

Guide to Taxonomies of Learning outcomes

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Introduction

With the introduction of modularisation, UCD has moved to a learning outcomes based approach to ensure that curriculum design evolves from a more teacher-centred (content) to a more student-centred (learning) focus. Identifying learning outcomes enables both the teacher and students to clearly identify what a student is expected to have achieved or have made progress towards achieving on completion of a module. This short guide is designed to facilitate module coordinators in writing appropriate learning outcomes. It has been especially designed for use during the College of Arts and Celtic Studies and the College of Human Sciences module enhancement process. It is not designed to be prescriptive but rather may be a useful way of considering how to write meaningful outcomes for your modules.

Learning taxonomies or classifications are commonly utilised as a way of describing different kinds of learning behaviours and characteristics that we wish our students to develop. They are often used to identify different stages of learning development and thus provide a useful tool in distinguishing the appropriateness of particular learning outcomes for particular module levels within our Programmes. The most common and earliest of these is Bloom's Taxonomy (1956), adapted more recently by Anderson et al (2001).

1. Taxonomy of Anderson et al (2001) and Bloom (1956).

This taxonomy is similar to many others in its hierarchical nature: simply put the categorization implies implying that the earlier level, as a general rule, must be mastered before the next level. The original taxonomy has three parts (or domains) and these are the **Cognitive**, **Affective** and **Psychomotor**.

The **Cognitive** domain has received most attention both in Anderson/Bloom's and others' taxonomies. The revised Bloom's **Cognitive** domain has a hierarchy of categories that capture the process of learning, from simply remembering information to creating something new: *Remember Understand Apply Analyze Evaluate Create*. To these levels has been added a knowledge dimension (*factual conceptual procedural metacognitive*). **Table 1** below indicates the structure of Bloom's revised taxonomy and some verbs that might be useful in writing learning outcomes appropriate to particular kinds of skills that you wish your students to demonstrate. For other examples see:

<http://oregonstate.edu/instruct/coursedev/models/id/taxonomy/#table> .

Table 1: Anderson's et al (2001) Cognitive Revised Domain

	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge	List	Summarize	Classify	Order	Rank	Combine
Conceptual Knowledge	Describe	Interpret	Experiment	Explain	Assess	Plan
Procedural Knowledge	Tabulate	Predict	Calculate	Differentiate	Conclude	Compose
Metacognitive Knowledge	Appropriate Use	Execute	Construct	Achieve	Action	Actualise

Krathwohl's Taxonomy of the **Affective** Domain was developed from Bloom's original and is the best known of the affective domains, it includes concepts such as Receiving ideas; Responding to ideas, phenomena; Valuing ideas, materials; Organization of ideas, values; Characterisation by value set (or to act consistently in accordance with values **internalised**). The learner moves from being aware of what they are learning to a stage of having internalised the learning so that it plays a role in guiding their actions. We expect graduates of our colleges to develop the ability to respond with a highly developed value system to the world around them and in expressing this kind of outcome, we can use affective domain framework. The affective domain is certainly applicable in Arts and Human Sciences, as it captures the idea of students learning the value of what is being taught. Educators can expect that students learn to value and appreciate literature, music, visual art, culture etc as part of their learning about them. It is normal for us to expect students to come to appreciate the significance of many of the ideas and topic we are teaching rather than just mastering skills. The affective domain is one area where we can find the vocabulary to help express this expectation. (see <http://classweb.gmu.edu/ndabbagh/Resources/Resources2/krathstax.htm>) (Seels & Glasgow, 1990).

Table 2: Affective Domain

Level	Characteristic	Some Verbs
Receiving	Developing awareness of ideas and phenomena	Ask Follow Reply Accept Prefer
Responding	Committing to the ideas etc by responding to them	Answer Recite Perform Report Select Follow Explore Display
Valuing	Being willing to be seen as valuing certain ideas or material	Justify Propose Debate Relinquish Defend Initiate
Organisation and Conceptualisation	To begin to harmonise internalised values	Arrange Combine Compare Balance Theorize
Characterisation by value	To act consistent with the internalised values	Discriminate Question Revise Change

An example of a useful **Psychomotor domain** is Dave's (1970) and Ferris and Aziz's (2005) adaptation of Bloom's original Taxonomy. The key categories in this competence capture the development in learning from initial exposure to final, unconscious mastery. While the taxonomy deals largely with motor-area skills and the mastery of them, it is also applicable to the Colleges of Arts and Celtic Studies, and Human Sciences. Many of the skills and attributes we seek to impart to our students involve just this kind of development. This may be the more obvious ones such as performing on a musical instrument or being part of a successful excavation, but included here are also such things as the development of fluency in a language as well as the key transferable skills of encoding and decoding information in graphic forms, such as tree diagrams and bar charts along with the ability to produce accurate maps. The key stages and a brief explanation are shown below in table format. For another view on the categorisation and organisation of the psychomotor domain, you can visit the website <http://www.businessballs.com/bloomstaxonomyoflearningdomains.htm#bloom's%20taxonomy%20overview>).

