Designing and Assessing Learning Outcomes

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Workshop Learning Outcomes

- **Expect-to-see:** Participants will describe the principles and features of successful learning outcomes.

- **Expect-to-see:** Participants will design a set of three or more useable learning outcomes applicable to their courses or programs.

- **Like-to-see:** Participants will design assessments that align with learning outcomes.

- **Love-to-see:** Participants will apply the principles of learning outcome design to their selection and use of instructional strategies.
Introductions... (1 of 2)
You and your target course

Please introduce yourself and share answers to these questions:

- What is your course/program name and level (e.g., Inferential Statistics – 2nd year)?
- What is the main “content” of the course/program?
- What strengths and weaknesses do learners bring to you?
- What do you suspect or know to be the most difficult learning for your students?
General Curriculum Design Process

1. Community of Learners
2. External Factors
3. Learning Outcomes
4. Course Concepts
5. Assessment
6. Learning Activities

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Revised, E Ishiguro August 2011
Course Design Components

- Context (External Factors)
- Students (Community of Learners)
- Content
- Instructional Strategies (Learning Activities)
- Assessments
- Learning Outcomes
What are learning outcomes?

- Think-Pair-Share Exercise 1 (preview – 1 of 4)

  - **Think-Write** (2 minutes)
    Write your ideas about learning outcomes.

  - **Think-Say** (4 minutes)
    Tell your partner your ideas about learning outcomes.

  - **Think-Say** (4-6 minutes)
    Share your and your partner’s ideas with the group.
Think-Write (2 of 4) (2 minutes)

- What comes to mind when you think of learning outcomes?
- What keywords relate to learning outcomes?
Think-Say (3 of 4) (4 minutes)

- Pair off and share your ideas.
- Commonalities?
- Differences?
Think-Say (4 of 4) (4-6 minutes)

- Share with the plenary.
Understanding how learning outcomes relate to learning *per se*

- Learning outcomes are not a new idea.
  - Instructional Objectives
  - Learning Objectives
  - Learning Goals
  - Behavioural Objectives
  - Performance Objectives, etc.

- The specification of learning outcomes derives from what we know about learning.
- Here is a quickie overview...


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Mager’s Objectives

Mager: The ideal learning objective consists of three key components: performance, conditions and criteria.

Performance: What the learner does. (Behaviour)

Conditions: When/where the learner does it.

Criteria: How much/how well the learner does it.
What makes for good descriptions?

**Performance:** What the learner does. (Behaviour)
- Describes activity
- Specifies actions or products of actions
- Observable, at least to the learner.

**Conditions:** When/where the learner does it.
- When presented with ...
- Without prompting...
- Working with a partner...

**Criteria:** How much/how well the learner does it.
- Qualitative or quantitative criteria
- How much, how often, how quickly, how accurately...
Defining some terms

- What is “learning?”
- What are “outcomes?”
Learning and Outcomes

- **Learning** is a relatively permanent change in behaviour resulting from reinforced practice.

- **Outcomes** are results, stated in terms of measurable changes in behaviour under specified conditions.

Q: What do “behaviour” and “conditions” include?
Behaviour

• Any activity of the learner

• Behaviour is broadly defined:
  • Overt and Covert
  • Non-verbal and Verbal (most university learning is verbal)

• Examples
  Thinking, Talking, Problem-solving, Writing, Evaluating, Imagining, Creating, Discriminating, Analyzing, Running, Painting, Organizing, Critiquing, Constructing, Coding, Computing, etc.

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So what is teaching?
Teaching defined

“Teaching is arranging **conditions** to expedite learning.” (BF Skinner)

“Conditions” refers to the contextual factors surrounding learning:

- Antecedent conditions (before behaviour)
- Consequent conditions (after behaviour)
The ABCs of Learning
Antecedent conditions

- The context in which behaviour occurs, including:
  - The learner’s history (esp. in similar circumstances)
  - The current setting
  - The “state” of the learner
- The instructional stimuli
  - Information (text, objects, drawings, lecture, videos, tweets, etc.)
  - Questions
  - Problems
  - Prompts
  - Audience
  - Readings
  - Incentives (promises of consequences)
  - etc.
Consequent conditions

What has happened after behaviour.

