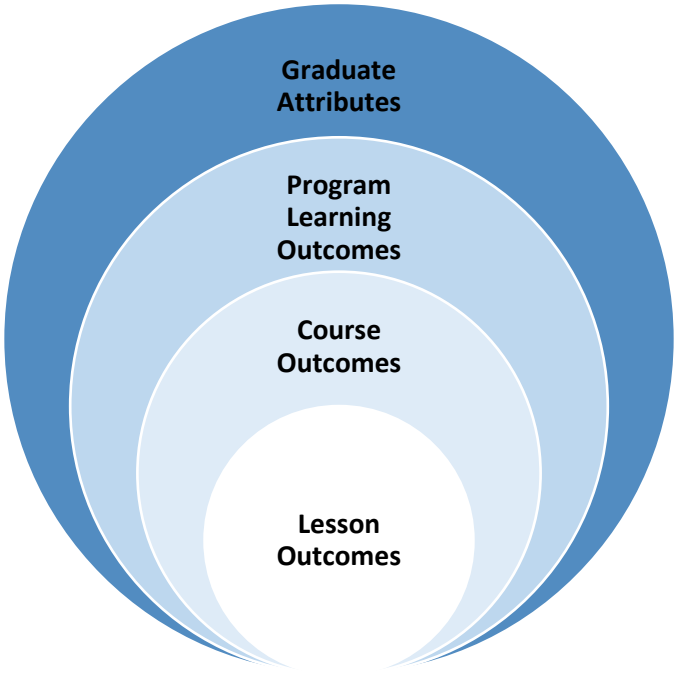
The University of Calgary's (n.d.) definition for academic program is "a set of course, a number of which may be mandatory and of a specialized nature, leading toward a particular credential." Therefore, a program of study includes not only degree programs, but also minors, certificates, embedded certificates, and other credentials.

Learning Outcomes

Definition of Learning Outcomes

A learning outcome is *"an intended effect of the program educational experience that has been stated in terms of specific, observable, and measurable student performance*" (Veltri, Webb, Matveev & Zapatero, 2011). They define the knowledge, skills, and attitudes that students should be able to attain by the end of a unit of study.

The term 'learning outcome' is an umbrella term that is used. Learning outcomes can be articulated at the lesson level, course level, program level, faculty or institutional level. Faculty or institutional learning outcomes are typically discussed in broad terms and usually referred to as graduate attributes.



Learning outcomes at different levels

Graduate attribute: Broad and long-term descriptions of learning expectations of students who attend a particular institution/ faculty (Driscoll & Wood, 2007).

Program learning outcome (PLO): The knowledge, skills and attributes that students are expected to attain by the end of a program of study.

Course outcome: The knowledge, skills and values/ attitudes that students should be able to attain by the end of a course.

Lesson outcome: A specific and measurable statement of the learning that students should be able to acquire by the end of a lesson (in a face-to-face environment) or piece of instruction (in an online environment).

Example:

- **Graduate attribute:** Communication
- **Program learning outcome:** Students will be expected to write an evidence-based research paper, drawing upon salient literature in the field.
- **Course Outcome:** Students will be expected to evaluate the literature and select appropriate sources to support their arguments.
- **Lesson Outcome:** Students will be expected to use a standard citation style in their written work.

Program Learning Outcomes (PLOs)

PLOs are the knowledge, skills and attributes that students are expected to attain by the end of a program of study. They are broader than course outcomes in that students typically cannot attain them by taking one course; usually, they need to take more than one course in order to build knowledge and scaffold their learning. They may be taken up in various ways in different courses, deepening students' understanding as they progress through the program.

For example, a PLO might be:

> Students will be expected to write a research paper that is informed by academic literature in the field.

This statement is very broad and needs to be articulated in more specific, measurable ways at the course level. Here are some examples of potential course outcomes that align with the PLO, though there could be many others:

> Students will be expected to find appropriate academic articles to inform their written work.
> Students will be expected to evaluate the suitability of specific academic articles that inform their written work.

Students will be expected to write a clear, concise research paper that relates to course concepts
Students will be expected to use APA in their citations, references and paper formatting.

Why PLOs are Important

PLOs are important because they communicate what is critical, intentional and distinct about a program. They indicate what is valued, to the extent that it needs to be articulated to students (and more broadly) as well as reflected in student learning experiences. PLOs set the stage for what students will learn and help guide decision-making about the program.

According to the literature, well-written learning outcome statements have a number of advantages, such as:

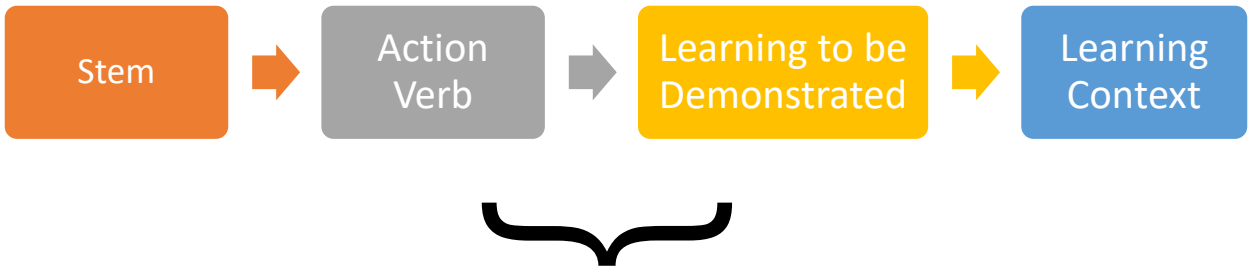
- Learning outcomes clearly communicate to students what they will be expected to learn by the end of a program (Marzano, 2010, in Clark & Hsu, 2023).
- They therefore have an impact on student learning in that they can guide students' perceptions of what is important and where they should devote their learning efforts (Clark & Hsu, 2023).
- They can help to shape what student assessment methods might be used.

