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BENJAMIN BLOOM

LEARNING THROUGH TAXONOMIES

LEARNING OUTCOMES

Having read this chapter you should be able to:

- understand the impact of Bloom on the theories of evaluation and learning
- identify and understand his notions of mastery learning and the cognitive, affective and psychomotor learning domains
- apply principles of mastery learning and the three learning domains to your practice
- critically appraise his theories.

KEY WORDS

cognitive domain; mastery; affective domain; psychomotor domain; Bloom's taxonomies; objectives curriculum model

INTRODUCTION

Benjamin Bloom was indeed a psychologist and authority, who influenced generations in their quest to improve educational quality. (Husen, 2001: 89)

Bloom wrote seventeen books and numerous articles which had a significant role in shaping educational thought in the latter half of the twentieth century and today. His major theories were mostly a result of work conducted overseas, in particular India where he witnessed the widespread use of rote learning – learning which he considered was just the attaining of knowledge and was only retained long enough to pass examinations. As a result of this experience, he created the first of his taxonomies (classifications) of learning – the **cognitive domain** – which was published in the *Taxonomy of Educational Objectives, Book 1: Cognitive domain* (1956). He later focused on enhancing ‘mastery’ in learning rather than rote learning just to pass examinations. He went on to develop his work in the **affective domain** which considered feelings and behaviours. Unfortunately, Bloom did not finish his work on the **psychomotor domain** relating to manual and physical skills. However, this and his earlier works on mastery and the cognitive and affective domains have been explored and developed by others (Williams, 2004). Each of the taxonomies offers a ‘hierarchy of goals, of “intended learning outcomes” defined in terms of the kind of behaviour the pupil is intended or expected to display through his or her thoughts, actions or feelings’ before it can be declared the objective has been attained (Kelly, 2004: 63). **Bloom’s taxonomies**, then, are classifications of behavioural learning objectives into these three domains; each domain has a list of hierarchical learning objectives categorised according to their level of complexity. Bloom’s taxonomies have ‘provided educators with one of the first systematic classifications of the processes of thinking and learning’ (Forehand, 2010: 4). These three taxonomy domains will be examined separately later in this chapter.

Along with development of the domains of learning, Bloom’s other important idea was his 1960s work on **mastery learning**, which he argued was essential in developing a lifelong interest in learning (Bloom, 1968). Within this notion, he argued, the vast majority of students could learn the fundamentals of skills and knowledge if they were allowed enough time to do so. He contested that academic achievement was not really about intellectual ability which was examined within time constraints. Furthermore, he contended ‘that to *reduce* variation in students’ achievement and to have all students learn well, we must *increase* variation in instructional approaches and learning time’ (Guskey, 2005: 1). He also suggested that those learners who came from advantaged social backgrounds were quite used to having the time to prepare and rehearse examinations. Therefore, they had an edge over those less socially advantaged. The differences are evident before children start formal education, but the gap between those who are advantaged in this way is widened as they progress through the levels of learning at school. It was through the work of Bloom, and contemporary educational thinkers such as Jerome Bruner, that the significance of cognitive activity for the

very young was highlighted, thus prompting the US government to launch the Head Start programme (Goodlad, 2004). Head Start was a 1960s initiative to provide three- to five-year-old children from low-income families with medical and social enrichment 'to enable them to learn more effectively once they reach school' (Rowntree, 1981: 113). Prior to this the traditional perception was that the level of academic achievement was an inherent ability that individual children possessed, rather than a matter of social advantage or disadvantage.

Bloom, therefore, thought privilege and social class played a large part in deciding which children did well at school. Children benefited if they grew up in environments which fostered the behaviour, language and cognitive skills that were applicable for school. What was important was for children to be given time to develop and that the curriculum and associated pedagogy matched their learning needs. Bloom questioned the mainstream idea that some learners were superior to others, but he acknowledged some students were quicker than others in their learning. Furthermore, a favourable learning environment would enhance children's aptitude, motivation and speed of learning (Husen, 2001). For Bloom, education was embedded in a personal ethos of social justice and thus:

Attainment was a product of learning, and learning was influenced by opportunity and effort. It was then, and is now, a powerful and optimistic conception of the possibilities that education provides. (Eisner, 2000: 4)

BENJAMIN BLOOM, THE PERSON

Benjamin Bloom was from a poor Jewish family who fled their native Russia because of religious persecution. He was born after their arrival in the United States, in Lansford, Pennsylvania, in 1913. His first position following his graduation from Pennsylvania State College in 1933 was as a research assistant, firstly with the American Youth Commission and then with the Cooperation Study in General Education. Perhaps his most formative role was working with Ralph Tyler, who was the chairman of the School of Education at the University of Chicago on the seminal 'Eight-Year Study'. The purpose of the study was to revise the secondary school curriculum with a view to allowing greater numbers of students to access higher education. He was to have a very close relationship with the university throughout his career, becoming Professor of Education, completing his PhD and serving as a university examiner.