Table 3 Psychomotor Domain

Level	Characteristic	Some Verbs
Perception / Observing	Here the student is simply observing the procedure	Observe Listen Detect
Guided Response / Imitation	The student can follow instructions but needs to be instructed	Copy React Follow Reproduce

Mechanism	This is an intermediate stage where proficiency and confidence are growing	Organise Manipulate
Complex response	Proficiency has grown and performance is quick and accurate with little or no hesitation	The verbs are essentially the same as Mechanism, but modified by 'accurately' or 'quickly'
Adaptation	The student has such ability that they can combine and integrate related aspects of the skill without guidance	Reorganise Alter Rearrange Vary Internalise
Origination	The student has internalised automatic mastery of the skill	Compose Construct Design Initiate Create

2. The SOLO (Structure of Observed Learning Outcomes) Taxonomy

The alternative to Blooms' **Cognitive** Domain that is commonly utilised in Higher Education is the SOLO Taxonomy. It has been used to not only assist in writing learning outcomes but has also been used to categorise answers and is often used in assessment criteria. There are five hierarchical levels (Biggs & Collis, 1982; Biggs, 1992) that range from incompetence to expertise (Boulton-Lewis, 1994). A good representation of the SOLO taxonomy and the different types of relations it deals with can be found at: <http://www.learningandteaching.info/learning/solo.htm>.

Table 4: SOLO Taxonomy

Level	Characteristic	Some verbs
Pre-Structural	Incompetent, nothing known about the area	-
Uni-Structural	One relevant aspect is known	List, Name Memorize
Multi-structural	Several relevant independent aspects are known	Describe Classify Combine
Relational	Aspects of knowledge are integrated into a structure	Analyse, Explain, Integrate
Extended Abstract	Knowledge is generalised into a new domain	Predict, Reflect, Theorise

3. Finks Taxonomy.

Unlike the previous two taxonomies, Fink (2003) presents a taxonomy that is not hierarchical. In addition it covers a broader cross section of domains with the exception of a psychomotor domain. It is similar to Anderson's taxonomy (2001) in its emphasis is on metacognition (learning to learn) and also includes more affective aspects such as the 'human dimension' and 'caring: identifying/changing one's feelings'. Table 5 highlights some appropriate verbs linked to particular learning behaviours that may be of use in writing your learning outcomes. For more information on Fink's taxonomy see: <http://www.ou.edu/pii/significant/WHAT%20IS.pdf>

Figure 1: Finks Taxonomy (2003)