To date, there is little research into the usefulness of program learning outcomes. However, a few things have been identified:

- PLOs convey the goals of a program to prospective students as well as others such as staff, parents, and the general public (Praslova, 2010).
- They can be used by instructors as guidance when writing course outcomes (Clark & Hsu, 2023; Towns, 2010).
- They can be used when mapping course learning outcomes to ensure that courses are aligned with the overall goals of a program (Clark & Hsu, 2023; Denicoló, 2019).
- PLOs can also be used to construct curriculum maps and use them to inform curriculum renewal (Towns, 2010).
- PLOs can inform student learning within a program. If student assessments are identified that align with each PLO, the assessments can be used to gauge how well in general students have met each PLO (Clark & Hsu, 2023).

Writing Program Learning Outcomes

PLOs should be written in a way that is clear, student-focused, and communicates what students can expect to learn in the program. A fairly standard format for writing PLOs is stem + action verb + learning to be demonstrated + learning context:



The action verb can be included in 'learning to be demonstrated'. Note that sometimes, the learning context is not included in a PLO.

Stems

There are a variety of different stems you can use for your learning outcomes. A few suggestions are:

- By the end of the program, students will be expected to:
- Upon successful completion of the program, students will be able to:
- This degree is conferred to students who:

One stem you may want to avoid is "students will be able to…". It is not guaranteed that students will be able to meet a certain learning outcome at the end of a program, particularly if they are not an active participant in their studies. However, if a student passes the courses in a program, the assumption is that they have met the learning outcomes for that program.

Action Verbs

A strong action verb is essential to convey expectations for student learning. Consider the difference between the following PLOs:

By the end of the program, students will be expected to **know** key theories and frameworks in project management.	and	By the end of the program, students will be expected to **apply** key theories and frameworks in project management.

The first PLO uses the verb 'know', which is vague. Students might be able to demonstrate knowledge in different ways, and to various depths of understanding. The second PLO uses the word 'apply', which conveys more accurately the depth of understanding that students will need to demonstrate within the

program: they may be asked to write papers, analyze case studies, or perhaps complete an experiential learning opportunity.

PLOs in the Cognitive Domain

According to Bloom's Taxonomy, there are three domains of learning: cognitive, affective, and psychomotor. Many of the PLOs we see in higher education relate to the cognitive domain, but some programs may have one or more that are affective and/or psychomotor in nature.

The following table provides some suggestions for action verbs that may be useful when writing cognitive PLOs. It is not an exhaustive list, and there may be verbs that are a better disciplinary match for what you want to convey. This list is a good start, though. It uses Bloom's levels of learning and has been grouped into three stages, Remember/Comprehend, Apply/Analyze, Evaluate/Create.

Action Verbs for Writing Cognitive PLOs

Category of Bloom's Taxonomy	**Examples of Action Verbs**
Remember/ Comprehend	Describe, locate, label, identify, define, reproduce, select, explain, generalize, summarize, paraphrase, represent, contrast, distinguish, estimate, give examples, infer, interpret, arrange, match
Apply/ Analyze	Solve, classify, use, execute, implement, apply, compute, construct, demonstrate, model, operate, prepare, perform, analyze, sort, investigate, differentiate, break down, compare, diagram, deconstruct, illustrate, infer, outline, relate, organize, integrate, structure, calculate, modify
Evaluate/ Create	Judge, decide, debate, justify, verify, argue, assess, prioritize, predict, appraise, conclude, critique, defend, evaluate, estimate, test, create, invent, design, devise, formulate, hypothesize, produce, generate, produce, plan, construct, compose, write

Learning to be Demonstrated

The 'learning to be demonstrated' is often the 'what' of the learning outcome. For program learning outcomes, this often is expressed by knowledge or skills that students are expected to acquire.

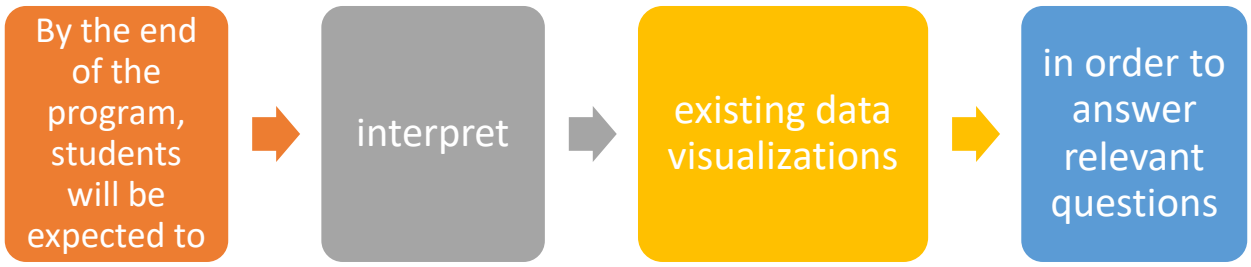
Learning to be demonstrated usually makes more sense in combination with the action verb.