Other positions of esteem followed, which included being involved in the setting up of Research and Development Centers. He was elected chairman of the American Educational Research Association (AERA) and, in 1970, in recognition of his work in education he was given the AERA Phi Delta Kappa award. From an early point in his academic career, he became absorbed in a number of global projects, particularly in Israel and India, and in 1961 he was instrumental in the implementation of

the International Association for the Evaluation of Educational Achievement (IEA). Some of his major theories explored further on in this chapter were as a result of his international work.

Bloom's early interactions with pedagogy came about because of his research into why some students succeed and others fail, particularly after the Second World War. Attendance at universities in the USA was exceedingly high, with veterans from the war wishing to take part in higher education. He discovered that the difference between those who succeeded and those who did not was not about hard work and their previous educational experience or intelligence, it was the disparity between the skills of problem solving (Doughty, 2006). Then in the 1960s Bloom was to play an influential role in the task force set up at the behest of President Lyndon Johnson's administration to research and develop ways to improve American school education. Bloom's main contribution to this task force was to recommend a programme of compensatory education. This was achieved by apportioning resources to schools in geographical areas with a high ratio of children who were considered to be living in poverty or children who did not have English as their first language. This programme was very much a part of the War Against Poverty campaign which sought to alleviate forms of social and cultural injustice in the United States. His thoughts on these issues and for compensatory educational programmes were set out in *Compensatory Education for Cultural Deprivation*, published with fellow researchers Alison Davis and Robert Hess in 1965 (Husen, 2001).

Bloom's work was internationally recognised, and his career was varied and included teaching and research which helped shape education policy. He wrote or edited eighteen books, and Bloom's taxonomy has been published in twenty-two languages (Forehand, 2010). The main areas he influenced were evaluation, compensatory education and curriculum design. However, for many teachers it is his ideas of taxonomies and mastery learning which are at the forefront. Benjamin Bloom died in 1999.

BLOOM'S TAXONOMIES AND MASTERY LEARNING

As a psychologist who was an expert on educational evaluation and measurement, Bloom produced works that have influenced a host of educational thinkers, particularly regarding education in early childhood. Moreover, his ideas have had an international impact on how we perceive the attainment of learning and in the way that schools are resourced, as well as the way their curricula are designed and organised. This section of the chapter will, rather than being strictly chronological, cover the major developments of his ideas. Firstly, an overview of the cultural and social aspects of Bloom's research will be made to gain an appreciation of what underpinned his ideas on education. Secondly, his taxonomies of learning – cognitive, affective and psychomotor – will be explored. Thirdly, there will be a consideration of his notion of mastery learning. Finally, and briefly, his thoughts on curricula design and organisation will be offered.

Bloom argued strongly that children who were culturally deprived were greatly hampered not only in their education but also in the quality of their lives after formal schooling. This, he thought, was exacerbated by a changing society where economic security was somewhat flimsy – an issue which is arguably reflected in our current times. He contended that where such deprivation affected the most basic of children's needs, such as insufficient rest, shelter and nutrition, there would be little hope of them achieving in school; their priorities would be to satisfy their basic needs rather than take an interest in school learning activities. Bloom censured both the school system and society for not providing children with these fundamental requirements:

That children should struggle to learn under such handicaps [*sic*] should be regarded as a serious indictment of school regulations and community morality. ... If it is the school regulations which are at fault, they must be changed. If it is the lack of food and other provisions, action at the community, state, or national level should be quick and adequate. (Bloom et al., 1965: 10)

It is the cultural environment of the home which Bloom considered significant in the development of children's learning. He found that parents and grandparents from middle-class families were comfortable in talking and reinforcing the learning of language, which put these children at an advantage before starting school and as they progressed in their schooling. Consequently, they were advantaged because they were stimulated by a range of interactions and resources such as toys and games. Equally, his studies demonstrated that children who grew up without this stimulation were intellectually hindered. Nevertheless, on a more optimistic note he found:

... the culturally deprived child's intelligence at one point does not determine the upper limits of what he [*sic*] might be able to learn in the schools if more favorable conditions are subsequently provided in the home and/or the school. (Bloom et al., 1965: 12)

It is with this spirit of hope that he developed his domains of learning and the notion of mastery learning, which have transformed thinking about school curricula and pedagogy.