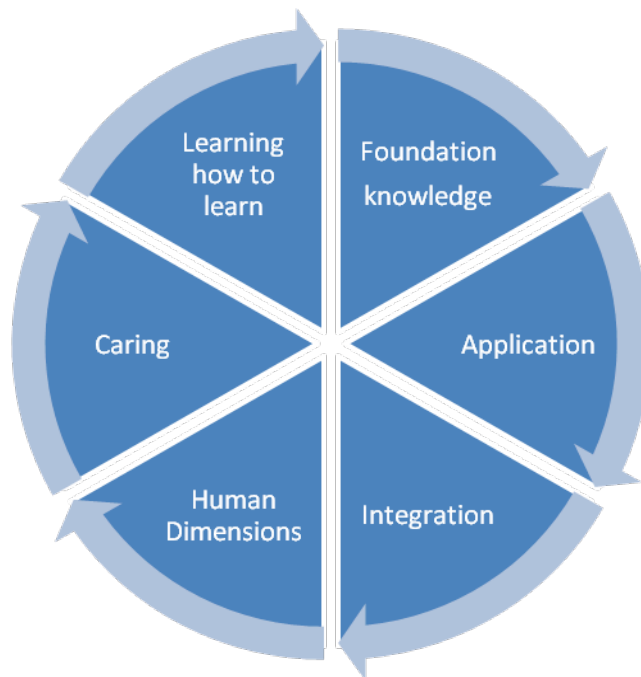
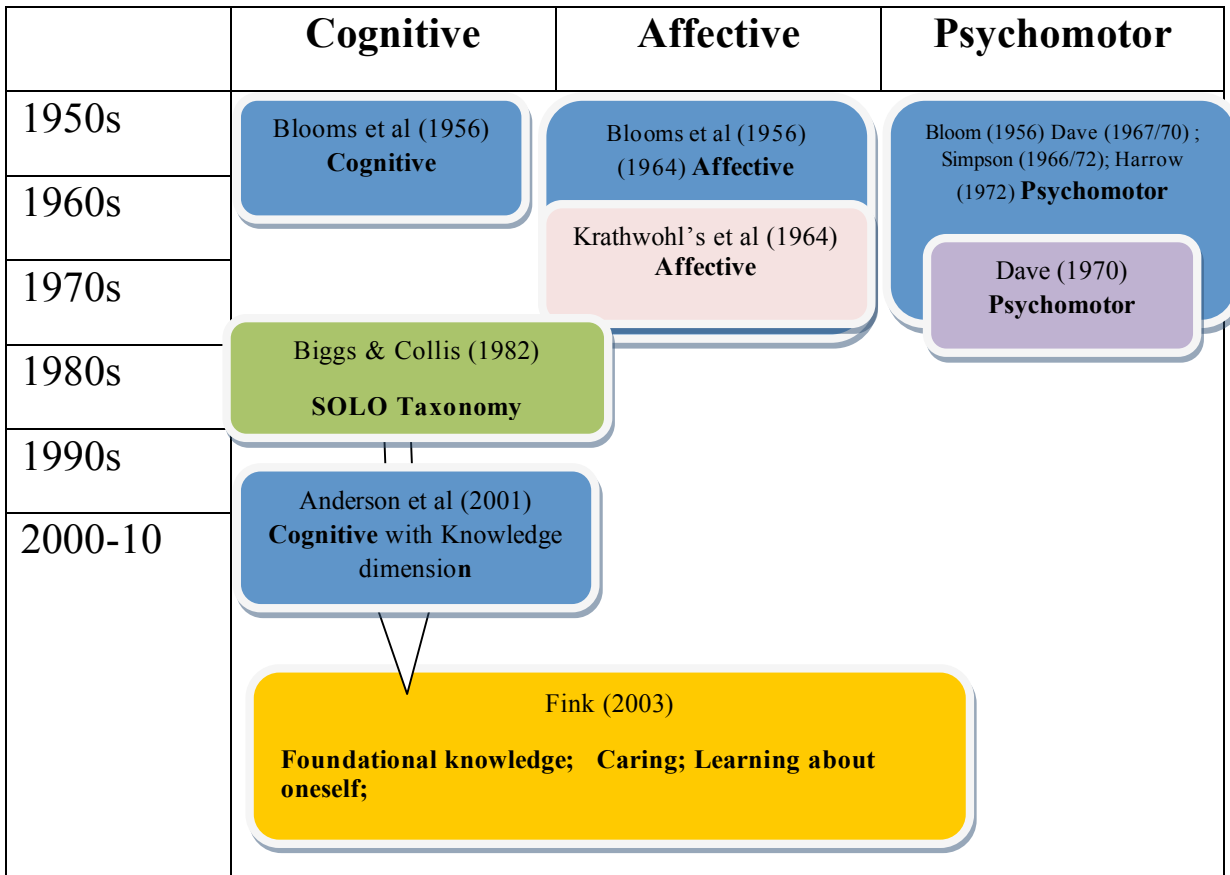


Table 5: Finks Taxonomy (2003; 2009)

Dimension	Description	Some Verbs
Foundational Knowledge	Understand and remember	name list describe
Application	Critical, creative and practical thinking; problem solving	Analyse interpret apply
Integration	Make connections among ideas, subjects, people	Describe integrate
Human Dimensions	Learning about and changing one's self; understanding and interacting with others	Reflect assess
Caring	Identifying/changing one's feelings, interests, values.	Reflect interpret,
Learning to learn	Learning how to ask and answer questions, becoming a self-directed learner	Critique analyze

Appendix 1: Overview of development of Taxonomies and their domains



Appendix 2:

Some critical thoughts when exploring the taxonomies.

- There has been some criticism in the literature of the practice and/or implications that all learning is simply hierarchical as it can imply that early years in the curriculum should only have lower cognitive level learning outcomes and experiences, i.e. factual, descriptive experiences. Challenging critical and complex learning activities can also be appropriate early in the curriculum.
- The frameworks are a guide for developing a range of student learning experiences and not a prescription; they need to be contextualised for the different disciplines/subject areas.
- There has been, over the last 50 years, huge popularity in the use of the Cognitive domain, despite the availability of the Affective and Psychomotor domains. These two have become more popular in recent years, despite the fact that all three have been there since 1956 (Bloom)
- Module co-ordinators may find the diagram in the SOLO taxonomy a useful help in understanding this version of the cognitive domain (see Biggs 1999b article in references and available in UCD's Academic Search Premier Database).
- Don't be put off by some of the educational language that may not seem to relate to your area, i.e. 'caring' in the Finks Taxonomy, or 'Psychomotor' in Blooms. When you explore these concepts further they relate to most areas/subjects/disciplines and can often reflect some core subject/discipline values not easily covered when only using the cognitive domain.

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Based upon R. H. Dave, as reported in R. J. Armstrong et al., *Developing and Writing Behavioural Objectives* (Tucson, AZ: Educational Innovators Press, 1970)