- **Reinforcement** (strengthens)
  - Intrinsic reinforcement
    - Natural consequences of the behaviour
  - Extrinsic reinforcement
    - Socially mediated consequences of the behaviour
- **Punishment** (weakens)
Think-Say and Hear-Say Exercise  (5 min)

- Pair up with a partner.
- Take turns talking about the ABC’s of Learning. What are they?
- Thinking of your course or program, identify important specific examples of ABC’s for your students.
Exercise 2:
Let’s try writing a simple learning outcome

- Imagine you have just brought home a new puppy from the pet store. (Cat lovers may substitute “kitten.”)

- Think-Write a learning outcome for your new pet that includes all three of Mager’s components.
  - Suggestion: Focus on what you want the pet to do rather than what you want the pet not to do.
Give your partner feedback

- Provide your partner feedback on their learning objective.

- Performance?

- Conditions?

- Criteria?
Homework for Part 2

- Using the BCIT handout *Writing Learning Outcomes* and Mager’s key features of instructional objectives, write at least one learning outcome.

- **Suggestion:** Be fairly specific and narrow in scope rather than broad.

- **Suggestion:** You may want to work on a general learning outcome that you divide into smaller more specific sub-outcomes.
Designing and Assessing Learning Outcomes

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October 2013

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Part 2 -- Overview

- Sharing homework
  - Pairs
  - Revise using feedback
  - Switch and share
  - Revise using feedback
  - Present
- Levels of Learning and Learning Channels
  - Bloom
  - Haughton
- Using the Learning Outcome Matrix
  - Homework

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Share your learning outcome

Partners provide feedback on Performance, Conditions and Criteria
Let’s drill down into the Behaviour
Domains of Learning

- Cognitive Domain (Bloom, 1956)
- Affective Domain (Krathwohl, 1969)
- Psychomotor Domain (Simpson, 1972)
Important: The higher levels of learning build upon the lower levels of learning!
Bloom’s Lower Levels

- **Knowledge** - observation and recall of information
  - knowledge of specifics (dates, events, places)
  - knowledge of ways of dealing with specifics
  - knowledge of universals and abstractions

- **Comprehension** - understanding information
  - translate knowledge into new context
  - interpret facts, compare, contrast
  - extrapolation of patterns

- **Application** - use information
  - use methods, concepts, theories in new situations
  - solve problems using required skills or knowledge

From Benjamin S. Bloom *Taxonomy of educational objectives.* Published by Allyn and Bacon, Boston, MA. Copyright (c) 1984 by Pearson Education. Adapted by permission of the publisher.

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Bloom’s Higher Levels

- **Analysis** - breaking into component parts
  - identify elements
  - identify relationships
  - identify organizing principles

- **Synthesis** - combining components into a whole
  - use old ideas to create new ones
  - generalize from given facts
  - relate knowledge from several areas
  - predict, draw conclusions

- **Evaluation** – assessing the value
  - compare and discriminate between ideas
  - assess value of theories, presentations
  - make choices based on reasoned argument
  - verify value of evidence
  - recognize subjectivity
Common Question Words

- **Knowledge:** Define, List, Recall, Name, Identify, Label
- **Comprehension:** Translate, Restate, Discuss, Describe, Recognize, Explain, Express, Report
- **Application:** Interpret, Apply, Employ, Use, Demonstrate, Dramatize, Practice, Illustrate, Operate, Solve, Sketch
- **Analysis:** Distinguish, Analyze, Differentiate, Calculate, Compare, Contrast, Diagram, Inspect, Inventory, Relate, Examine, Categorize, Parse
- **Synthesis:** Compose, Plan, Propose, Design, Formulate, Arrange, Assemble, Collect, Construct, Create, Set Up, Organize, Manage, Prepare, Make
- **Evaluation:** Judge, Appraise, Evaluate, Rate, Rank, Compare, Value, Revise, Score, Select, Choose, Assess, Estimate, Measure, Review

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Bloom’s Taxonomy Revised

Old Version

Knowledge
Comprehension
Application
Analysis
Synthesis
Eval.