Learning Context

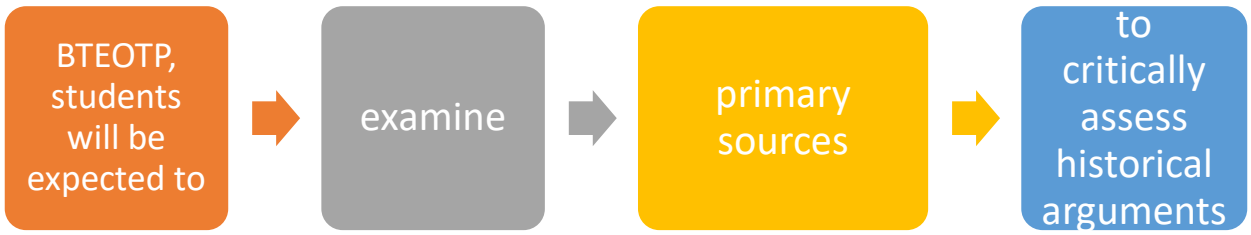
The learning context is not always expressed in program learning outcomes. It conveys additional information about the expectations for student learning, often the 'why' or the 'how' of student learning. There is no standard format or content for the learning context.

Examples of PLOs Deconstructed

Example from Data Science:



Example from History:



(Allegheny College, 2020)

For more examples of PLOs, refer to Appendix One (PLOs at the undergraduate level) and Appendix Two (PLOs for programs at the graduate level).

PLOs in the Affective Domain

The affective domain includes attitudes, values, feelings, ethics, and motivations. PLOs that are affective in nature are usually cognitive as well. Consider the following examples:

- Demonstrate cultural awareness, sensitivity, and competency in providing nursing care to individuals, families, and groups within a diverse society. (University of South Carolina, n.d.)
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. (CSUSM, n.d.)
- Recognize and analyze ethical dilemmas in business administration and propose solutions for practical and ethical business solutions. (Murray State University, n.d.)

Action Verbs for Writing Affective PLOs

Category of Bloom's Taxonomy	**Examples of Action Verbs**
Receive: Open to experience; willing to listen	Ask, listen, focus, attend, take part, discuss, acknowledge, hear, read
Respond: React and participate actively	React, respond, seek, discuss, interpret, clarify, provide additional examples, contribute, question
Value: Identify values and express personal opinions	Demonstrate, differentiate, explain, justify, propose, affirm
Conceptualize Values: Reconcile internal conflicts; develop value system	Build, develop, formulate, defend, modify, relate, prioritize, reconcile, contrast, arrange, compare, propose, verify
Internalize Values: Adopt belief system and philosophy (Anderson et al., 2001)	Act, display, influence, solve, practice, revise, defend, organize

PLOs in the Psychomotor Domain

The psychomotor domain involves skills that require physical movement, such as the development of manual skills and learning physical and manual tasks. Again, there is often a cognitive element to psychomotor learning. Examples include:

- Correctly and safely use relevant laboratory equipment and instruments and record data correctly in laboratory notebooks. (Adams State University, n.d.)
- Utilize modern tools and techniques to alter, characterize, and measure materials properties and to design processes according to accepted standards (Chemical and Materials Engineering). (San Jose State University, 2023)

Action Verbs for Writing Psychomotor PLOs

Category of Bloom's Taxonomy	**Examples of Action Verbs**
Imitate: Copy action of another; observe and replicate	Copy, follow, replicate, repeat, adhere
Execute: Reproduce activity from instruction or memory	Recreate, build, perform, execute, implement, follow
Perform: Execute a skill reliably, independent of help	Demonstrate, complete, show, perfect, calibrate, control, measure
Adaption: Adapt and integrate expertise to satisfy a new objective	Construct, solve, combine, coordinate, integrate, adapt, develop, formulate, modify, master, illustrate
Naturalize: Create new movement to fit a particular situation or specific problem (Anderson et al., 2001)	Design, specify, manage, invent, convert, create, fix, generate, plan

Questions to Consider When Writing PLOs

- How might faculty priorities and institutional strategies be expressed in PLOs?
- How can we best convey what is important about the program?
- What do we value about the program? What is special or innovative about it? How can we capture this in the PLOs?

Strategies to Write PLOs

For those of you who already have PLOs written, super! If they have not been revisited in three years or more, you might want to review them to make sure they still reflect the values and intentions of the program. Also, if your program goes through accreditation it might be preferable or even necessary to use the outcomes, competencies or standards that are set out by your accreditation board. In that case, the decisions are made for you.

If there are no PLOs for your program yet, you will need to establish some before you can proceed with curriculum mapping. First of all you will need to determine who should be involved in the writing process. For example, the review lead might write the first draft of the PLOs, then get feedback from a curriculum committee before presenting them to all faculty and student representatives for comments. Other review leads have sent out a general invitation to all instructors and student representatives, with the ones who express interest forming an ad hoc working group.

