



Teaching Toolkit

How Students Learn 2

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Behaviourism

Introduction

Behaviourism has been intrinsically linked with learning for many years. The concept of reinforcement (of something positive following an event to increase its likelihood of occurring again) is evident at all educational levels, from the smile of approval in early years to the awarding of credits and degrees at the higher levels (Jordan, Carlile, & Stack, 2008). While looked upon less favourably than the more modern cognitivist and constructivist theories, behaviourism continues to be hugely influential in teaching and learning in higher education. This resource looks at the presence of behaviourism in design and delivery of courses, and provides some info as to how behaviourist principles can be employed to promote learning.

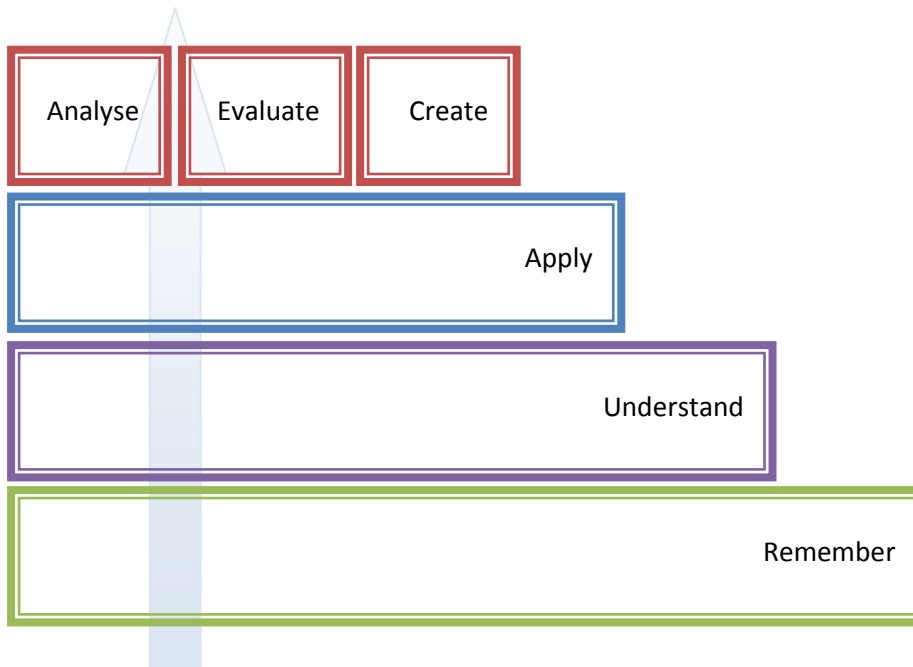
Learning is “any more or less permanent change in behaviour which is the result of experience” (Borger & Seaborne, 1966)

Learning Outcomes

The behaviourist definition of learning states that learning results in a change in behaviour, to ascertain whether learning has transpired we should abandon the examination of inaccessible and unobservable mental events (Tennant, 2003) in favour of directly observable behaviours. At the beginning of the module or programme therefore, clearly established behaviourally defined learning outcomes objectives are developed. These learning outcomes are expressed in terms of what the students can do as a result of engaging in the teaching and learning environment, and clearly define how students can demonstrate their mastery of the material.

