How to write learning outcomes

Bloom’s taxonomy is a very useful aid to writing learning outcomes. The taxonomy consists of a hierarchy of increasingly complex processes which we want our students to acquire. It provides the structure for writing learning outcomes.

Bloom’s Taxonomy is frequently used by teachers in writing learning outcomes as it provides a readymade structure and list of verbs.

Bloom proposed that knowing is composed of six successive levels arranged in a hierarchy:

1. Knowledge - ability to recall or remember facts without necessarily understanding them

   Use action verbs like:

   Arrange, collect, define, describe, duplicate, enumerate, examine, find, identify, label, list, memorise, name, order, outline, present, quote, recall, recognise, recollect, record, recount, relate, repeat, reproduce, show, state, tabulate, tell.

2. Comprehension - ability to understand and interpret learned information

   Use action verbs like:

   Associate, change, clarify, classify, construct, contrast, convert, decode, defend, describe, differentiate, discriminate, discuss, distinguish, estimate, explain, express, extend, generalise, identify, illustrate, indicate, infer, interpret, locate, predict, recognise, report, restate, review, select, solve, translate.

3. Application: ability to use learned material in new situations, e.g. put ideas and concepts to work in solving problems

   Use action verbs like:

   Apply, assess, calculate, change, choose, complete, compute, construct, demonstrate, develop, discover, dramatise, employ, examine, experiment, find, illustrate, interpret, manipulate, modify,
operate, organise, practice, predict, prepare, produce, relate, schedule, select, show, sketch, solve, transfer, use.

4. Analysis: ability to break down information into its components, e.g. look for inter-relationships and ideas (understanding of organisational structure)

Use action verbs like:

Analyse, appraise, arrange, break down, calculate, categorise, classify, compare, connect, contrast, criticise, debate, deduce, determine, differentiate, discriminate, distinguish, divide, examine, experiment, identify, illustrate, infer, inspect, investigate, order, outline, point out, question, relate, separate, sub-divide, test.

5. Synthesis - ability to put parts together

Use action verbs like:

Argue, arrange, assemble, categorise, collect, combine, compile, compose, construct, create, design, develop, devise, establish, explain, formulate, generalise, generate, integrate, invent, make, manage, modify, organise, originate, plan, prepare, propose, rearrange, reconstruct, relate, reorganise, revise, rewrite, set up, summarise.

6. Evaluation: Ability to judge value of material for a given purpose

Use action verbs like:

Appraise, ascertain, argue, assess, attach, choose, compare, conclude, contrast, convince, criticise, decide, defend, discriminate, explain, evaluate, interpret, judge, justify, measure, predict, rate, recommend, relate, resolve, revise, score, summarise, support, validate, value.

Another domain in Bloom’s Taxonomy

AFFECTIVE DOMAINII ("Feeling") concerned with value issues: involves attitudes.

1. Receiving
2. Responding
3. Valuing
4. Organisation
5. Characterisation

Integretion of beliefs, ideas and attitudes
Comparing, relating, synthesising values
Commitment to a value
Active participation in own learning
Willingness to receive information
Active verbs for affective domain

Accept, assist, attempt, challenge, combine, complete, defend, demonstrate (a belief in), discuss, dispute, embrace, follow, hold, integrate, order, organise, join, share, judge, praise, question, relate, share, support, synthesise, value.

Learning outcomes should:

• be written in the future tense, i.e.
  use phrases like “On successful completion of this module, students should be able to:” [list of learning outcomes]
• identify important learning requirements
• be achievable and assessable (use active verbs)
• use clear language easily understandable to students
• Learning outcomes should be clearly written so that they are understood by students, colleagues and external stakeholders
• Learning outcomes should focus on what students should be able to demonstrate upon completion of the module or programme
• Avoid complicated sentences,
• Avoid ambiguous verbs such as “understand”, “know”, “be aware” and “appreciate”
• 5 – 8 learning outcomes per module.

Example

Here is an example of some learning outcomes for an introductory course on atomic structure (physics). The aims of the course may be to give students an appreciation of how models of the atom have developed and help them to recognise the importance of quantum mechanics in describing the modern view of the atom.

At the end of this course you should be able to:

• define the terms wavelength, frequency, amplitude and node.
• recall the relative frequencies or wavelengths of the various regions in the electromagnetic spectrum
• describe the Bohr model of the atom and use it to account for the emission line spectra of the H atom
• discuss the limitation of the Bohr model
• use the Rydberg equation to predict the wavelengths of electronic transitions
• describe the concept of particle wave duality
• state the Heisenberg Uncertainty Principle and discuss the ramifications of it
• describe what you understand by the term orbital
• name and state the relationships between the quantum numbers $n$, $l$ and $m_l$
Checklist for Writing Learning Outcomes\textsuperscript{iv}

- Have I begun each outcome with an active verb?
- Have I avoided terms like know, understand, learn, be familiar with, be exposed to, be acquainted with, be aware of and appreciate?
- Have I included learning outcomes across the range of levels of Bloom's Taxonomy?
- Are my outcomes observable and measurable?
- Do all the outcomes fit within the aims and content of the module?

References

A Useful Guide to Learning Outcomes:

Declan Kennedy, Áine Hyland, Norma Ryan: Writing and Using Learning Outcomes. a Practical Guide


\textsuperscript{iii} The following example is taken from: The Higher Education Academy, Physical Sciences Center: Writing Learning Outcomes Advice on defining courses using an outcomes-based approach

\textsuperscript{iv} This checklist is taken from: Prof. Áine Hyland, European Universities Association: Using Learning Outcomes. Future Potential, Advantages and Traps