Bloom became interested in developing educational objectives which could be organised and ordered according to their cognitive complexity. This he argued would enable university examiners to reliably assess students and improve the validity of education practices. The result of this early work was the *Taxonomy of Educational Objectives, Book 1: Cognitive domain* (1956), which Bloom edited. The cognitive taxonomy stated that cognitive functions can be ordered into six progressively more difficult levels. Students needed to achieve at the level which came before to progress to the next higher stage of the taxonomy. Bloom also set out his ideas for a further two domains of learning in this text which were developed later: the affective and psychomotor, each with a hierarchical taxonomy similar to that of the cognitive domain. These taxonomies could be employed to evaluate tasks and offer a method of forming learning objectives (Eisner, 2000). This is accomplished by linking specific

verbs or outcomes in the taxonomies with a level of attainment, which in turn has been helpful to educators in their lesson planning (Forehand, 2010). The cognitive domain taxonomy was concerned with knowledge and information and contained the following six hierarchical levels, from simple to more complex, which students may be asked to perform:

THE COGNITIVE DOMAIN TAXONOMY

- knowledge – facts, recall, categorisation, theories and abstractions
- comprehension – making sense of what things mean and how they relate to each other
- application – applying knowledge to different situations
- analysis – breaking down knowledge into its constituent parts to gain a clearer understanding of the whole
- synthesis – bringing together the separate constituents to create a new whole
- evaluation – reflecting on knowledge and making judgements.

This cognitive domain was followed by the affective domain, which related to matters of attitudes and emotions – particularly important for working with people. This has a taxonomy of five levels:

THE AFFECTIVE DOMAIN TAXONOMY

- receiving – taking messages and responding to stimulus
- responding – taking responsibility by responding to and seeking to find out
- valuing – recognising that something is worth doing
- organising and conceptualising – the individual develops their own way of arranging responses to stimuli and develops particular attitudes based on a set of values
- characterising by value or value concept – bringing together ideas, beliefs and attitudes in a coherent whole.

The third and final domain was the psychomotor domain, which related to the acquisition of practical or physical skills. The purpose of this domain is specifically important for learners in fields such as performing arts and in the vocational subjects of engineering and construction. The psychomotor taxonomy has six levels:

THE PSYCHOMOTOR DOMAIN TAXONOMY

- reflex movements – in response to stimuli
- basic fundamental movements – build upon reflex movements

- perceptual abilities – used to interpret stimuli and behave accordingly
- physical abilities
- skilled movements – involve practice
- non-discursive communication – involves creative and artistic behaviour.

(Huddleston and Unwin, 2002: 125)

With each of these three domains Bloom was seeking to change the behaviour of learners: 'The distinction between the cognitive and the psychomotor domain can be related to the difference between *knowing that* and *knowing how*' (McLay et al., 2010: 83). Though there are criticisms that some teachers employ Bloom's taxonomies mechanistically, there is no doubt that they offer a valuable aid for the planning of lessons, assessments and programmes of study, as well as forming learning objectives, all of which will be explored when this chapter looks at the application of Bloom's work. His work on the domains of learning, particularly the cognitive and affective domains, played a large part in his thinking behind his research into the concept of mastery learning.

MASTERY LEARNING AND THE OBJECTIVES CURRICULUM MODEL

Bloom's idea of mastery learning was influenced by John Carroll's (1963) model of school learning. Bloom set out his thoughts on mastery learning in *Human Characteristics and School Learning* (1976), in which he suggested that mastery of any subject of knowledge is theoretically achievable for almost all learners if they are provided with the pedagogy apposite to their individual needs:

... central to the mastery learning strategies was the development of feedback and corrective procedures at various stages or parts of the learning process ... the key to the success of mastery learning strategies largely lies in the extent to which students can be motivated and helped to correct their learning difficulties at the appropriate points in the learning process. (1976: 5)

Bloom's assertion was that student achievement could be improved by teachers adopting three strategies during the schooling process. Firstly, by finding out, what he called, the cognitive entry behaviour of students – that is, what their level of ability was when given assignments to undertake. After establishing the differences between the learner's actual ability and the ability level required by the school, a differentiated pedagogy is then employed to match these differences. Secondly, by considering the affective entry behaviour it would allow teachers to counter early disappointments in the learning process by using motivating interventions to encourage perseverance, and feedback. The final strategy is to modify the teaching and learning resources to the individual needs and interests of the student (Husen, 2001). In short, mastery learning is a teaching or – as Bloom calls it – an instructional strategy which employs feedback and corrective

activities to bolster achievement. Although the mastery learning process will be further explored later, Guskey briefly outlines the mastery procedure as follows:

... teachers first organize the concepts and skills they want the students to learn into instructional units that typically involve about a week or two of instructional time. Following initial instruction on the unit, teachers administer a brief formative assessment based on the unit's learning goals. Instead of signifying the end of the unit, however, this formative assessment's purpose is to give students information, or feedback, on their learning. (2005: 3)