Some strategies for writing PLOs include:

- Work from your program description
- Adapt course outcomes to more global statements
- Use accreditation requirements
- Examine competencies or guidelines issued by professional organizations
- Examine PLOs used for similar programs at other institutions
- Strike a subcommittee or ask your curriculum committee to draft PLOs
- Hold a faculty retreat to draft or revise PLOs
- Ask potential employers what competencies are expected of their employees
- Use alumni surveys to ask people what was essential about the program

Writing PLOs collaboratively can result in immediate benefits. As people discuss their perceptions of the program, aspirations and future directions, what is working well and how to make things even better, they gain a fuller understanding of the curriculum and what other people are doing in their courses, making connections and thinking about things in a different way. Also, instructors can be more accepting of PLOs when they have had the opportunity for input rather than being presented with statements that are set in stone.

How many PLOs?

A general guideline of how many PLOs for a four-year degree are effective is about 7 – 12. However, there are many examples of programs that have more, and some examples of programs that have less, particularly credentials that are shorter than the typical four-year undergraduate degree. The right number of PLOs would be the number that is needed to express the intentions for student learning in the program. Please note that if you have too many PLOs it can be wieldy. Some groups have dealt with this by clustering their PLOs into categories or themes. A more difficult issue is when there are too few PLOs, as these tend to be global. As a result all courses map to the PLOs and it is difficult to discern useful information from the curriculum maps.

Future Aspirations

Your faculty or department may be considering a new program focus or highlighting a new initiative. For example, a group might want to investigate ways in which the program promotes mental health and wellness in order to identify gaps as well as strategies that can be leveraged. In this scenario, they might add an additional PLO:

> By the end of the program, students will be expected to develop personal resilience and self-management regarding their academic studies.

The PLO serves as a reminder to instructors that supporting students in this way is a shared responsibility. The mapping process can identify what is already being done at the course level. Examples of course outcomes that could be associated with this PLO include:

> By the end of the course, students will be expected to
>
> - Keep a daily log indicating their stress level.
> - State three resources on campus they can access when they feel stressed.

Common Issues with PLOs and How to Fix Them

Poorly-structured PLOs do not clearly communicate the intended meaning to others. This includes PLOs that are vague, not observable, and not measurable (Meda & Swart, 2018). In this section, we discuss PLOs with common issues and how you might improve them.

1. PLOs that use the verb 'understand'

PLOs that use the verb 'understand' tend to be vague. The verb 'understand' can mean different things to instructors and students, particularly when it comes to assessments. Students might think they understand a topic when they can answer multiple choice questions on it, which often only requires recognition of the answer. Instructors, however, might be expecting a more complex demonstration of understanding that is assessed in different ways that require analysis and application. If that is the case, replace 'understand' with a stronger action verb. Consider the following examples:

PLO with 'Understand' **By the end of the program…**	**More Specific Statements** **By the end of the program…**
… students will be able to ***understand*** the impact of the learning environment on children's learning. (Early Childhood Education)	… graduates will be able to ***apply*** their knowledge of child development to create healthy, respectful, supportive, and challenging learning environments for each child. (DePaul University College of Education, 2019)
… students will ***demonstrate an understanding of*** how culture, socialization, social situations, and social structure affect personal behavior, ideas, choices and social opportunities (Sociology). (Wilfrid Laurier University, 2023).	… ***identify and describe*** key features of inequality in several contemporary societies, such as structural and intersectional inequalities in the United States; uneven power relations between the global North and the global South; and legacies of colonialism and imperialism. (Northeastern University, 2023)
… students will ***gain an understanding of*** fluid mechanics	… students will have the ability to ***solve*** hydrostatic problems, including calculating the pressure distribution for incompressible fluids (Anadolu University, 2023).

The PLOs in the right column are clearer, stronger statements to express expectations of student learning by replacing 'understand' with a more accurate action verb.

2. Vague statements

PLOs can be vague for a number of reasons, such as a weak action verb or lacking detail in the description or learning context. The following example shows a lack of detail:

Vague PLO	Clearer PLO
Describe the historical role of the field of psychology.	Describe the historical role of the field of psychology in creating and maintaining systems of oppression, and identify opportunities for the field to advance equity and justice. (University of Maryland, n.d.)

To add clarity, ask someone (or several people) to provide feedback about the scope and meaning of the PLO, and if they have any questions. This should help you to add clarity to the PLO.

3. Not measurable

PLOs that are measurable provide guidance to students on how they will be assessed within the program and encourage them to take a deep approach to learning. The following example shows a PLO statement that is not explicit about how it will be measured, along with one that is:

Not Measurable	Measurable
Learn about political events in broader historical and theoretical contexts.	Locate, evaluate, and use information and scholarship needed to place particular political events in broader historical, cross-national, and theoretical contexts. (UCLA Social Sciences Computing, 2019)

In order to make your PLOs measurable, use a strong action verb and state how students can demonstrate their learning.

4. Not observable

Verbs such as 'appreciate', 'perceive', or 'be aware of' are not observable, nor measurable. Instead of using them, state how students can demonstrate appreciation or learning. What evidence is there that they have appreciation? The following example shows how you can modify an affective PLO to describe how students demonstrate appreciation in their learning.

Not Observable	Observable
Gain an appreciation for student diversity in the elementary classroom.	Planning and/or adapting learner centered curricula that engage students in a variety of culturally responsive, developmentally, and age-appropriate strategies. (Gonzaga University, n.d.)