New Version

Remembering
Understanding
Applying
Analysing
Evaluating
Creating
Bloom original and revision

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<th>New Domain</th>
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<td>Knowledge</td>
<td>Remembering</td>
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Adapted from: http://www.nwlink.com/~donclark/hrd/bloom.html  
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Cognitive Domain Wheel

Verb Wheel Based on Bloom's Taxonomy

“Level”

Domain

Appropriate verbs

Student products

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Think-Say and Hear-Say Exercise  (5 min)

- Pair up with a new partner.

Thinking of your course or program, identify specific examples of important lower-level behaviours:
  - Remembering (Knowledge)
  - Understanding (Comprehension)
  - Applying (Application)
Share
Think-Say and Hear-Say Exercise  (5 min)

- Pair up with your first partner.

- Thinking of your course or program, identify specific examples of important higher-level behaviours:
  - Analyzing (Analysis)
  - Evaluating (Evaluation)
  - Creating (Synthesis)
Share
Developing More Outcomes

Exercise 3 (Step 1)

Describe three learning goals for your course.

1.

2.

3.
Exercise 3 (Step 2)

- Using Bloom’s taxonomy, jot down verbs that seem relevant.

- With your goal statement in mind, list possible verbs.
  - Try working from the highest level down
    - What evaluation verbs?
    - What synthesis verbs?
    - What analysis verbs?
    - What application verbs?
    - What comprehension verbs?
    - What knowledge verbs?

Or, creating verbs...
Or, evaluating verbs...
Or, analyzing verbs...
Or, applying verbs...
Or, understanding verbs...
Or, remembering verbs...

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Share
# Haughton’s Learning Channels

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Learning Channels

Exercise 3

- Identify the Learning Channels that seem to be most relevant to your three learning goals.

- Specify both the Input and the Output channels.

- Examples: *See-Say, Hear-Write, Think-Draw*, etc.
Share
Using the Learning Outcome Matrix

Learning Outcome Matrix

- Organizes learning outcomes
- Relates outcomes to Levels of Learning (e.g., Bloom)
- Identifies Learning Channels (Haughton)
- Facilitates identification of formative and summative assessments (more on this next sessions)
- Facilitates identification of instructional methods (more on this next sessions)
- Prompts one to consider challenges
<table>
<thead>
<tr>
<th>Code</th>
<th>LO#</th>
<th>Learning Outcome Description</th>
<th>Level of Learning</th>
<th>Learning Channels</th>
<th>Instructional Methods</th>
<th>Practice Opportunities</th>
<th>Assessments</th>
<th>Challenges</th>
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Matrix Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>This field of the matrix can be used to categorize or designate the learning outcome. The code might note the general topic, &quot;unit&quot; or week of the course, the importance of the learning outcome, or whatever you may use to organize your learning outcomes.</td>
</tr>
<tr>
<td>LO#</td>
<td>This field can be used to identify the particular learning outcome.</td>
</tr>
<tr>
<td>Learning Outcome Description:</td>
<td>This field is used to describe the particular learning outcome. Your description will be most useful if you specify (1) the Behaviour, (2) the Conditions, and (3) the Criteria. The Behavior refers to what the learner will do, the Conditions refer the conditions under which the behaviour is to occur (when..., where...), and the Criteria refer to the minimal acceptable performance that satisfies the learning outcome.</td>
</tr>
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</table>

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Matrix Fields continued...

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level(s) of Learning</td>
<td>This field is used to designate the level of learning targeted by the learning outcome.</td>
</tr>
<tr>
<td></td>
<td>For Cognitive Domain learning outcomes, one can use Benjamin Bloom's classification system: Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation.</td>
</tr>
<tr>
<td></td>
<td>Another is the Affective Domain by Krathowal: Receiving, Responding, Valuing, Organizing, Characterization.</td>
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<td></td>
<td>Another is the Psychomotor Domain: Perception, Set, Guided Response, Mechanism, Complex Overt Response, Adaptation, and Origination.</td>
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</table>
Matrix Fields continued...