There are clear connections between Bloom's taxonomies, his notion of mastery learning and the **objectives curriculum model**, which uses aims and objectives which are presented in 'bite-sized pieces' for its simplicity of delivery (Kelly, 2004). The objectives curriculum model is widely used in education; it is often evident in subject-specific curricula and for skills training. It is driven by the needs of assessment, testing attainment, and for modifying learner behaviour. The objectives curriculum model is clearly aligned with mastery learning which employs specific teaching techniques. A large part of the mastery learning concept was the use of formative assessment as a learning strategy 'and then [to] follow those assessments *with feedback and corrective procedure*' (Guskey, 2005: 3, emphasis in original). For mastery learning to be effective, students also need to build their perseverance. Perseverance can be enhanced by frequent recognition of students' success through feedback which is specific to the task at hand. Once students gain mastery for a given task they are more liable to bolster their perseverance for other similar learning undertakings (Bloom, 1968). As we will discover later on in this chapter, Bloom's claims regarding the value of mastery learning may appear a little over-optimistic. Nevertheless, his inclusive approach to learning cannot be faulted, and he championed a non-elitist attitude to learning and achievement: 'Modern societies no longer can content themselves with the *selection of talent*; they must find the means for *developing talent*' (Bloom, 1976: 17).

Bloom's ethos of social justice was also evident in his ideas of curriculum design. Although his work is very closely connected with assessment and test score outcomes, he was very aware that these needed to be seen in light of the differences between resources, time allowed for the study of subjects and quality of learning experiences of the various schools. He felt that an understanding of the different regional environments mattered when trying to make sense of assessment outcomes. Although governments of the USA and UK appear not to have taken much notice of this element of Bloom's thinking, he did, however, have an international impact on the design of school curricula, particularly in nations that traditionally used methods such as rote learning. In 1971 he directed a United Nations Educational, Scientific and Cultural Organization (UNESCO) seminar in Sweden that promoted the inclusion of environmental aspects in curricula design, and included the differences in geographic locations and the adoption of pedagogic and assessment methods that matched national cultures (Eisner, 2000).

LINKS WITH OTHER THEORISTS

Bloom's work on education evaluation, objective setting and the curriculum was influenced by his mentor Ralph Tyler. Bloom was a researcher under Tyler's guidance during the notable 'Eight-Year Study' between 1934 and 1942, in which thirty secondary schools were given the opportunity to follow their own radical curricula and evaluation methods: 'The basic aim of the study was to provide the space needed for schools to function as educational laboratories, a concept first advanced by John Dewey' (Eisner, 2001: 55). As we have already seen, Bloom was further influenced by John Carroll's ideal style of school learning which helped shape his later notions of mastery learning. W.J. Popham, the renowned North American psychologist who was a supporter of education evaluation and the use of behavioural objectives, promoted the use of Bloom's taxonomies for curriculum design (Scott, 2008). John Hattie's empirical research into the effectiveness of learning and teaching methods reflects many of Bloom's ideas of corrective feedback and challenging learners in both the use of mastery learning and the use of hierarchical taxonomies. The process involved in mastery learning has connotations with Barak Rosenshine's principles of instruction. Guy Claxton advances the notion of resilience in the learning process, a similar notion to Bloom's perseverance. Carol Dweck also supported fostering persistence and rewarding effort as major elements in the learning process. His focus on the importance of formative assessment is also linked with Dylan Wiliam. Furthermore, Linda Darling-Hammond's notion of performance assessment is aligned with Bloom's taxonomies, which allows students to demonstrate improvement in the higher stages of learning (Aubrey and Riley, 2021).

Bloom argued that their family, social and cultural backgrounds all have an impact upon children's achievement in school. This is certainly aligned with Bourdieu's views on social reproduction and cultural capital as well as the notion of 'habitus', which Bloom linked with the pre-entry cognition and affective domain levels of children starting in school. These ideas, which argued that culturally deprived children were at a disadvantage when compared with their middle-class peers, were outlined in *Compensatory Education for Cultural Deprivation* (Bloom et al., 1965). Like Vygotsky and Bruner, Bloom stressed the significance of the use of language for learners in their early years:

Most disadvantaged children ... spend less time in direct interaction with their parents than middle-class children do. In addition, the parents in deprived homes usually do not have the skills or the language to effectively use the time they spend with their children to foster the language and cognitive development which will help children in school. (1965: 69)

Furthermore, the role of the family and the environment in nurturing language skills in preparation for schooling was also associated with Basil Bernstein and the ecological theory of Urie Bronfenbrenner, who we will encounter again in Chapter 10.

Bronfenbrenner, with possibly the same degree of optimism as Bloom, argued that the role of the parent could have a great impact on altering their child's learning before school and during their schooling (Bloom, 1981). Such optimism, however, is underpinned by a realisation that children require their basic human needs to be met before they can perform at higher-level cognitive tasks. Like Maslow, Bloom felt that teachers, and indeed schools and society, should ensure that a child's basic human needs of food, shelter and safety should be met before learners could start to reach their ultimate goal of self-actualisation.