To make a PLO more observable, you may need to change the action verb and/or add detail to the demonstration of learning.

5. Content-focused

It is certainly feasible to have content-related PLOs, but the focus should still be on what learners are meant to achieve regarding the content. Examples of content-focused PLOs are shown below, with ways in which they could be reworded to bring the focus back to student learning.

Content-focused	Focus on Student Learning
Have knowledge of major theories in the field.	Compare and contrast the advantages and limitations of major theoretical perspectives in the field.
Grasp (chapters in a foundational textbook).	Describe how evolutionary and historical processes have shaped primates and human ancestors and led to the biological, behavioral, and cultural diversity seen in the present (UCDavis, 2024).
Comprehend disciplinary concepts and approaches.	Identify and apply relevant physical laws and principles to disciplinary problems (physics) (Carnegie Mellon University, 2024).

Many content-focused PLOs can be improved by selecting a stronger action verb and being more specific about how learning can be demonstrated.

6. Describing the activity instead of student learning

Sometimes PLOs describe the learning activity, rather than the expectations for student learning:

PLO Describing the Activity	PLO Describing the Goal for Student Learning
Students will participate in a work-integrated learning opportunity.	Students will integrate and apply authentic professional and technical knowledge and skills relating to (the field of study) in a work setting (Stirling et al., p. 36)
Students will conduct laboratory work.	SWBET apply the scientific method to biological problems by developing hypotheses with testable predictions, determining appropriate treatments/ controls, designing unbiased sampling protocols, testing predictions in a statistical context, evaluating hypotheses based on results, and identifying the scope of inference (Vanderbeld et al., 2023).

To modify a PLO that describes an activity, think about the learning goals of the activity. Add the phrase "in order to…" to the end of the PLO, as the following example:

Students will participate in a work-integrated learning opportunity…	…in order to…	… apply course concepts, theories and skills to professional settings (Stirling et al., p. 36).

7. Scope is either too broad or too narrow

It can be challenging to define the proper scope for a PLO. If the scope is too narrow, PLOs can appear like course outcomes and require a long list to capture the learning experience across a program of study. If the PLOs are too global, they can be overwhelming and appear like the overarching goal of a program. The following PLO might be split into a more than one statement instead.

Global PLO	Rewritten as a Couple of PLOs
Students will be expected to develop the ability to identify, formulate, and solve complex engineering problems by using appropriate tools and applying principles of engineering, science, and mathematics, taking global, cultural, social, ethical, environmental, and economic factors into account.	… identify, formulate, and solve complex engineering problems. … use appropriate tools when applying principles of engineering, science, and mathematics. … consider global, cultural, social, ethical, environmental, and economic factors when solving engineering problems.

Conversely, if you have a long list of PLOs, many of which can be addressed within a single course, it may be worthwhile to consider how they could be grouped together, capturing the goals of learning under a programmatic statement. The following statements provide an example:

Granular PLOs	Rewritten as a Single PLO
Students should be able to evaluate the differences between predicted and observed results obtained from conducting scientific experiments.	Students will be expected to apply scientific methods when conducting experiments.
Use APA in their citations, references and paper formatting	Students will be expected to have the ability to write an evidence-based research paper, drawing upon salient literature in the field.
Construct a logic model for a program evaluation project.	Students will be expected to use established processes when conducting a program evaluation.

Evaluating Your PLOs

Writing or revising program learning outcomes is an opportunity for all staff to discuss the purpose of the program. Even if your staff is in general agreement about what should be accomplished in the program, you might find that there are some subtle differences in perspective. Involving all instructors in the process of writing or revising PLOs can have immediate benefits as people discuss the program, gain new understanding about the goals of the program, and shift their perspective from what they are doing in individual courses to what everyone is doing collectively in the program.

Once you have consensus on the overall goals of the program, you can examine your list of PLOs. Appendix 1 has a rubric that can be used to evaluate your PLOs based on several factors, such as whether or not they are a comprehensive list, their scope and articulation, whether they focus on student learning, clarity, if they are assessable, and their alignment with the curriculum.

Work-Integrated Learning and Examples of Program Learning Outcomes

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October 2022

Work-Integrated Learning and Program Learning Outcomes

Learning outcomes are the knowledge, skills, and values/ attitudes that students are expected to attain by the end of a unit of study. Program learning outcomes (PLOs) are broad statements of what students should be able to know and do upon completion of a program (Harden, 2002).

PLOs are intended to be met when a student is at the end of their academic program. However, unlike other PLOs which are met through a series of courses, PLOs related to Work-integrated Learning (WIL) may be met through a single WIL opportunity. Therefore, they may look similar to a course outcome.

Questions to Guide Writing Learning Outcomes for WIL

The following list provides prompts to think about when writing program learning outcomes for Work-integrated Learning (WIL) opportunities.

What type of WIL experience will students be participating in? Is there a particular focus that should be considered when writing learning outcomes (entrepreneurship, service learning, other)?
What disciplinary knowledge, skills and approaches will students develop and/or apply in their WIL experience?
What skills or knowledge should students learn from their WIL experience?
What skills or knowledge do students want to learn in their WIL experience?
What types of projects will students design, manage, collaborate on and/or evaluate as part of their WIL experience?
What connections should students develop between their WIL experience and course learning?
What communication skills should students develop in their WIL experience?
What values, perspectives and beliefs should students reflect upon as part of their WIL experience?
What particular aspects of professionalism, autonomy and/or lifelong learning should students demonstrate as part of their WIL experience? (Stirling et al., 2016)
How can you capture the relationship between the student, community partner, and the University in the learning outcomes?
What is realistic to expect in terms of student learning given the length of time and scope of the WIL experience?