Bloom’s Taxonomy of learning

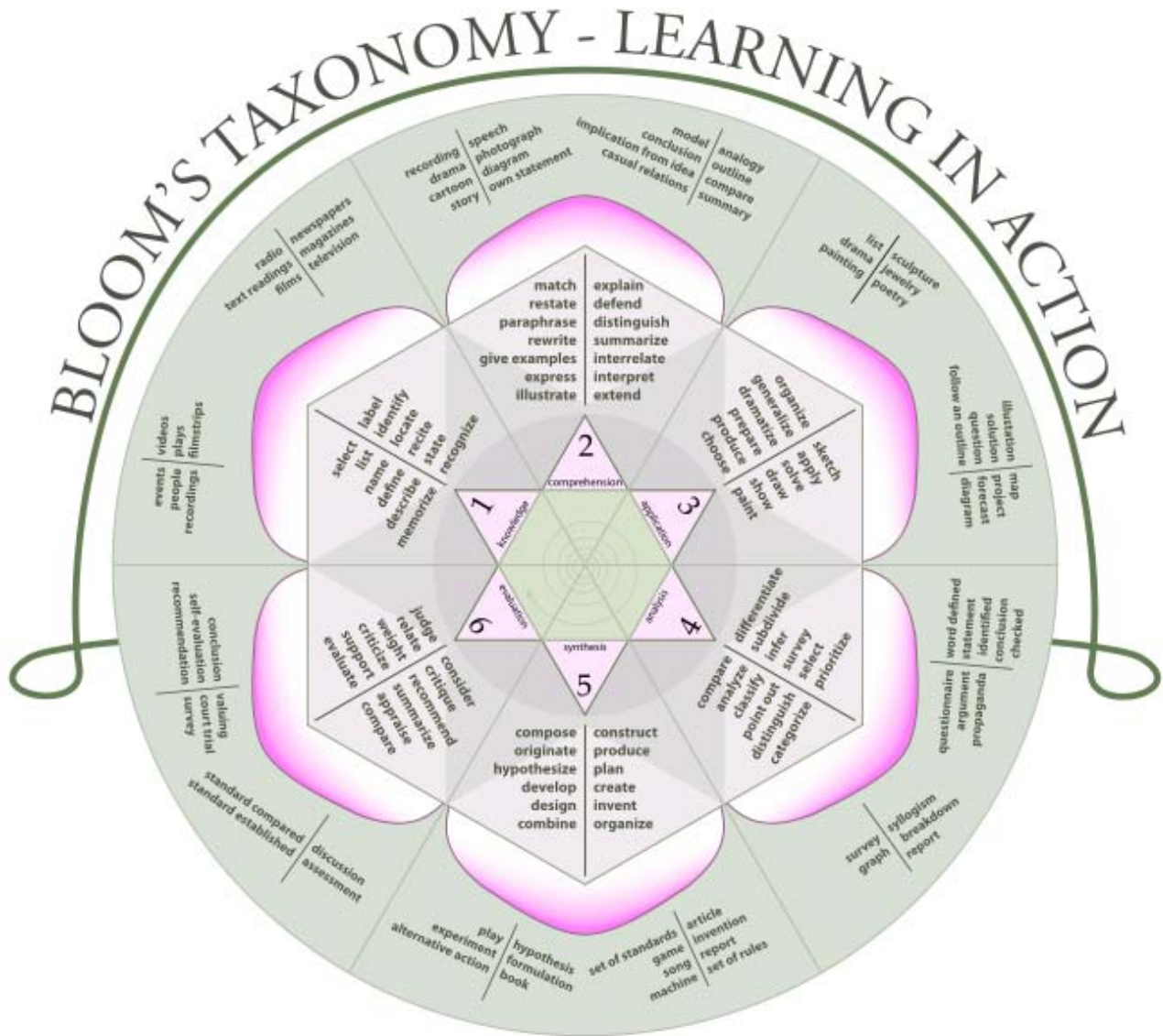
Bloom’s taxonomy will be familiar to many. He proposed three major domains of learning: cognitive (our understanding and critical thinking); affective (how we react emotionally); and psychomotor (our ability to physically manipulate tools or instruments) (Bloom & Krath, 1956). It’s the first of these three that is regularly drawn on in planning teaching session. Bloom identifies a number of cognitive levels at which we can function, moving from the basic ability to understand and recall information, to the more complex cognitive tasks of information synthesis and evaluation. Often presented as a hierarchical pyramid, there is no fixed or sequential development path. Learners may operate at a number of levels simultaneously, though performing at the highest levels is dependent on the ability to master the cognitive demands of the lower levels (see Figure 1).



Note: Many representations identify the top three as 'create', 'evaluate', and 'analyse' respectively, Anderson & Krathwohl (2001) portray these three as parallel, not hierarchical.