CRITIQUING BLOOM

Criticisms of Bloom's work generally focus on his over-optimistic inclusive stance on child development and the perceived predetermined and mechanistic nature of taxonomies and mastery learning. His ideas on compensatory learning which brought 'deprived' children up to the entry level standard at school, although laudable from a social justice viewpoint, are a somewhat hopeful aspiration rather than a practical proposition. Although Bloom's differentiated and progressive notion is evident in some initiatives in schools today, such as personal learning and assessment for learning, the idea of individual children having time to have formative learning, teaching and assessment so they can all achieve in an already crowded curriculum is not a practical option. This is particularly the case in a school system which is becoming more competitive and reverting to a culture of summative assessment with end-of-year examinations.

Bloom's concept of using taxonomies to develop learning in the three domains of cognition, affection and psychomotor is based on the idea that hierarchical objectives will change behaviour. This, some would argue, places too much stress on rigid outcomes, which in turn can lead to a perilously restricted and mechanistic manner of learning (Huddleston and Unwin, 2002; McLay et al., 2010). Furthermore, the linear and hierarchical nature of the taxonomies does not mirror the truth of the real-life learning process. The taxonomies suppose that learning is linear and a step-by-step system, but in reality this is not appropriate for learning in schools. 'We do not acquire knowledge and then, at some later stage, attain understanding; the two must go hand in hand' (Kelly, 2004: 64). There is also a philosophical criticism of the meaning of the words used in the hierarchical taxonomies. For example, 'knowledge' could mean a number of things to a number of people, and 'how do we know that we know something[?]' (Matheson, 2008: 3). In an effort to be clearer about what is meant by words used in the taxonomies, there is a natural tendency (and a dilemma) to be more prescriptive and detailed in framing the objectives so the outcomes of the learning can be assessed – which returns again to the criticism of a restricted and mechanistic approach to learning and teaching. Kelly (2004) argues that the objectives curriculum model aims to modify students' behaviour without giving any leeway to their own wishes or interests. Such moulding of behaviour, he contests,

... is indoctrination rather than education and thus to be deplored ... [and] ... is endemic to all forms of instrumentation in educational planning. This model, then, must be recognized as fundamentally at odds with the notion of education for emancipation or empowerment. (2004: 61)

Another criticism is that Bloom's taxonomies first saw light nearly seventy years ago at a time of optimism after the Second World War. Since then many progressive cultural and social changes have taken place. Doughty contends that the taxonomies are now obsolete, and that they are 'a thoroughly deceased old horse that needs no additional flogging' (2006: 16).

As we have seen, mastery learning is effective in that it can allow – time and resourcing permitting – for slower learners to achieve the same level as faster learners. Furthermore, mastery learning has a positive effect on the levels of learner persistence, motivation and self-esteem. Nevertheless, mastery learning has been censured because overuse, and a narrow application of mastery learning methods, could lead teachers 'to teach to the test'. Stenhouse also contests that mastery learning is 'predictive of the rate at which they [the students] can learn rather than the possible level of achievement' (1975: 64). It is further argued that some of the more important developmental outcomes of the affected domain are very difficult to measure, such as valuing, showing sympathy and awareness. So perhaps the notion of mastery learning is flawed when it comes to the deeper, developmental and creative nature of learning. Moreover, mastery learning in practice takes a huge amount of time and groundwork to prepare resources, plan sessions, organise the classroom environment, and give corrective summative feedback to learners (O'Donnell, 2007). Unfortunately, despite the best intentions, not all teachers are afforded such conditions (Petty, 1998). Even Bloom questions whether mastery learning is worth the effort for the students if it takes several years, and admits that the biggest problem is finding approaches which reduce the time for the slower students to achieve (Bloom, 1968).

However, in spite of these criticisms teachers can take a great deal from Bloom's work and apply this to their classroom practice. Indeed, Howard Doughty, in his critical article, considers that 'Benjamin Bloom had an important and perhaps transformative effect upon education from elementary schools through postgraduate programs' (2006: 3).