Examples of WIL PLOs by Category

By the end of the placement/internship/practicum, students will be expected to…

Knowledge of the field or discipline and its application:

- … integrate and apply authentic professional and technical knowledge and skills relating to (the field of study) in a work setting.
- … integrate and apply professional and technical knowledge and skills relating to (the field of study) in a work setting, under supervision.
- … apply course concepts, theories and skills to professional settings.
- … apply knowledge and skills to design, manage, and deliver a project. (Stirling et al., p. 36)

Professionalism:

- … apply ethical standards for the discipline in a work setting with guidance from a mentor.
- … demonstrate integrity and professional conduct according to norms in the workplace.
- … respect individuals with diverse backgrounds, perspectives, and skills, and acknowledge their contributions.
- … accept responsibility for one's own growth and development (Davis et al., 2006).
- … demonstrate responsibility for analyzing work situations, making appropriate decisions and following through with them (Stirling et al., 2016).

Communication:

- … clearly communicate to community/ industry partners in appropriate formats such as oral presentations, technical reports, and program evaluation reports, appropriate for the audience and purpose.
- … apply principles of effective collaboration in a work setting.
- … develop effective team work and communication skills and apply them in a work setting.
- … respect confidentiality in the workplace and apply principles of confidential treatment of information.

Critical Reflection/ Metacognition:

- … engage in critical reflection to process the learning experience and apply new insights to future learning.
- … engage in critical reflection to understand various perspectives and/or exercise thoughtful judgment (Stirling et al., p. 24)
- … engage in critical reflection to understand one's own perspectives and beliefs.
- … engage in critical reflection to understand various cultural perspectives and beliefs.

Problem Solving:

- … examine workplace settings to understand context, issues, assumptions, and parameters.
- … consider all relevant stakeholder positions, cultural perspectives and alternative pathways to solving workplace problems.
- … think independently and cooperatively to identify relevant existing ideas and generate original solution ideas (Davis et al., 2006).

- … solve or resolve a workplace problem under supervision.

Leadership:

- … motivate others to achieve individual and organizational goals.
- … provide support and removes barriers to aid the success of others
- … encourage achievement by recognizing individual and group successes (Davis et al., 2006).

Community and Industry Research and Projects:

- … formulate new research questions relating to a work setting.
- … apply appropriate techniques to investigate research questions.
- … use appropriate data analysis procedures to infer trends and results.
- … clearly communicate findings to community/ industry partners in appropriate formats such as technical reports or program evaluation reports (CEWIL, 2021).

Entrepreneurship:

- … leverage resources, space, mentorship and/or funding to engage in entrepreneurship.
- … advance external ideas that address real-world needs (CEWIL, 2021).
- … demonstrate entrepreneurial thinking skills, such as design thinking, systems thinking, or transdisciplinary thinking, to identify opportunities for impact.
- … look for and identify opportunities for improvement, innovation or creativity.
- … explore strategic partnerships and forge working relationships that can help to solve problems.
- … engage in social entrepreneurship to identify ways to for people to live in a way that is more sustainable, economically viable, culturally responsive, and/or educationally supported.
- … identify resources and innovate to generate value.
- … develop an understanding of their level of risk tolerance.
- … identify the usefulness of new learning and how it can be applied in creative or innovative ways.

For more information on writing program learning outcomes for WIL, please see *A practical guide for Work-integrated Learning* (Stirling et al., 2016).

Academic Integrity and Examples of Program Learning Outcomes

By the end of the program, students will demonstrate:

- the ability to apply the principles of honesty, trust, fairness, respect, and responsibility in their academic work.
- ethical conduct within their academic work by acting with integrity.
- their ability to apply the Indigenous principles of relationality, reciprocity, and respect to their academic work (Gladue, 2020).

Generative Artificial Intelligence and Examples of Program Learning Outcomes

By the end of the program, students will:

- Demonstrate an understanding of core generative artificial intelligence (GAI) concepts as they relate to the field of study.
- Evaluate the output of GAI tools and refine the results to improve accuracy
- Analyze the output of GAI tools with regard to ethical considerations such as equity and bias, and refine the results to improve accuracy
- Implement GAI tools into disciplinary processes and approaches to improve efficiency and maintain accuracy

Examples of Program Learning Outcomes for Undergraduate Programs

Example of Interdisciplinary PLOs based on the Council of Ministers of Education, Canada

By the end of the program, students will be expected to:

- Develop a knowledge base of theories and concepts within their primary area of study.
- Use different approaches to solving problems using well established ideas and techniques within the discipline.
- Locate and critically evaluate qualitative and quantitative information.
- Formulate and communicate orally and in writing arguments based on information, theories, and concepts.
- Apply knowledge and skills in a variety of contexts, including situations that are new to the student.
- Conceptualize, design, and implement research for the generation of new knowledge or understanding within the discipline (Council of Ministers of Education, 2007).

