Bloom's Taxonomy

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How to use this

This document gives an overview of Bloom's taxonomy with many examples. If you are trying to create assessment questions at particular Bloom's level, you are welcome to use/adapt the questions.

There are action verbs given along with each Bloom's level. You can use those action verbs in appropriate sense to create questions.

Examples of activities (especially the ones using technology) that can be performed at each Bloom's level are present. Feel free to use/adapt them.(form two illustrative domain)

More details can be found in reference list provided at the end.

Introduction

A taxonomy is used to classify things. Bloom's is a taxonomy of educational objectives. This taxonomy defines levels of objectives in 3 domains:

- Cognitive (knowledge based)
- Affective (emotive based) &
- Psychomotor (action based)

A revised version of Bloom's taxonomy was published by Anderson et al. in 2001. We will concentrate on cognitive domain from revised Bloom's taxonomy in this document.

Bloom, B. S. (1956). Taxonomy of educational objectives: The classification of educational goals .
Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Allyn & Bacon.

Why Bloom's taxonomy?

Educational activities include setting learning objectives for students, assessing students and delivering instruction. An **alignment** between these activities is necessary: We should ensure that we are assessing the students on required learning objectives. The instruction should be directed towards helping student achieve those learning objectives.

Bloom's taxonomy provides one way to create and classify these educational activities and check for alignment between them. By providing a **hierarchy**, it provides a sense of difficulty/complexity of educational activities. It has been persistently used from 1956 by teachers, policy-makers, learning technology developers around the world.

Cognitive Domain

The levels in cognitive domain are as follows according to revised Bloom's taxonomy:

- Create
- Evaluate
- Analyze
- Apply
- Understand
- Remember

This is a hierarchy and each level subsumes the ones below it.

For each of these levels let us see a brief description of the level, an example of an assessment question at that level, some frequently used action verbs to frame questions at that level and an example of a task at the level using a technology. Let us start from the lowest level in the hierarchy.

Remember

Description: Recognize, recall facts

Example: Recalling Newton's laws of motion

Action verbs: list, recite, define, name, match, quote, recall, identify, label, recognize

Task using a Technology: Highlighting, Bookmarking, Flashcards, Searching/Googling

Understand

Description: Grasp meaning, explain, interpret, translate, paraphrase

Example: Describing the concept of uniform circular motion

Action verbs: describe, explain, paraphrase, restate, give original examples of, summarize, interpret, discuss

Task using a Technology: Summary writing in blog/wiki/journal, Explaining by Mind maps, categorising, annotating

How does this subsume the level below (recall)?

This would require the learner to recall the concept of constant speed and tangential direction. Then explaining what happens when a body in constant speed changes its direction constantly.

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Apply

Description: Use knowledge in a new situation. Involves rules, methods, laws, principles

Example: Use the formula of s = ut + ½ at^2 to solve a problem

Action verbs: calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model

Task using a Technology: Creating presentations (Powerpoint, Zoho, Prezi), Play simulation/games, explain using screen capture

How does this subsume the level below (understand)?

Assuming that the formula is not given, this would require the learner to recall the formula and its parameters.
Then assigning correct values for the parameters and solving and converting units.

Analyze

Description: Separate whole into parts until structure of whole and relationship between parts is clear.

Example: Analyze a physical scenario and find the relative magnitude of forces acting upon the object in the scenario

Action verbs: classify, outline, break down, categorize, analyze, diagram, illustrate

Task using a Technology: Organizing using (database, MS Excel), analyze & explain graphs(excel, draw.io, graphsketch.com), Mashups

How does this subsume the level below (apply)?

This would require the learner to: Understand what forces are acting
Recall their formulae
Apply those formulae to find the relative magnitude

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Evaluate

Description: Judge value based on criteria, decision making.

Example: Evaluate a given free body diagram for a given physical scenario

Action verbs: choose, support, relate, determine, defend, judge, grade, compare, contrast, argue, justify, support, convince, select, evaluate

Task using a Technology: Create argumentation maps (Mind map, compendium), Writing summary (Wiki, blog, journal), Writing review/critique/conclusions (Comments, wikis)

How does this subsume the level below (analyze)?

This would require:
Analyze the physical scenario to find objects and forces present
Remember relevant concepts
Apply the procedure to write free body diagrams
Compare the two free body diagrams

Create

Description: Combine parts to make (new) whole, creative behaviours, propose plans

Example: Create working models to demonstrate Newton's laws of motion

Action verbs: design, formulate, build, invent, create, compose, generate, derive, modify, develop

Task using a Technology: Write a program(IDEs) ,Plan an activity (planners), create models (Blender, Sketchup), create blog, vlog, podcast

How does this subsume the level below (evaluate)?

This would require the learner to: Analyze real world examples of Newton's laws Explain how Newton's laws in the context of those examples Identify objects and forces Calculate relative magnitude/ momentum/ final velocity etc

Examples

Domain: Basic Electronics & Logic Design

Create	Design of counter/ state machine
Evaluate	Compare and contrast two methods for implementing given function
Analyze	Realize a multiplexer by selecting optimum gates
Apply	Apply truth tables and solve problems
Understand	Write truth table for given combination of "AND" gates
Recall	Draw logic symbol of "AND" gate

Examples

Domain: Linear Equations

Create	Suppose you are given any two linear equations. Devise a rule to determine if there is a unique set of x,y values which satisfy both equations.
Evaluate	Decide which method (among elimination, substitution, graphical) is easier to solve simultaneous linear equation. Justify.
Analyze	A verbal problem like: A multiplex sold 500 tickets in a day. Adult tickets cost Rs 200...
Apply	Calculate the slope and y-intercept of the straight line shown in a graph
Understand	Explain why is y=mx+b called a 'linear' equation
Recall	Define a linear equation

References

1. Book on revised Bloom's taxonomy

Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Allyn & Bacon

2. Writing Objectives Using Bloom's Taxonomy:

http://teaching.uncc.edu/learning-resources/articles-books/best-practice/goals-objectives/writing-objectives

3. Bloom's and ICT tools:

http://edorigami.wikispaces.com/Bloom%27s+and+ICT+tools#Bloom%27s%20revised%20taxonomy%20and%20Digital%20Approaches

4. Biggs Constructive alignment

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher education*, *32*(3), 347-364.