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Channel</td>
<td>This field refers to the inputs and outputs of the learning event (see below). Each learning episode will involve a combination of one or more inputs, and one or more outputs. Since we learn that which we practice (and little else), knowing the learning channels informs our instructional methods, learner practice opportunities, and summative assessment.</td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td>The inputs consist of the basic five senses (See, Hear, Touch, Taste, Smell) and Think, where the source of the input is cognitive.</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td>Outputs consist of general response modes (Say, Write, Feel (emote), Think, Select, Do, etc.</td>
</tr>
</tbody>
</table>

Note: The Learning Channel Output designation is central to assessment!
Matrix Fields continued...

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Instructional Methods</td>
<td>This field refers to what the <strong>instructor</strong> will do to facilitate the learning outcome. Sometimes instructional methods will involve things like assigning readings, presenting information, leading a discussion, modeling behaviour, etc.</td>
</tr>
<tr>
<td>Practice Opportunities</td>
<td>This field describes how the learner will practice. Given X (condition) the learner will Y (behaviour) and Z (condition) will occur.</td>
</tr>
<tr>
<td>Assessments</td>
<td>This field describes how the instructor will assess the mastery of the learning outcome.</td>
</tr>
<tr>
<td>Challenges</td>
<td>This field is where one can list any obstacles that might interfere with the learning process, instruction methods, practice, or mastery.</td>
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<tr>
<td>Code</td>
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Homework for Part 3

- To prepare for the next session, please develop three (or more) learning outcomes using sheets (pages 5-8 in Workshop Worksheet).

- Bring your learning outcomes to the next session, and we will spend time refining them.

- We will also take a look at assessment of learning outcomes and instructional strategies.

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Comments and Questions?

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October 2013

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<tr>
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<th>Context (External Factors)</th>
<th>Students</th>
<th>Content</th>
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<th>Learning Activities</th>
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Developing a Learning Outcome

- State your **Learning Goal**.

- **Paraphrase** it as needed to capture the scope of what you want the learner to learn.

- Identify the **Level(s) of Learning and Action Verbs**.

- Identify the **Input and Output Learning Channels**.

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Developing a Learning Outcome

- Describe the **Antecedent Conditions** (When? Where?).

- Describe how you could **Measure** the learning.

- Describe the **Criteria for Mastery** of the outcome.
Developing a Learning Outcome

- Describe how learners will Practice.

- Describe your Instructional Strategies.

- Identify possible Challenges to goal attainment.
Developing a Learning Outcome
Example from Learning Skills Course

- **State your Learning Goal.**
The learner will understand active and passive learning.

- **Paraphrase it as needed to capture the scope of what you want the learner to learn.**
The learner will be able to distinguish between and describe advantages and disadvantages of active and passive learning. The learner will be able to give examples of active and passive learning activities.

- **Identify the Level(s) of Learning and Action Verbs.**
  Knowledge: Describe active and passive learning. (Say, List features, Identify)
  Comprehension: Paraphrase active and passive learning. (Explain, Translate)

- **Identify the Input and Output Learning Channels.**
  Think-Write; Think-Say; See-Write; Hear-Say
Developing a Learning Outcome

Example from Learning Skills Course

- **Describe the Antecedent Conditions** (When? Where?). When asked, will give features and examples, and advantages and disadvantages.

- **Describe how you could Measure the learning.** Short-answer quiz (written and/or oral).

- **Describe the Criteria for Mastery of the outcome.** Descriptions must include (1) relevance of activity to learning goal, (2) frequency of practice, and (3) range of learning channels.
Developing a Learning Outcome

Example from Learning Skills Course

- Describe how learners will **Practice**.
  Think-Say to partner in class. Think-Write examples in class notes.

- Describe your **Instructional Strategies**.
  Show list of active and passive learning behaviours. Explain (1) relevance, (2) frequency, and (3) range of activities. Then, have learners describe features and examples to one another, and write these in their class notes.

- Identify possible **Challenges** to goal attainment.
  Class participation.
Your Turn

- Using the worksheet, develop a learning outcome.
- Think about each item, and write your response.
- Work with a partner on your first learning outcome.
- Work independently on the second learning outcomes, and then share with your partner.

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Comments and Questions?

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