Bachelor of Arts in Sociology from Indiana University (2012)

The student learning outcomes for the degree are as follows:

- Theoretical: Graduates will be able to analyze and evaluate major theoretical perspectives in sociology
    - Graduates should be able to identify the general theoretical orientation.
    - Graduates should be able to apply theoretical analyses of social structure and social processes.
    - Graduates should be able to interpret social issues in terms of the major theoretical perspectives.
- Methodological: Graduates will be able to utilize and evaluate research methods and data analysis used in sociology.
    - Graduates should be able to demonstrate appropriate use of both quantitative and qualitative methodologies.
    - Graduates should be able to evaluate different research methods.
    - Graduates should be able to interpret the results of data gathering.
    - Graduates should be able to demonstrate appropriate use of statistical techniques.
    - Graduates should be able to demonstrate competent use of statistical software.
- Critical Thinking: Graduates will be able to evaluate critically arguments and situations.
    - Graduates should be able to critically evaluate theoretical arguments.
    - Graduates should be able to develop evidence-based arguments.
    - Graduates should be able to critically evaluate published research.
- Communication Skills: Graduates will be able to communicate effectively in both written and oral form.
    - Graduates should be able to write a research report.
    - Graduates should be able to develop an oral research report.

- Professional Ethics: Graduates will be knowledgeable of appropriate ethics concerning both professional conduct and the use of human subjects.
    - Graduates should demonstrate a mastery of the ethical standards for conducting research with human subjects.
    - Graduates should demonstrate an understanding of the ethical standards of the American Sociological Association (Indiana University, 2012).

Bachelor of Arts in Philosophy
The University of British Columbia (n.d.)

http://philosophy.ubc.ca/undergraduate/learning-outcomes/

After successfully completing a BA in Philosophy:

1. Students will be able to explain philosophical texts and positions accurately, to identify and apply philosophical research methods consistently, to articulate and defend precise philosophical positions, and to anticipate and rebut objections to those positions.
2. Students will be able to apply their philosophical learning to important public issues and to articulate why philosophical understanding is valuable in such debates.
3. Students will develop their own philosophical areas of interest and investigate them from various perspectives.
4. Students will attain the research skills necessary for writing a research paper that engages with primary and, where applicable, secondary literature on a topic in philosophy.
5. Students will learn to recognize and articulate fundamental questions about what exists, what we can know and how we should live our lives. Students will understand influential attempts to answer such questions, along with evaluating their advantages and disadvantages.
6. Students will acquire competence in translation, interpretation, and proof in sentential and predicate logic and will understand how these processes aid in the evaluation of arguments.
7. Students will be able to describe the ways in which the formal techniques of logic are important to philosophical research.
8. Students will acquire reading skills necessary to understand and critically engage with historical and contemporary philosophical texts.
9. Students will be able to identify some of the central concerns and methods of philosophy in at least two periods in its historical development, and will be able to explain the relations between those eras of philosophy and contemporary philosophy. Students will be able to show sensitivity to issues of translation, textual transmission and the historical and cultural context in which philosophical ideas develop.
10. Students will be aware of the existence of multiple philosophical traditions, and will be able to reflect on the cultural specificity of some of their own concepts and values.
11. Students will be able to explain and discriminate between major approaches to moral philosophy such as consequentialism, deontology and virtue ethics, and to summarize and evaluate the views of at least one philosopher associated with each.
12. Students will be able to explain and discriminate between major approaches to political philosophy such as Libertarianism, Marxism, Liberalism and Communitarianism, and to summarize and evaluate the views of at least one philosopher associated with each.

13. Students will be able to explain epistemological concepts such as the nature of knowledge, justification, evidence and skepticism, and to summarize and evaluate major philosophical positions in relation to each.
14. Students will be able to explain metaphysical concepts such as necessity, reality, time, God and free will, and to summarize and evaluate major philosophical positions in relation to each.

Materials Engineering Degree from the University of British Columbia

At the end of the program, students will be able to:

1. Characterize and select materials for design by evaluating the linkages between material properties, microstructures and processing.
2. Analyze materials engineering problems using a balance of mathematics, physics and chemistry including thermodynamics, mass, momentum and energy transport, kinetics and mechanics of materials.
3. Solve materials engineering problems. Identify and formulate problems, develop and apply analytical and experimental methods of investigation, identify contributing factors and generate, validate, and evaluate alternative solutions.
4. Design processes for the extraction, synthesis and processing of materials to meet technical, economic, environmental and ethical needs and constraints.
5. Communication effectively in a professional environment through technical reports and presentations. Articulate and justify technical solutions to diverse audiences.
6. Recognize and evaluation the societal benefits of materials engineering. Appreciate and evaluate the environmental and societal impact of materials. Recognize the importance of professional and ethical responsibilities, the evolving nature of materials engineering and the importance of lifelong learning (University of British Columbia, n.d.).

Bachelor of Science in Biology, York University

Upon successful completion of any program in Biology, students will be able to demonstrate:

- General knowledge and understanding of the major concepts, methodologies and assumptions in biology.
- General understanding of the basic structures and fundamental processes of life at the molecular, cellular, organismal and population levels, with detailed knowledge in certain topics.
- The ability to gather, review, evaluate and interpret biology information (in scholarly reviews, primary sources and mass media articles).
- The ability to apply learning from other areas (e.g. chemistry)
- The ability to effectively apply the scientific method for problem solving and experimental design in biology.
- The ability to carry out basic biological laboratory activities safely and reliably
- The ability to collect, organize, analyze, interpret and present quantitative and qualitative biological data.