Figure 1: Bloom's Cognitive Learning Taxonomy

Bloom's taxonomy should be drawn upon when developing learning outcomes to ensure more tangible descriptors are used (such as "evaluate", "discuss", "construct", "classify", or "combine") at the expense of general, non-observable descriptors (such as "understand"). Literature is replete with good examples of how this taxonomy can be coupled with appropriate actions verbs or descriptors, and with accompanying learning activities. One example is presented in Figure 2.



(Image from <http://www.thecaepreschool.com/bloomspop.html>)

Figure 2: Bloom's Cognitive Taxonomy with Associated Verbs & Learning Activities

Behaviourism in Teaching and Learning

Instrumental teaching is the most common application of behaviourist learning theories in higher education. This is the foundation for the outcomes-based curriculum, where the learning outcomes are specified in clearly observable behavioural terms.

While often criticized for failing to address issues of higher level learning (i.e., acquisition of concepts, problem-solving and originality), behaviourism has been effective in the teaching and assessment of competencies to verify that students possess the requisite skills.

Some behaviourist approaches to teaching include:

- Breaking material into small units
- Providing opportunities for frequent feedback
- Using reinforcement to strengthen the behaviour that you want to encourage
- Employing different schedules of reinforcement to encourage learning (see below)
- Describing the terminal behaviour and organising material to be learned (e.g., inform students of learning objectives for the class, explain exactly what you want them to learn by the end of the lesson, and arrange the material to be learned in steps)
- Using special forms of reinforcement to motivate students to persevere when they lose motivation
- Base assessment on pre-established learning outcomes

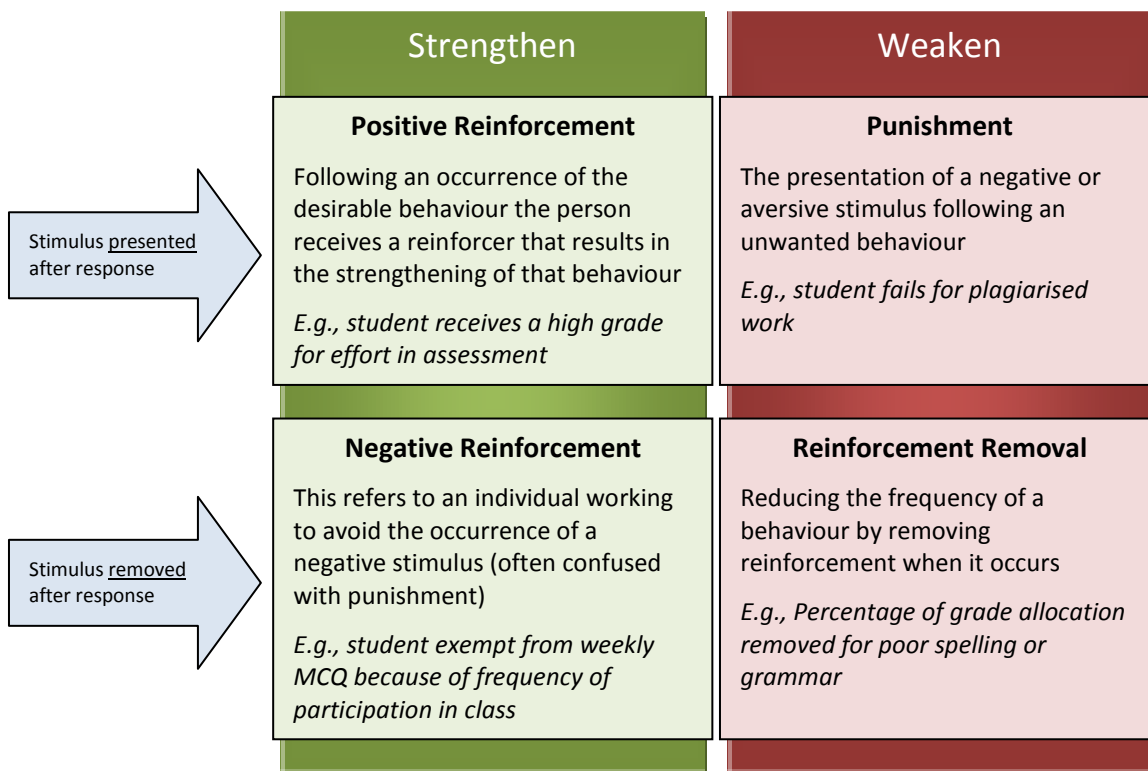
Behaviourist techniques can be used to strengthen or weaken behaviour, as well as maintain or teach new behaviour. The information presented below, based on Driscoll (2005) outlines the principles associate with each.