APPLYING BLOOM IN THE CLASSROOM

Bloom's positive outlook regarding learning and development for the majority of children centred on the significance of an encouraging learning environment and the role and value of the teaching within it:

Who can learn in schools is determined to a large extent by the conditions in the school; the quality of instruction is a major determiner of who will learn well – *the few or the many*. (1976: 138, emphasis in original)

To begin with Bloom considered his taxonomies as not just a means to assess pupils' learning. He saw the three domains as providing a conventional set of terms which could be used by all teachers (and recognised by learners) in challenging learners from easier to more developmental tasks. These taxonomical terms could be used in setting learning objectives and employed in short-term planning for lessons and medium- and long-term planning such as schemes of work. Furthermore, they could be used for tasks which teachers do on a day-to-day basis, such as setting differentiated learning activities, questions and answers, and providing formative and corrective feedback. The taxonomies, and the use of intended objectives, continue to be popular with curriculum planners as they help form levels of attainment in linear and hierarchical small staged phases; this is certainly well established in the National Curriculum for England and Wales, as well as in the curricula for further and higher education (Kelly, 2004). However, for the most part the taxonomies provide an excellent basis for a developmental learning framework and the setting of objectives to be used in the planning, teaching and assessment activities mentioned. Many writers have given suggestions for learning objectives for each of the domains. Here are some offered by Petty (1998: 347).

THE COGNITIVE DOMAIN TAXONOMY

- Knowledge: To be able to: state; recall; list; recognise; select; reproduce ...
- Comprehension: To be able to: explain; describe reasons for; identify causes of ...
- Application: To be able to: use; apply; construct; solve; select ...
- Analysis: To be able to: break down; list component parts of; compare and contrast; differentiate between ...
- Synthesis: To be able to: summarise; generalise; argue; organise; design; explain the reason for ...
- Evaluate: To be able to: judge; evaluate; give arguments for and against; criticise ...

THE AFFECTIVE DOMAIN

- To listen to ... to appreciate the importance of ...
- To have an awareness of ... to respond with personal feelings ...
- To have an aesthetic appreciation of ... to have a commitment towards ...
- To recognise the moral dilemmas involved in ...

THE PSYCHOMOTOR DOMAIN

- To plane; to draw; to throw; to weld ...

The taxonomies, particularly the cognitive domain, have been sequenced with the easiest first, starting with knowledge and ending with evaluation as the most complex.

Petty (2009) suggests that the cognitive domain is divided into two categories of tasks: reproductive tasks and reasoning tasks. Reproductive tasks (knowledge, comprehension and application) require low cognitive effort, while reasoning tasks (analysis, synthesis and evaluation) involve a deeper learning experience for the student. Reproductive tasks are those which are given directly to the student by the teacher, such as copying or recounting information. With reasoning tasks, on the other hand, 'the student must process and apply what they have learned, linking it with existing learning and experience' (Petty, 2009: 14). It is crucial that the more developmental and harder objectives (reasoning tasks) are also used in teaching, otherwise the criticism of the taxonomies being mechanistic becomes a reality and the learners will not develop their deep learning. So, the taxonomies give teachers a framework to check that their planning and teaching actually help progress children's learning. The three different domains should be used accordingly. For example, practical and skill-based sessions should employ the psychomotor domain, group projects and activities the affective domain, and classroom-based sessions the cognitive domain. Perhaps more importantly, all three could be used over a range of activities for the same subject matter – cognitive for the introduction of the subject and linking to previous learning, leading into the affective domain for group work in preparation for the psychomotor domain to practise and hone their skills, then back to the cognitive domain to make sense of and evaluate their learning.

Therefore, what is of note here is that although Bloom distinguished between the different domains, he did indicate that one domain influences the learning of the next domain and, as such, the learner develops as a whole. For example, the cognitive domain leads into the affective domain, which in turn leads into the psychomotor domain. As the pupil gains knowledge of their subject, their behaviour and awareness develop, which allows them to use and value the skills attained (Huddleston and Unwin, 2002). All of these activities range from the easier to the higher-order challenging outcomes of learning. Neary argues that, particularly in experienced-based programmes, all three domains – cognitive, affective and psychomotor – should be integrated in order that the student 'can recognise the relationship between thinking, feeling and doing' (Neary, 2002: 141). Bloom's taxonomies also offer the chance to differentiate teaching to help reach the pupils who require more time to learn, so they 'can feel secure but stretched' (Williams, 2004: 11). Differentiation, and the use of feedback as a corrective tool are both key aspects of Bloom's mastery learning.

There are two aspects of teaching where differentiation and challenge can be very effective. The first is by the use of questions during lessons. These should be from the easier (using the verbs given above to ascertain knowledge and understanding) to the more developmental (to ascertain analysis, synthesis and evaluation) in the cognitive domain. The teacher, knowing the pupil, will be able to challenge them to help them develop. During this process what is important is how the teacher responds to the answers given by the pupils. As such, feedback to answers needs to be corrective for the future but also encouraging in its nature. The second aspect is

the use of these encouraging and developmental comments in formative feedback on pupils' written work. Written feedback which is corrective, encouraging and allows time to achieve is central to Bloom's inclusive approach to teaching and education in general.