- An understanding of the research methods in biology that enable the student to effectively evaluate the appropriateness of different established strategies/ techniques to solve problems, and to devise and to solve problems using these methods.
- Awareness of current issues relating to biology (including one or more detailed areas within biology).
- The ability to effectively work with others in the laboratory and class setting.
- (continued) behavior consistent with academic integrity and social responsibility (York University, n.d.)

Diploma in Graphic Design, Seneca Polytechnic

As a graduate, you will be prepared to reliably demonstrate the ability to:

- Conceptualize and develop design solutions using principles of design to create visual communications that meet the needs of the project.
- Employ the design process to create design solutions that meet the project objectives and the needs of the client and/or user.
- Plan, create and use photography, illustration and typography in design layouts to meet the requirements of the creative brief.
- Design, develop and create a variety of media products using relevant, current and/or emerging technologies.
- Communicate ideas, design concepts and opinions clearly and persuasively to others.
- Use recognized industry practices throughout the design process and related business tasks.
- Plan, implement and evaluate graphic design projects using project management skills to deliver quality work to clients according to schedule and within budget.
- Complete all work in a professional and ethical manner, and in accordance with all applicable legislation and regulations (Seneca Polytechnic, 2023).

Examples of Program Learning Outcomes for Graduate Programs

Master's Certificate in Elearning, Werklund School of Education, University of Calgary

By the end of the program, students will be expected to:

1. Demonstrate a solid understanding of the research, practices, and trends in the field of elearning (in Canada).
2. Investigate the continuum of elearning, from digital technologies used to support learning, to blended and fully online course delivery.
3. Investigate complex elearning issues using a variety of information sources, including current elearning research and practice.
4. Select existing media and methods to meet specific student learning needs within elearning environments.
5. Create plans that integrate appropriate educational media and technology to enhance student learning in face-to-face, blended, and fully online methods of delivery.
6. Design and develop digital content and environments that meet specific student learning needs.
7. Evaluate technology-enabled learning experiences based on different criteria.

Adapted from: Ministerial Statement (Council of Ministers of Education Canada, 2007)

Master's Certificate in Software Security, Computer Science, University of Calgary

By the end of the program, students will be expected to:

1. Gain foundational knowledge in the principles of secure systems: systems security and applications security.
2. Develop a secure software system or product that will be connected to the Internet: anticipate potential threats and design options to secure a product.
3. Apply existing tools and practices into the software development process in order to enhance the security of their software.
4. Apply threat modeling, security design, and security assessment skills in the process of developing an innovative product such as a mobile application or other smart device.
5. Recognize the limitations of technical security measures, and strategize and evaluate ways to address gaps, including non-technical solutions such as deployment of policies and programs.
6. Communicate systems design and security assessment results to a technical audience who may not be security experts.
7. Decide on a course of action based on relevant legal and ethical considerations.

Appendix 1: Rubric for Evaluating Your Program Learning Outcomes (PLOs)

Criteria	Emerging	Developing	Strong
Comprehensive List	The list of PLOs may be incomplete, more like a list of course outcomes, or disorganized.	The list of PLOs is approaching completion but may not consider one of the following: disciplinary considerations, institutional priorities, and/or accreditation competencies (if relevant).	The list of PLOs is comprehensive, incorporating disciplinary considerations, institutional priorities, and accreditation competencies (if relevant).
Scope and Articulation of PLO Statements	The PLO statements are overly generalized (E.g. "Communication"), or The PLO statements are too detail-oriented. The statements are not written as learning outcomes.	The PLOs are generally accurate in scope, but some statements may be too narrow or wide. In general, the PLOs are achievable by students given the length of the program. For the most part, the statements are written as learning outcomes, including a stem, action verb, learning to be demonstrated, and learning context.	The PLOs are accurate in scope. They are achievable by students given the length of the program. The statements are written as learning outcomes, including a stem, action verb, learning to be demonstrated, and learning context.
Focus on Student Learning	Focus is not on student learning but may be on content or teaching and learning activities. Most statements do not use a strong action verb.	Generally focused on student learning. Most statements use a strong action verb.	PLOs consistently focus on student learning. All statements use a strong action verb.
Clarity	The PLOs lack clarity. They are challenging for students and non-professional to understand.	The PLOs are generally clear. Students and non-professionals may have difficulty with some of the terminology.	The PLOs are clear. Terminology can be understood by students and non-professionals.
Assessable Outcomes	It is unclear in the PLOs how students might demonstrate their learning.	Most of the PLOs indicate how students could demonstrate their learning.	All PLOs indicate how students could demonstrate their learning.
Alignment with Curriculum	The PLOs lack alignment with the curriculum.	There is general alignment between the PLOs and the curriculum, but further refinement is needed.	There is alignment between the PLOs and the curriculum.

(Adapted from Montana State University, n.d.)

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Resources

A Guide to Developing and Assessing Learning Outcomes at the University of Guelph http://www.uoguelph.ca/vpacademic/avpa/outcomes/KennyDesmarais_LearningOutcomesGuide_2012.pdf

Alberta Credential Framework: https://open.alberta.ca/publications/alberta-credential-framework

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