Taylor Institute
Curriculum Review Series #3

Curriculum Review:
Program-level Learning Outcomes

UNIVERSITY OF CALGARY
Taylor Institute for Teaching and Learning
Educational Development Unit

Patti Dyjur
Frances Kalu
October 2017

Authors
Patti Dyjur, Curriculum Development Specialist
Taylor Institute for Teaching and Learning, University of Calgary

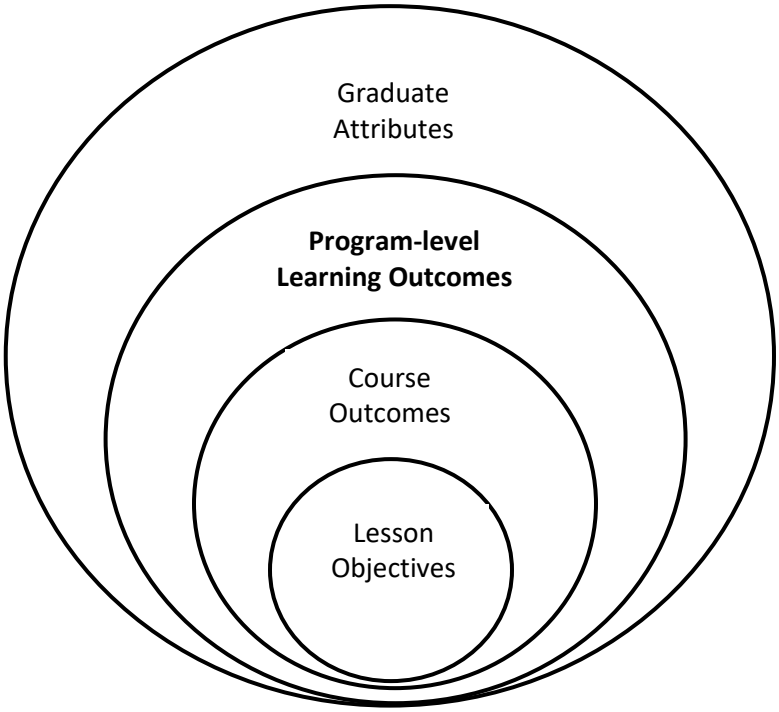
Frances Kalu, Curriculum Development Specialist
Taylor Institute for Teaching and Learning, University of Calgary

October 2017
Taylor Institute for Teaching and Learning
434 Collegiate Blvd NW
University of Calgary, Calgary, AB Canada T2N 1N4

Recommended Citation
Dyjur, P. & Kalu, F. (2017). *Curriculum review: Program-level learning outcomes*. Calgary: University of Calgary.

Table of Contents

Program-Level Learning Outcomes (PLOs)



Definition of learning outcome:

- "An intended effect of the educational experience that has been stated in terms of specific, observable, and measurable student performance" (Veltri, Webb, Matveev & Zapatero, 2011)
- The knowledge, skills, and values/ attitudes that students are expected to attain by the end of a unit of study

Learning outcomes at different levels

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

Program-level learning outcomes (PLOs): 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 objectives: 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-level 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 Objective:** Students will be expected to use a standard citation style in their written work.

What are program-level 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, grasping the essentials. 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 map directly back to 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 are they important?

PLOs are important because they communicate what is critical, intentional and special 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.

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 are effective is 8 – 12. However, there are many examples of programs that have more, and some examples of programs that have less. 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.

Evaluating Your PLOs

Writing or revising program-level 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. Some discussion questions for your faculty and/or advisory group are:

- Do they convey the purpose of the program?
- Do they convey what is important about the program?
- Do they outline the critical competencies, skills and knowledge that students are expected to learn by the end of the program?
- What do you value about the program? What is special or innovative about it? Are they captured in the PLOs?
- What would the program need to be like in order for it to be the most sought after of its kind in Canada?
- Is anything missing?

Examples of Program-level Learning Outcomes – 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 (n.d.):

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 (n.d.):

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.

Examples of Program-level Learning Outcomes – Graduate Programs

Master's Certificate in Elearning, Werklund School of Education

University of Calgary

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

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.

Brainstorming Activity

Scenario: We are faculty members, sessionals, and graduate students in the multidisciplinary program, “Teaching in Higher Education”. The program is in the early stages of being reviewed.

Individual brainstorming: What knowledge, skills and values should a graduate of our program have? Do not filter at this point, jot down all your ideas. In a few minutes you will discuss at your table. If the group generates more ideas, jot them down.

Knowledge

Skills

Values/ Attitudes

References

Council of Ministers of Education. (2007). *Ministerial statement on quality assurance of degree education in Canada.* Retrieved from http://www.cmec.ca/Publications/Lists/Publications/Attachments/95/QA-Statement-2007.en.pdf

Driscoll, A., & Wood, S. (2007). Outcomes-based Assessment for Learner-centered Education. Sterling, VA: Stylus.

Indiana University. (2012). *IPFW undergraduate and graduate bulletins: Sociology (B.A.).* Retrieved from http://bulletin.ipfw.edu/preview_program.php?catoid=19&poid=3609&returnto=search

Kuh, G. D. (2008). *High-impact educational practices: A brief overview*. Retrieved from http://www.aacu.org/leap/hip.cfm

University of British Columbia. (n.d.). *Faculty of applied science, materials engineering: Program learning outcomes.* Retrieved from http://www.mmat.ubc.ca/prospective_students/undergraduate/program/outcomes.php

University of British Columbia. (n.d.). *Learning outcomes: Philosophy undergraduate degrees.* Retrieved from http://philosophy.ubc.ca/undergraduate/learning-outcomes/

University of Calgary. (2012). *Academic quality assurance handbook curriculum reviews.* Retrieved from http://www.ucalgary.ca/provost/activities/reviews

Veltri, N. F., Webb, H. W., Matveev, A. G., & Zapatero, E. G. (2011). Curriculum mapping as a tool for continuous improvement of IS curriculum. *Journal of Information Systems Education, 22*(1), 31-42.

York University (n.d.). *Program learning outcomes, Department of Biology*. Retrieved from http://test.scienceqa.apps01.yorku.ca/biology/undergraduate-program/program-learning-outcomes/

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

Kennedy, D., Hyland, A., & Ryan, N. (2006). Writing and using learning outcomes: A practical guide. In Froment, E., Kohler, J. Purser, L., & Wilson, L. (Eds.): *EUA Bologna Handbook – Making Bologna Work.* Retrieved from http://www.tcd.ie/teaching-learning/academic-development/assets/pdf/Kennedy_Writing_and_Using_Learning_Outcomes.pdf

Taylor Institute for Teaching and Learning. (n.d.). *Program-level learning outcomes.* University of Calgary. Retrieved from http://itsotlcweb01.ucalgary.ca/taylorinstitute/teaching-community/node/161