The uses of differentiated questioning and formative feedback are, as previously mentioned, recent examples of initiatives such as personalised learning and assessment for learning. Such personalised methods, as we discovered in the previous section of this chapter, take time, but it is argued that they are well worth the effort and with collaborative planning and sharing of practice are achievable activities. Moreover, apart from the advantage to the individual pupils, Bloom contests that the use of formative assessment and feedback (based on the use of objectives formed from the taxonomies) allows the teacher to discover what elements of the lesson the pupils as a group learned well and what elements were not so successfully learned (Bloom, 1981).

It is this appreciation of what went well and what not so well that gives teachers the opportunity to reflect on and evaluate their practice. This reflection and evaluation has two purposes. The first is about evaluating the outcomes of pupils' work and ensuring that the formative feedback is both informative by giving direction for further improvement and encouraging to help motivate further engagement in the learning process. The second purpose of the reflection and evaluation is of a more personal and professional nature, in that it gives teachers a chance to see where they can improve their planning, assessment and teaching and hence further progress the pupils' learning (Kyriacou, 2012).

MASTERY LEARNING PROCESS

In practice, mastery learning is a quite structured, and possibly mechanistic, process which is based upon students achieving the set objectives from the taxonomies. Bloom suggests that the learning takes place in linear units of 'instruction' which take one or two weeks to complete. Firstly, students are taught the content of the unit, then teachers set a short formative assessment from the unit's learning objectives. The outcome of this formative assessment is to give the students feedback on their individual learning and what is needed for them to improve. Along with this feedback are certain differentiated corrective activities for each student so they can be successful in achieving the unit's learning outcomes. Corrective activities incorporate alternative learning resources including reading, and the use of prompts. As can be seen in Figure 6.1, following unit one formative assessment, the outcomes can either feed into enrichment activities or be used to inform corrective activities. When students complete the corrective activities, they undertake a second round of formative assessment to address the same learning objectives but using different tasks and questions. The aim of this second formative assessment is to give students a second chance of success. There will be students, however, who will succeed in their first formative assessment

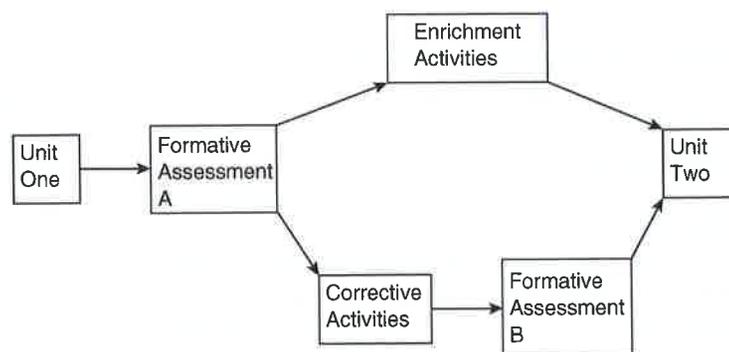


Figure 6.1 The mastery learning (linear) process

(Adapted from Guskey, 2005)

after the initial taught session and have no need to complete a second assessment – these are offered enrichment activities instead to give their learning greater breadth. Bloom suggests these enrichment activities are chosen by individual students and would include further problem-solving tasks and group project work. Once all have succeeded in the assessment (those who undertake either one or two assessments) then they are allowed to pass on to the next linear unit (Guskey, 2005).

Although Bloom's ideas appear inclusive, valid, well-meant and practical in terms of teaching and assessment, their application should be considered with a slight element of caution. The criticisms – for example, of the mechanistic dangers of teaching to predetermined hierarchical objectives and the possibility of an over-reliance on mastery learning – are valid. However, with a degree of flexibility, and individualised and negotiated planning, Bloom's ideas can lead to a progressive and deep learning experience for pupils and avoid the pitfalls of the aforementioned criticisms.

OVERVIEW OF APPLICATION: BLOOM'S TAXONOMIES AND MASTERY LEARNING – IDEAS FOR CLASSROOM PRACTICE

There are a number of ideas mentioned above in applying Bloom's thinking in practice. Here, we have condensed these into some points for you to consider for planning, teaching and assessment. Perhaps you can think of some other ideas yourself, or from discussions with others, which would be pertinent to Bloom's work.

(Continued)

- Use taxonomies developmentally when setting learning outcomes (objectives), from easier to more complex in your lesson plans or in the longer-term schemes of work.
- Many teachers start lessons which cover developing subject knowledge with the easier learning outcomes to refresh recall from previous lessons and to then link with the new information.
- Endeavour to employ all three domains where possible. This is particularly important in experience-based and vocational programmes.
- Use differentiation, informed by each learner's previous achievement, for the setting of tasks and in giving feedback.
- Reflect on the outcomes of formative assessment to enhance the developmental nature of feedback given to individual students, and also to evaluate your teaching/assessment practice for the future.
- Set enrichment activities which are specific, purposeful and challenge students' learning.