Strengthening or Weakening Behaviours

Changing behaviour is based on Skinner's laws of conditioning and extinction:

Law of conditioning	Law of extinction
A response followed by a reinforcing stimulus is strengthened and therefore more likely to occur again	A response that is not followed by a reinforcing stimulus is weakened and therefore less likely to occur again

Skinner noted that for a specific behaviour to occur both the nature and the timing of the stimulus following a response were important in predicting the future occurrence of the behaviour. The principles for strengthening or weakening behaviour can be summarised as follows:



Teaching New behaviours

Previous techniques are used when the learner knew the behaviours already. There are three principles for teaching new or complex behaviours: shaping, chaining, and fading.

<p><i>Shaping</i></p>	<p>Shaping is used to teach new behaviours that are relatively simple by positively reinforcing successive approximations to the target behaviour.</p> <p>Closer approximations to the goal should not be reinforced until after the previous one has been firmly established. If too large a step is expected of the learner at once, the behaviour may break down and shaping may have to resume at the point where the learner has repeated demonstrated success.</p> <p>It's also important to ensure that reinforcement is delivered immediately contingent upon the desired response since delays can result in a randomly occurring behaviour being reinforced and conditioned</p>
<p><i>Chaining</i></p>	<p>Chaining serves to established complex behaviours made up of discrete, simpler behaviours already known to the learner. This can be achieved by forward chaining (starting with first step) or backward chaining (starting with end product and working back)</p>
<p><i>Discrimination learning and Fading</i></p>	<p>Discrimination can be seen when someone will respond to a certain stimulus, but fails to produce the same response when presented with a similar stimulus</p> <p>Using pigeons, Terrace (1963) demonstrated that almost errorless discrimination could be achieved with fading. This refers to the fading out of discriminative stimuli used to initially establish a desired behaviour. So the desired behaviour continues to be reinforced as the discriminative cues are gradually withdrawn</p>

Maintaining Behaviour

Maintaining a desirable behaviour using behaviourist principles involves altering the frequency (ratio schedule) or timing (interval schedule) of the reinforcement. There are four approaches based on these options: fixed ratio; fixed interval; variable ratio; and variable interval.

	Fixed Reinforcement	Variable Reinforcement
Based on Frequency (Ratio)	<p><i>Fixed Ratio</i></p> <p>Reinforcement is contingent upon the response from the learner. Requires the learner to make a certain number of responses before reinforcement is delivered</p> <p>(E.g., Weekly MCQ tests that accumulate for a percentage of final grade)</p>	<p><i>Variable Ratio</i></p> <p>The number of responses required for reinforcement varies from reinforcement to reinforcement. Variable ratio schedules produce the highest rates of responding</p> <p>(E.g., Receiving infrequent praise for responding to questions in class)</p>
Based on Time (Interval)	<p><i>Fixed Interval</i></p> <p>Reinforcement is delivered after some fixed period of time. It is often found that responding becomes more frequent as the time for reinforcement nears</p> <p>(E.g., Attendance increasing in final weeks of term)</p>	<p><i>Variable Interval</i></p> <p>Reinforcement varies depending on time rather than occurrences of the behaviour. Variable interval schedules produce steady rates of responding</p> <p>(E.g., Reward for attendance and participation in tutorials)</p>