SUMMARY

As a psychologist, Bloom has had a significant impact on the development of education as a whole. This impact was driven by his research experiences in countries such as India and Israel, as well as his idealistic yet optimistic desire for all children to have equal access to quality education systems regardless of their social background. His early work was mainly concerned with evaluation and assessment matters; his seminal ideas emanated from these studies. He held a number of prestigious educational and research positions. He was also at the forefront in campaigns such as the War Against Poverty in the United States, which explored ways of developing educational programmes to tackle the growing learning barriers for those children and families perceived to be educationally and culturally disadvantaged.

His initial interest came from helping universities become more confident and secure in their assessment practices, which would then enable them to evaluate the teaching and learning practices they employed. As a consequence of this interest, and by being influenced by Ralph Tyler, Bloom initially developed and produced two taxonomies of learning objectives. The first two domains were the cognitive and the affective domains. A third taxonomy for the psychomotor domain was added later. The original notion was that these taxonomies could be employed to ensure a focus on the assessment tasks of programmes and avoid students just memorising facts. However, the taxonomies became a widely used means for teachers to formulate behavioural learning objectives, plan and develop lessons and even programmes of learning. They could also be used to challenge learners and differentiate teaching methods. The use of

Bloom's taxonomies is widespread in many sectors of education. However, their function is not without some criticism, in that if the taxonomies were rigidly applied this could lead to a mechanistic approach to learning.

Bloom is also renowned for his concept of mastery learning, which emerged from the work of John Carroll, his optimism and his work on developing the taxonomies. This notion argued that almost all children can master any subject of knowledge given the time to do so and if they are provided with the appropriate pedagogy, and resources, which meet their individual needs. This is, to some thinkers, a worthy and inclusive idea and one which has the support of a number of other like-minded educational thinkers such as Barak Rosenshine and John Hattie. Nonetheless, his ideas have attracted forthright criticism. For example, his taxonomies were considered to be linear and hierarchical which do not reflect the truth of real-life learning. The curriculum model objectives endeavour to shape students' behaviour without taking into consideration their own aspirations or interests. The practical implications of time and resources needed in order for mastery learning to work, for all children, would indicate that it is a difficult outcome to achieve; there is also a danger that mastery learning could lead teachers 'to teach to the test'. Furthermore, his work is also quite dated and no longer fit for purpose in the twenty-first century.

What is important is that Bloom has left a functional set of ideas in his taxonomies, the use of the objectives curriculum model, and his notion of mastery learning which have been of benefit to numerous teachers who have applied these to their practice. He has also been a campaigner for children and communities perceived to be educationally deprived in the United States and internationally. But what is more noteworthy is that his ideas, driven by his deep belief in social justice, have advantaged numerous young people in accessing learning.

GLOSSARY OF TERMS

Affective domain

The area of learning relating to feelings, emotions and behaviours.

Bloom's taxonomies

These are classifications of behavioural learning objectives into the three domains – cognitive, affective and psychomotor – and each domain has a list of hierarchical learning objectives which are categorised according to their level of complexity.

Cognitive domain

The area of learning concerned with intellectual ability, such as knowledge and thinking skills.

Mastery learning

Mastery learning is more than just the recall of facts, it is the acquisition of the principles of the skills and knowledge of any given subject. Given enough time, appropriate pedagogy and resources all children can theoretically achieve subject mastery.

Objectives curriculum model

This is focused on learners attaining a prescribed set of learning objectives, and is usually used in subject-specific curricula and concentrates on the training of skills and on modifying learner behaviour. The model is aligned with prescribed and set instructional techniques which are firmly related to assessment and the testing of student attainment.

Psychomotor domain

The area of learning relating to the acquisition of practical or physical skills.

FURTHER READING

Bloom, B. (1964) *Stability and Change in Human Characteristics*. New York: John Wiley & Sons.

This quantitative work explores how variations in the environment affect human characteristics such as physique, intelligence, interests, attitudes and personality.

Bloom, B., Hastings, J. and Madaus, G. (eds) (1971) *Handbook on Formative and Summative Evaluation of Student Learning*. New York: McGraw-Hill.

A comprehensive practical textbook for teachers regarding the evaluation of student learning. It covers both general processes of evaluation techniques and teaching, as well as how those techniques can be applied to specific subject areas.

Dixon, L., Harvey, J., Thompson, R. and Williamson, S. (2010) Practical teaching. In: Avis, J., Fisher, R. and Thompson, R. (eds) *Teaching in Lifelong Learning: A guide to theory and practice*. Maidenhead: Open University Press.

This chapter contains some practical ideas for the setting of general and specific learning objectives in lesson planning to enhance learner challenge and differentiation.

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